

SECTION EC6

ENGINE CONTROL SYSTEM [GASOLINE ENGINE (V-6)]

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HOW TO USE THIS MANUAL

APPLICATION NOTICE

Information

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Check the vehicle type (Refer to [GI-35, "Model Variation"](#)) to confirm the service information in EC section.

Service information	System
Turbo high pressure models	<ul style="list-style-type: none"> • With turbocharger speed sensor • 2 electric water pump
Turbo low pressure models	<ul style="list-style-type: none"> • Without turbocharger speed sensor • 1 electric water pump

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PRECAUTION

PRECAUTIONS

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

INFOID:000000013592669

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, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, 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:

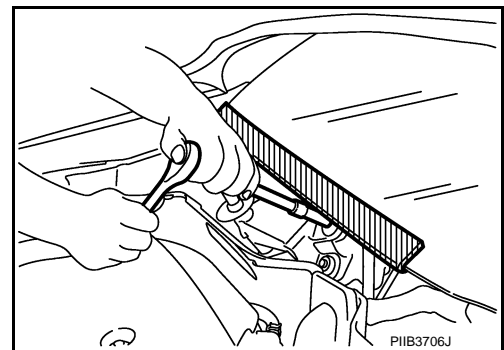
Always observe the following items for preventing accidental activation.

- 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 or batteries, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

INFOID:000000013592677

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



Precautions for Removing Battery Terminal

INFOID:000000013592699

When disconnecting the battery terminal, pay attention to the following.

- Always use a 12V battery as power source.
- Never disconnect battery terminal while engine is running.

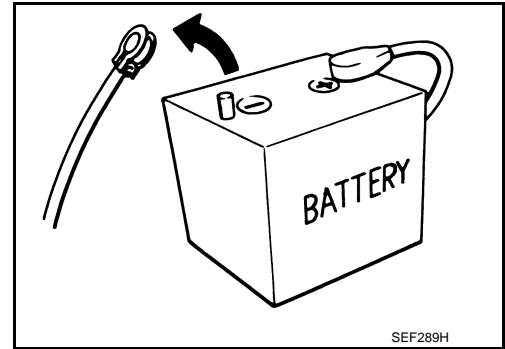
PRECAUTIONS

[VR30DDTT FOR USA AND CANADA]

< PRECAUTION >

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
- For vehicles with the engine listed below, remove the battery terminal after a lapse of the specified time:

BR08DE	: 4 minutes	V9X engine	: 4 minutes
D4D engine	: 20 minutes	YD25DDTi	: 2 minutes
HR09DET	: 12 minutes	YS23DDT	: 4 minutes
HRA2DDT	: 12 minutes	YS23DDTT	: 4 minutes
K9K engine	: 4 minutes	ZD30DDTi	: 60 seconds
M9R engine	: 4 minutes	ZD30DDTT	: 60 seconds
R9M engine	: 4 minutes		



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NOTE:

ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- After high-load driving, if the vehicle is equipped with the V9X engine, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery terminal.

NOTE:

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

NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

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

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

INFOID:0000000013591368

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

CAUTION:

- **Always turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to illuminate.**
- **Always connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to illuminate due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-8, "VR30DDTT : Harness Connector"](#).**
- **Always route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.**
- **Always connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Always erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

PRECAUTIONS

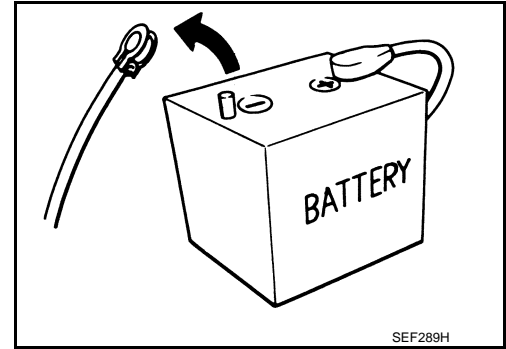
[VR30DDTT FOR USA AND CANADA]

< PRECAUTION >

INFOID:000000013591369

General Precautions

- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.

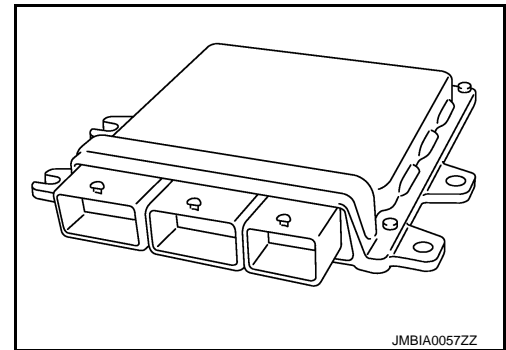


- Never disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.

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

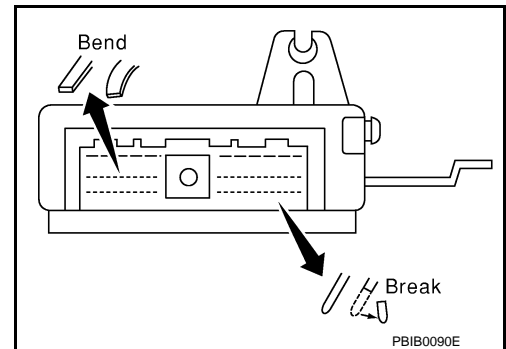


- When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- 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.

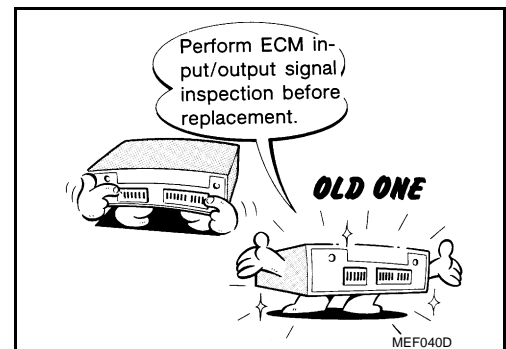
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.



- 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 [EC6-131, "TURBO HIGH PRESSURE MODEL : Reference Value"](#) (For turbo high pressure model) or [EC6-172, "TURBO LOW PRESSURE MODEL : Reference Value"](#) (For turbo low pressure model).

- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor, crankshaft position sensor.

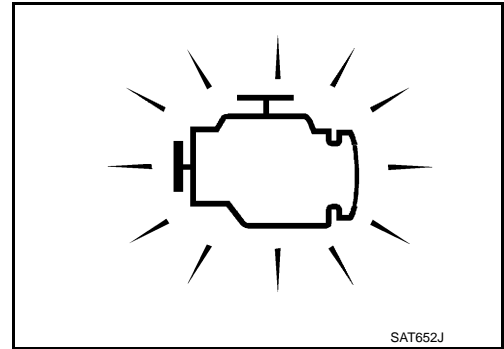


PRECAUTIONS

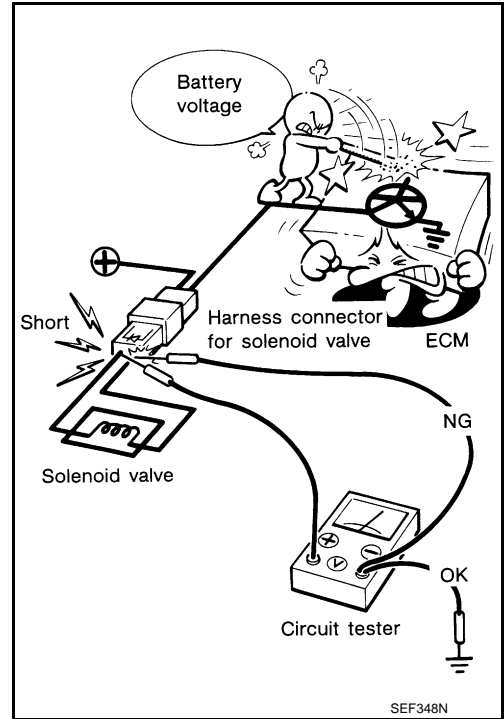
[VR30DDTT FOR USA AND CANADA]

< PRECAUTION >

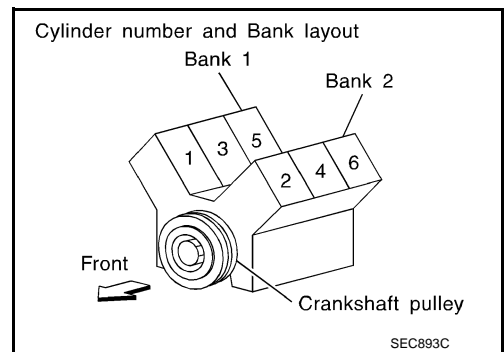
- After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



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



- B1 indicates bank 1, B2 indicates bank 2 as shown in the figure.
- Never operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



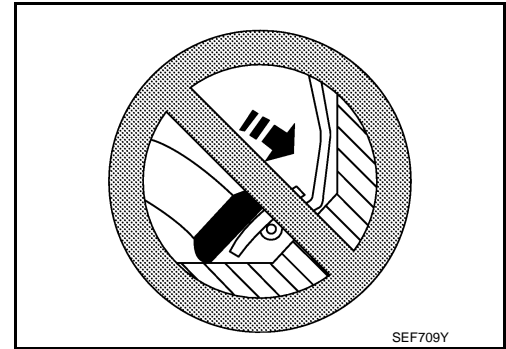
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PRECAUTIONS

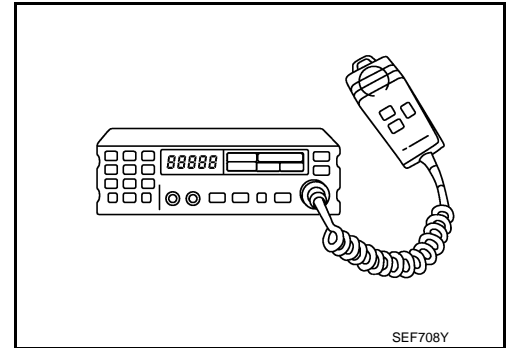
< PRECAUTION >

[VR30DDTT FOR USA AND CANADA]

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



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
 - Keep the antenna as far as possible from the electronic control units.
 - Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Never let them run parallel for a long distance.
 - Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - Be sure to ground the radio to vehicle body.



PREPARATION

< PREPARATION >

[VR30DDTT FOR USA AND CANADA]

PREPARATION

PREPARATION

Special Service Tools

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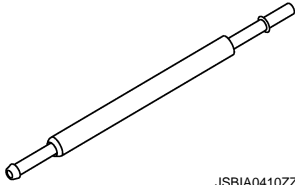
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NOTE:

The actual shapes of TechMate tools may differ from those of special service tools illustrated here.

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Tool number (TechMate No.) Tool name	Description
KV10120000 Fuel tube adapter  <p style="text-align: center;">JSBIA0410ZZ</p>	Measuring fuel pressure

D

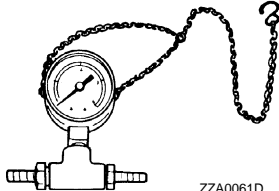

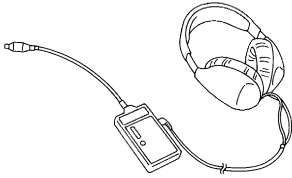
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Commercial Service Tools

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Tool name (TechMate No.)	Description
Pressure gauge  <p style="text-align: center;">ZZA0061D</p>	Checking fuel pressure
Quick connector re- lease  <p style="text-align: center;">PBIC0198E</p>	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Parts No. 16441 6N210)
Leak detector i.e.: (J-41416)  <p style="text-align: center;">S-NT703</p>	Locates the EVAP leak

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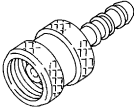
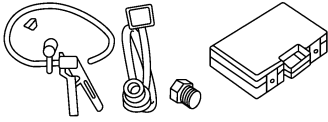
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PREPARATION

< PREPARATION >

[VR30DDTT FOR USA AND CANADA]

Tool name (TechMate No.)	Description
<p>EVAP service port adapter i.e.: (J-41413-OBD)</p>  <p>S-NT704</p>	<p>Applies positive pressure through EVAP service port</p>
<p>Fuel filler cap adapter i.e.: (J-42909)</p>  <p>ALBIA1353ZZ</p>	<p>Checks fuel tank vacuum relief valve opening pressure</p>

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

SYSTEM DESCRIPTION

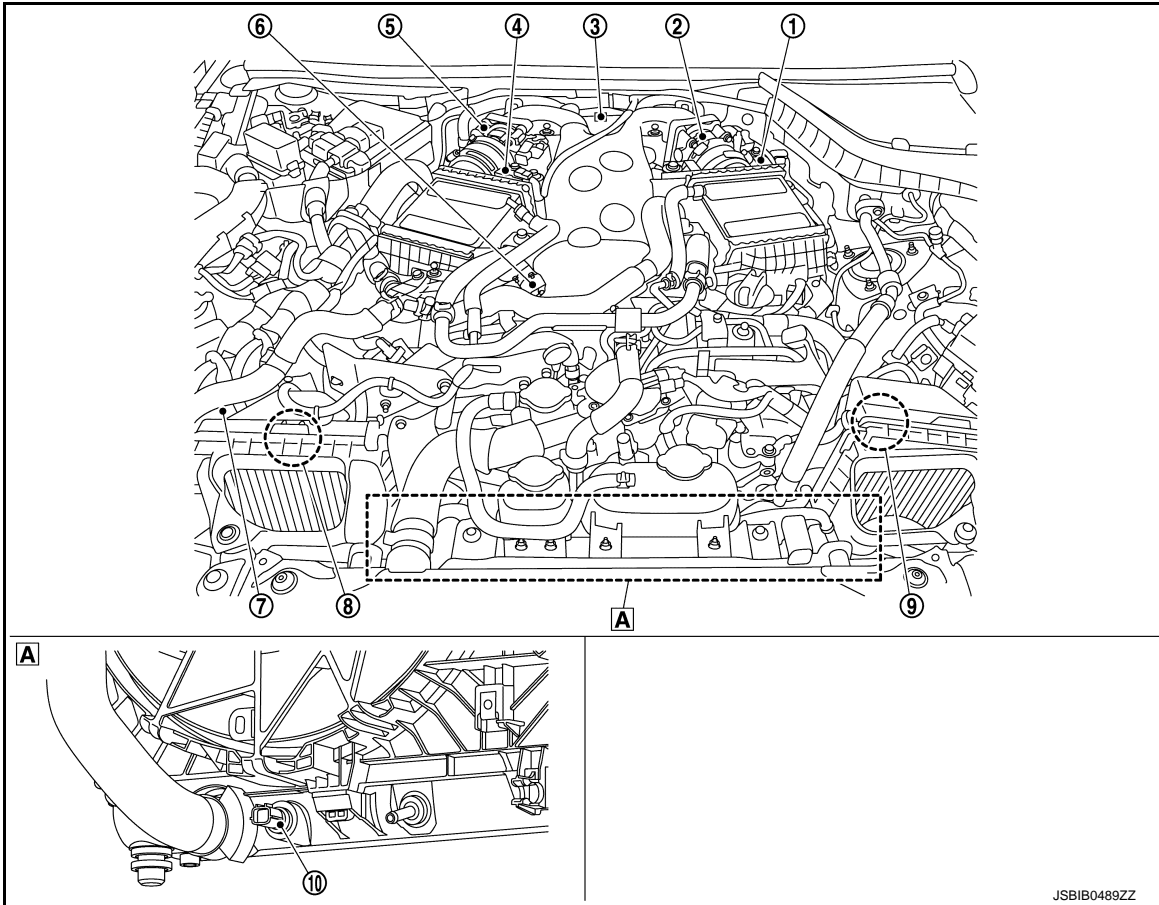
COMPONENT PARTS

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

INFOID:000000013591372

Engine Room Component



A Radiator lower side

No.	Component	Function
①	Turbocharger boost sensor (bank 2)	EC6-53. "Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)"
②	Electric throttle control actuator (bank 2)	EC6-43. "Electric Throttle Control Actuator"
③	EVAP canister purge volume control solenoid valve	EC6-46. "EVAP Canister Purge Volume Control Solenoid Valve"
④	Turbocharger boost sensor (bank 1)	EC6-53. "Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)"
⑤	Electric throttle control actuator (bank 1)	EC6-43. "Electric Throttle Control Actuator"
⑥	Manifold absolute pressure sensor	EC6-51. "Manifold Absolute Pressure Sensor"
⑦	ECM (with barometric pressure sensor)	EC6-42. "ECM (With Barometric Pressure Sensor)"
⑧	Mass air flow sensor (with intake air temperature sensor) (bank 1)	EC6-51. "Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)"

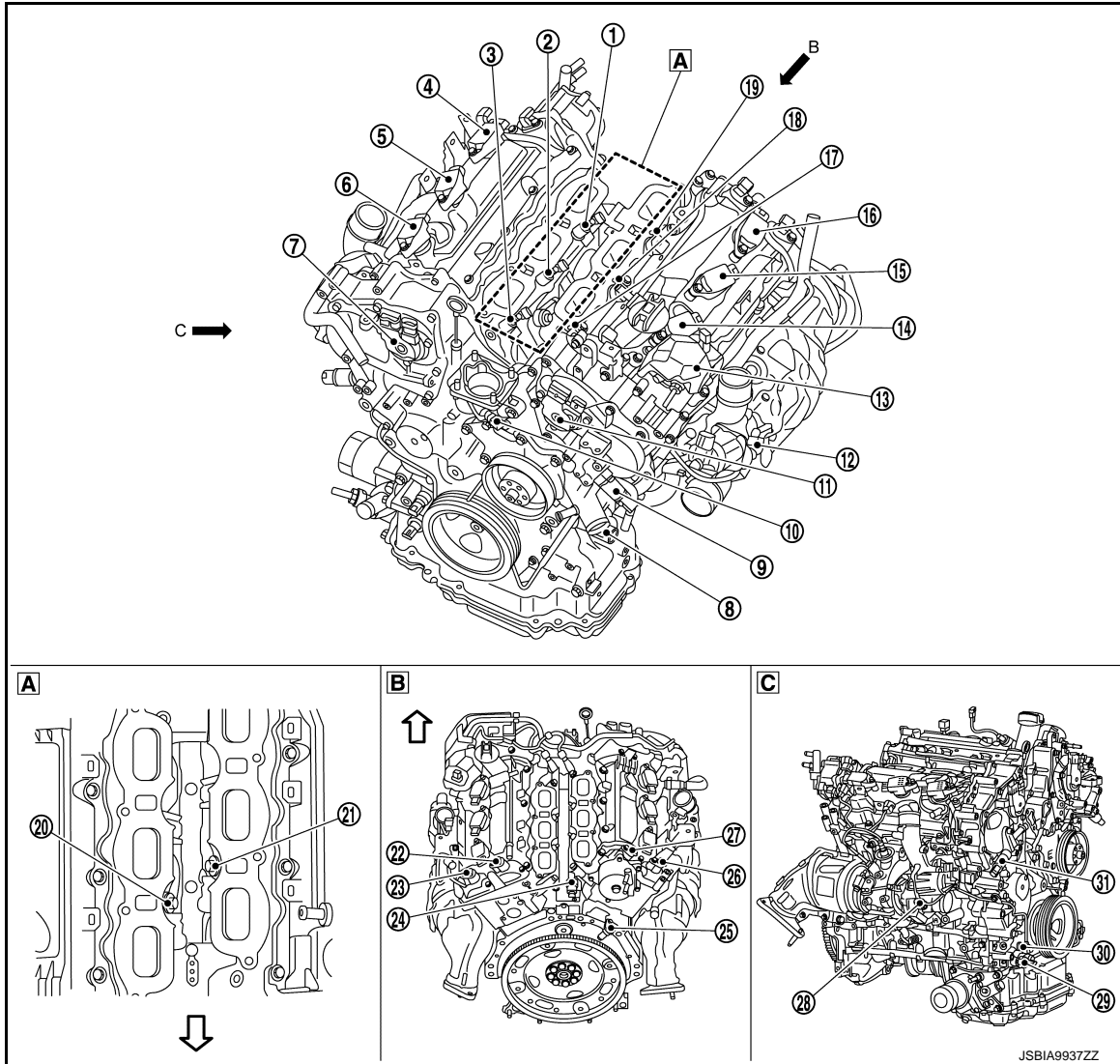
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

No.	Component	Function
⑨	Mass air flow sensor (bank 2)	EC6-51, "Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)"
⑩	Engine coolant temperature sensor 2	EC6-44, "Engine Coolant Temperature Sensor 2"

Engine Assembly Component



Top view of the engine

A (view with intake manifold is removed)

B Rear view of the engine

C Side view of the engine

← Engine front

No.	Component	Function
①	Fuel injector (No.5 cylinder)	EC6-47, "Fuel Injector"
②	Fuel injector (No.3 cylinder)	
③	Fuel injector (No.1 cylinder)	

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

No.	Component	Function
④	Ignition coil (with power transistor) and spark plug (No.5 cylinder)	EC6-50. "Ignition Coil and Spark Plug"
⑤	Ignition coil (with power transistor) and spark plug (No.3 cylinder)	
⑥	Ignition coil (with power transistor) and spark plug (No.1 cylinder)	
⑦	Electric intake valve timing control actuator (bank 1)	EC6-43. "Electric Intake Valve Timing Control Actuator"
⑧	Engine oil pressure control solenoid valve	EC6-45. "Engine Oil Pressure Control Solenoid Valve"
⑨	Exhaust valve timing control solenoid valve (bank 2)	EC6-47. "Exhaust Valve Timing Control Solenoid Valve"
⑩	Engine coolant temperature sensor 1	EC6-44. "Engine Coolant Temperature Sensor 1"
⑪	Electric intake valve timing control actuator (bank 2)	EC6-43. "Electric Intake Valve Timing Control Actuator"
⑫	Turbocharger speed sensor (bank 2)*	EC6-54. "Turbocharger Speed Sensor"
⑬	High pressure fuel pump	EC6-49. "High Pressure Fuel Pump"
⑭	Ignition coil (with power transistor) and spark plug (No.2 cylinder)	EC6-50. "Ignition Coil and Spark Plug"
⑮	Ignition coil (with power transistor) and spark plug (No.4 cylinder)	
⑯	Ignition coil (with power transistor) and spark plug (No.6 cylinder)	
⑰	Fuel injector (No.2 cylinder)	EC6-47. "Fuel Injector"
⑱	Fuel injector (No.4 cylinder)	
⑲	Fuel injector (No.6 cylinder)	
⑳	Knock sensor (bank 1)	EC6-51. "Knock Sensor"
㉑	Knock sensor (bank 2)	
㉒	Intake camshaft position sensor (bank 2)	EC6-50. "Intake Camshaft Position Sensor"
㉓	Exhaust camshaft position sensor (bank 2)	EC6-46. "Exhaust Camshaft Position Sensor"
㉔	Fuel rail pressure sensor	EC6-48. "Fuel Rail Pressure Sensor"
㉕	Crankshaft position sensor	EC6-42. "Crankshaft Position Sensor"
㉖	Exhaust camshaft position sensor (bank 1)	EC6-46. "Exhaust Camshaft Position Sensor"
㉗	Intake camshaft position sensor (bank 1)	EC6-50. "Intake Camshaft Position Sensor"
㉘	Turbocharger speed sensor (bank 1)*	EC6-54. "Turbocharger Speed Sensor"
㉙	Engine oil pressure sensor	EC6-45. "Engine Oil Pressure Sensor"
㉚	Engine oil temperature sensor	EC6-46. "Exhaust Camshaft Position Sensor"
㉛	Exhaust valve timing control solenoid valve (bank 1)	EC6-47. "Exhaust Valve Timing Control Solenoid Valve"

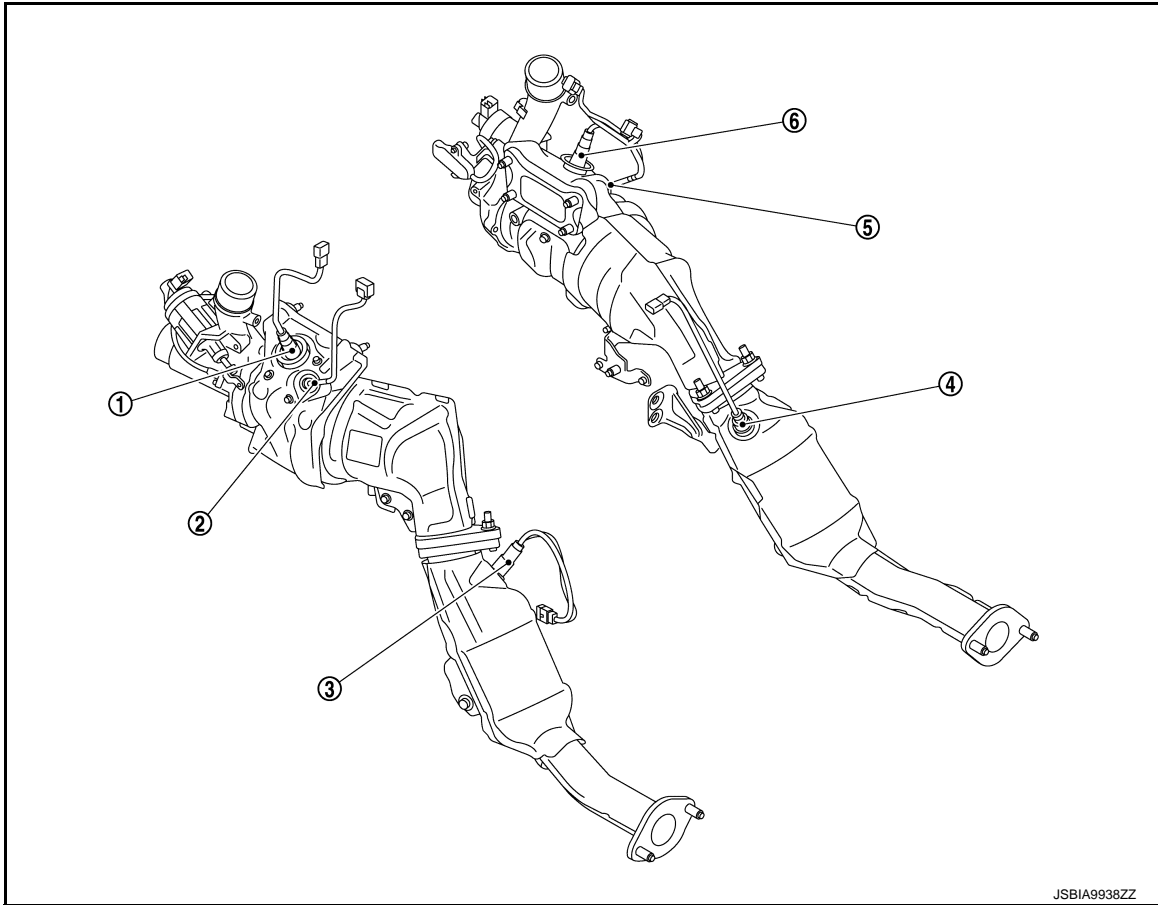
*: For turbo high pressure model

Exhaust System Component

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]



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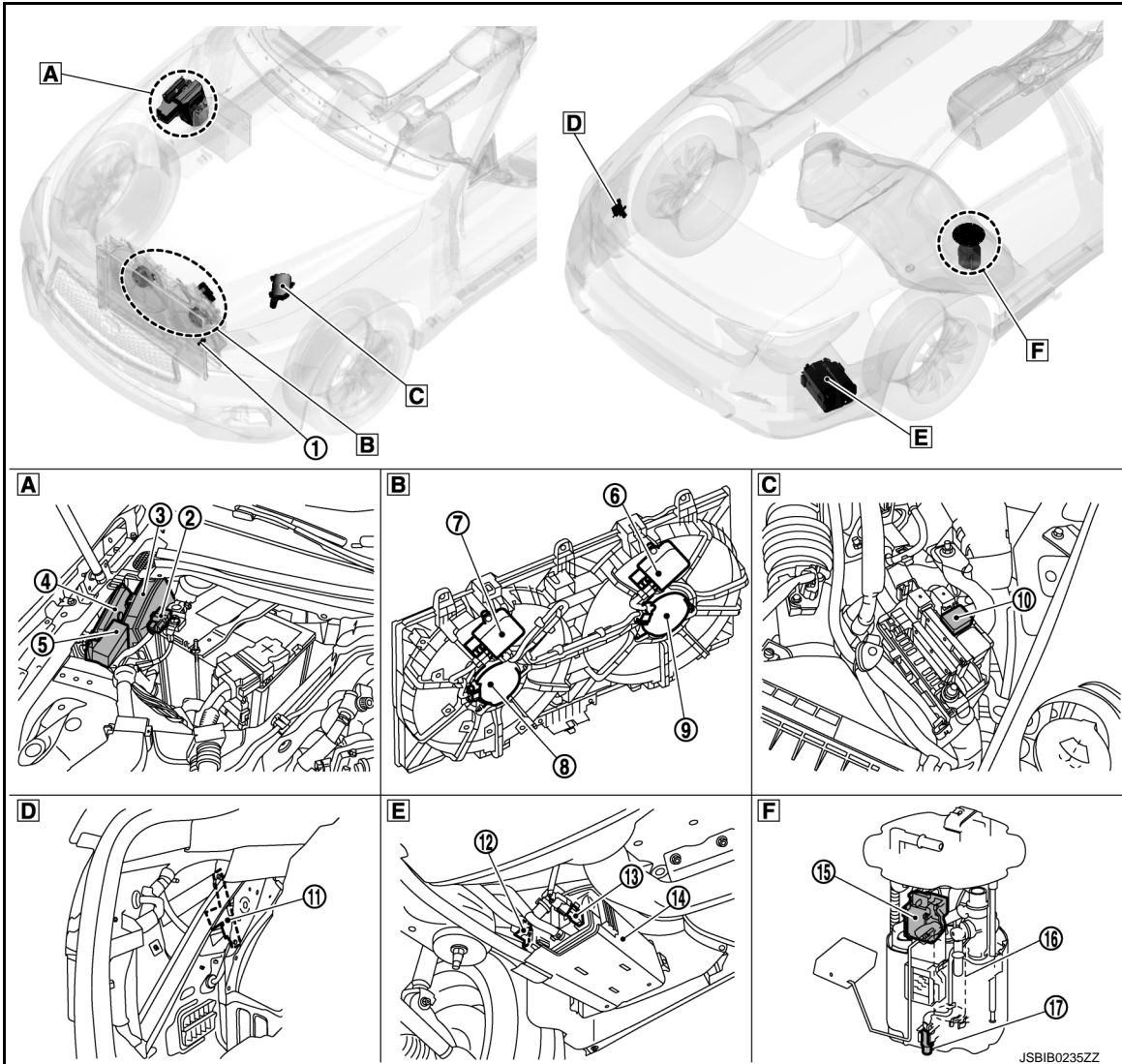
No.	Component	Function
①	Air fuel ratio (A/F) sensor 1 (bank 2)	EC6-40. "Air Fuel Ratio (A/F) Sensor 1"
②	Exhaust gas temperature sensor (bank 2)	EC6-47. "Exhaust Gas Temperature Sensor"
③	Heated oxygen sensor 2 (bank 2)	EC6-49. "Heated Oxygen Sensor 2"
④	Heated oxygen sensor 2 (bank 1)	
⑤	Exhaust gas temperature sensor (bank 1)	EC6-47. "Exhaust Gas Temperature Sensor"
⑥	Air fuel ratio (A/F) sensor 1 (bank 1)	EC6-40. "Air Fuel Ratio (A/F) Sensor 1"

Vehicle Compartment

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]



- A** Around the battery **B** Around the radiator **C** Fuse and fusible link block
D Left side of trunk room **E** Right side of main muffler **F** Rear seat (lower right)

No.	Component	Function
①	Refrigerant pressure sensor	EC6-52. "Refrigerant Pressure Sensor"
②	Battery current sensor (with battery temperature sensor)	EC6-40. "Battery Current Sensor (With Battery Temperature Sensor)"
③	IPDM E/R	IPDM E/R controls the internal relays and the actuators. When CAN communication with ECM is impossible, IPDM E/R performs fail-safe control. <ul style="list-style-type: none"> • PCS-6. "RELAY CONTROL SYSTEM : System Description" • PCS-24. "Fail-safe" • PCS-9. "POWER CONTROL SYSTEM : System Description"
④	Electric intake valve timing control module	EC6-43. "Electric Intake Valve Timing Control Actuator"
⑤	Cooling fan relay 2*	EC6-42. "Cooling Fan"
⑥	Cooling fan control module 2*	EC6-42. "Cooling Fan"
⑦	Cooling fan control module 1	EC6-42. "Cooling Fan"
⑧	Cooling fan motor-1	EC6-42. "Cooling Fan"

COMPONENT PARTS

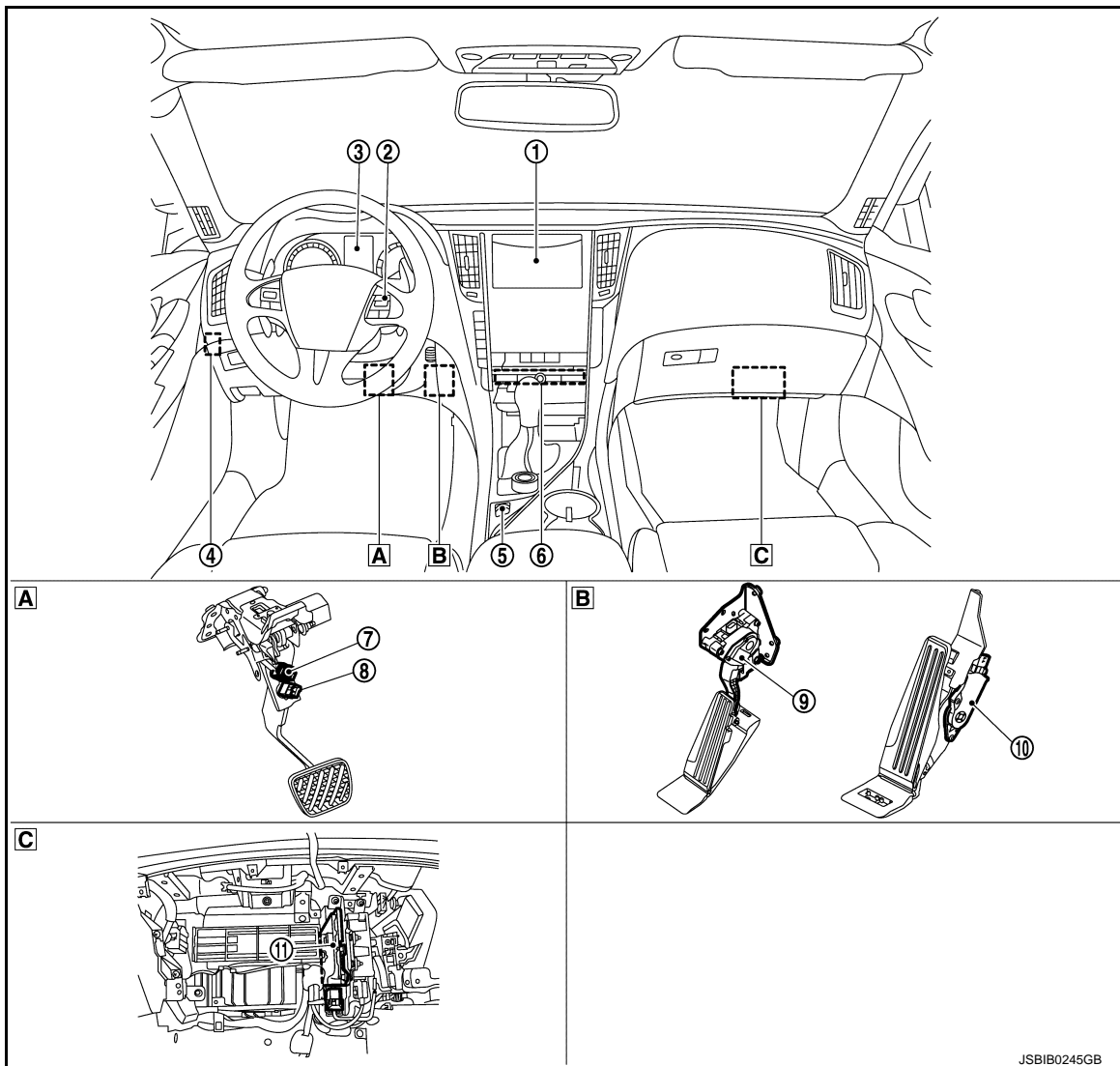
< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

No.	Component	Function
⑨	Cooling fan motor-2	EC6-42. "Cooling Fan"
⑩	Cooling fan relay 1	EC6-42. "Cooling Fan"
⑪	Fuel pump control module	EC6-48. "Fuel Pump Control Module"
⑫	EVAP canister vent control valve	EC6-46. "EVAP Canister Vent Control Valve"
⑬	EVAP control system pressure sensor	EC6-46. "EVAP Control System Pressure Sensor"
⑭	EVAP canister	EVAP canister stores the generated fuel vapors in the sealed fuel tank to activated charcoals of EVAP canister when the engine is not operating or when refueling to the fuel tank.
⑮	Fuel level sensor	EC6-48. "Fuel Level Sensor"
⑯	Low pressure fuel pump	EC6-51. "Low Pressure Fuel Pump"
⑰	Fuel tank temperature sensor	EC6-48. "Fuel Tank Temperature Sensor"

*: For turbo high pressure model

Interior Compartment



A Brake pedal

B Accelerator pedal

C Grove box (back side)

JSBIB0245GB

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

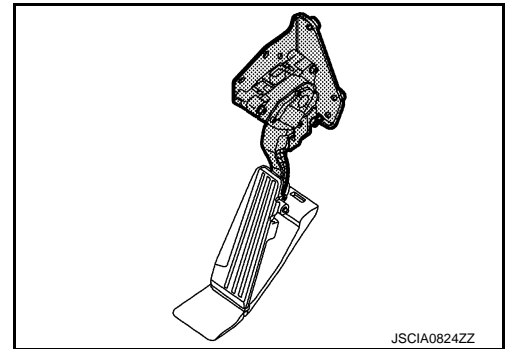
No.	Component	Description
①	Display control unit	Displays a drive mode status on the display screen, according to signals received from ECM. For details of installation position, refer to AV-14, "Component Parts Location" .
②	ASCD steering switch	EC6-40, "ASCD Steering Switch"
	ICC steering switch	EC6-50, "ICC Steering Switch"
③	Combination meter	Performs the ON/OFF control of the indicator lamp, warning lamp, and the information display, according to signals received from ECM via CAN communication.
④	Chassis control module	Chassis control module send the drive mode select switch signal to the TCM via the CAN communication line. For details of installation position, refer to DAS-516, "Component Parts Location" .
⑤	Drive mode select switch	DMS-11, "Drive Mode Select Switch"
⑥	A/C auto amp.	Controls the air-conditioning system (e.g. compressor, blower fan motor), according to a command from ECM.
⑦	Stop lamp switch	EC6-53, "Stop Lamp Switch & Brake Pedal Position Switch"
⑧	Brake pedal position switch	EC6-53, "Stop Lamp Switch & Brake Pedal Position Switch"
⑨	Accelerator pedal position switch (with ECO pedal)	EC6-39, "Accelerator Pedal Position Sensor"
⑩	Accelerator pedal position switch (without ECO pedal)	EC6-39, "Accelerator Pedal Position Sensor"
⑪	Steering force control module (with direct adaptive steering)	For details of installation position, refer to STC-113, "Component Parts Location" .

Accelerator Pedal Position Sensor

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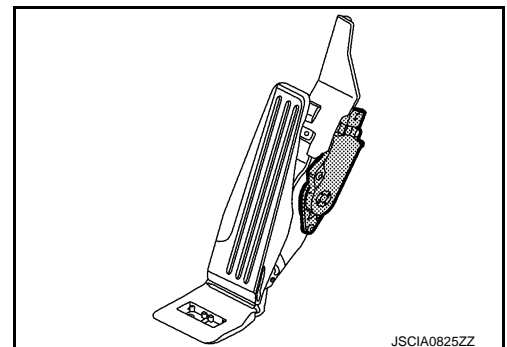
With ECO pedal

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



Without ECO pedal

The accelerator pedal position sensor is integrated with the accelerator pedal. The sensor detects the accelerator position and sends a signal to the ECM.



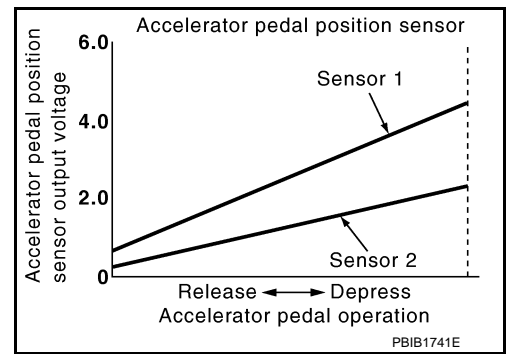
COMPONENT PARTS

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

Accelerator pedal position sensor has 2 sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

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



Air Fuel Ratio (A/F) Sensor 1

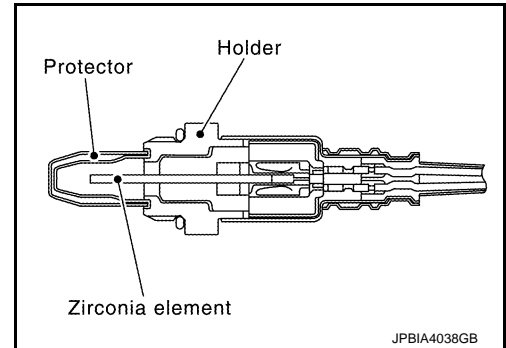
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DESCRIPTION

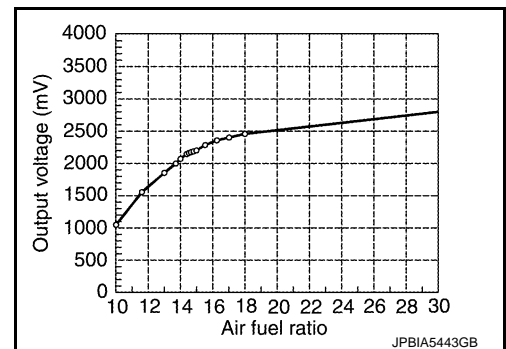
The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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.

ASCD Steering Switch

INFOID:000000013591375

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

Refer to [EC6-83. "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for the ASCD function.

Battery Current Sensor (With Battery Temperature Sensor)

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OUTLINE

COMPONENT PARTS

[VR30DDTT FOR USA AND CANADA]

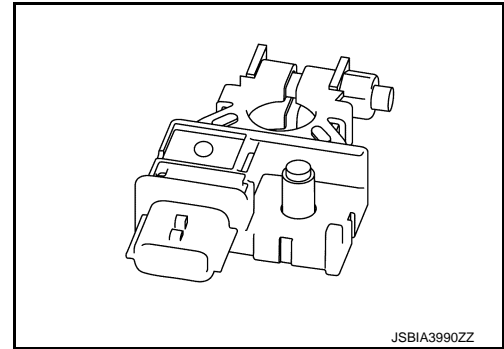
< SYSTEM DESCRIPTION >

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 [CHG-7. "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.



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BATTERY CURRENT SENSOR

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

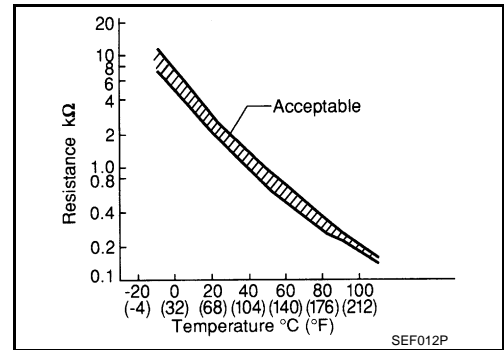
BATTERY TEMPERATURE SENSOR

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

<Reference data>

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

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



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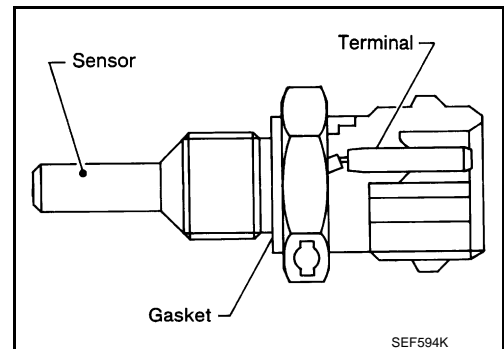
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Charge Air Cooler Coolant Temperature Sensor

INFOID:000000013591377

The charge air cooler coolant temperature sensor is used to detect the charge air cooler coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the charge air cooler 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.



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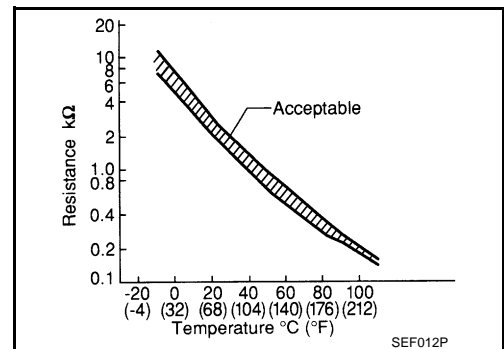
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<Reference data>

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

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



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COMPONENT PARTS

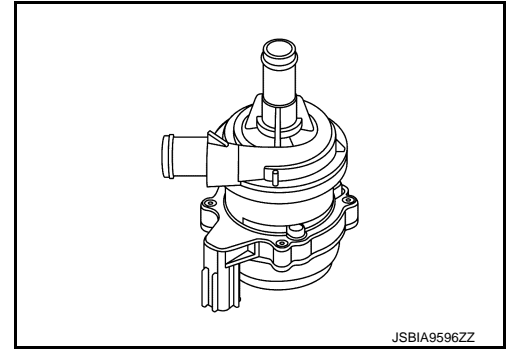
< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Charge Air Cooler Cooling Electric Water Pump

INFOID:000000013591378

The charge air cooler cooling electric water pump is activated according to a drive duty signal transmitted from ECM and circulates charge air cooler coolant.



JSBIA9596ZZ

Cooling Fan

INFOID:000000013591379

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.

COOLING FAN RELAY

Cooling fan relay provides power supply to the cooling fan control module.

Crankshaft Position Sensor

INFOID:000000013591380

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

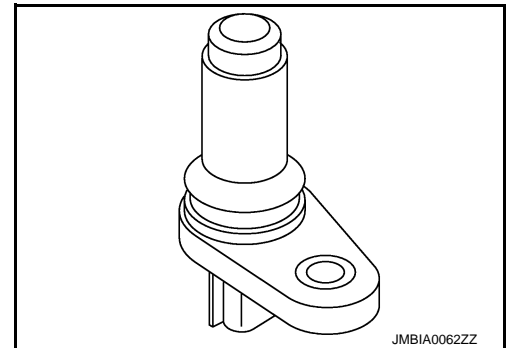
The sensor consists of a permanent magnet and Hall IC.

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.

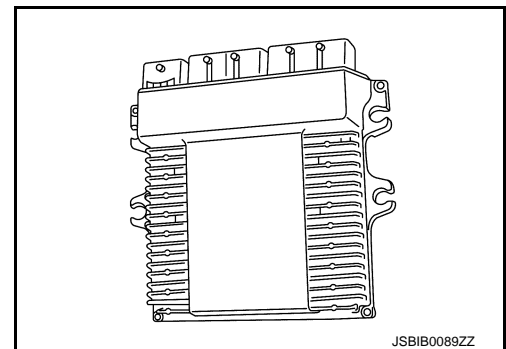


JMBIA0062ZZ

ECM (With Barometric Pressure Sensor)

INFOID:000000013591381

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



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COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Electric Intake Valve Timing Control Actuator

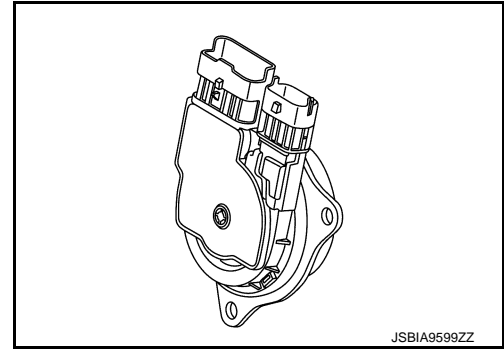
INFOID:000000013591382

The electric intake valve timing (IVT) control actuator activates the actuator motor according to a signal from the electric IVT control module to maintain the timing of intake valve timing at advance angle or retard angle.

The actuator has position sensor and transmits a motor position signal and a motor speed signal to Electric IVT Control Module.

NOTE:

The actuator is non separable.

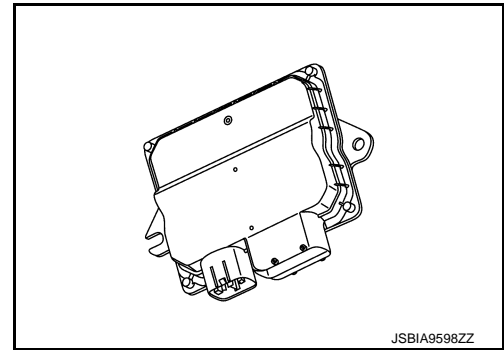


Electric Intake Valve Timing Control Module

INFOID:000000013638592

The electric intake valve timing (IVT) control module controls the electric IVT control actuator, according to signals sent from ECM and the sensor built in the electric IVT control actuator.

The target angle of valve timing is adjusted based on the engine communication signals transmitted from ECM.



Electric Throttle Control Actuator

INFOID:000000013591411

THROTTLE CONTROL MOTOR

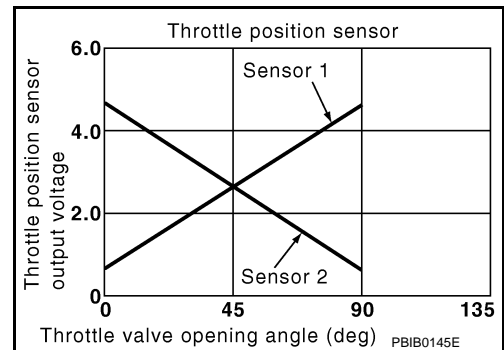
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

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

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

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



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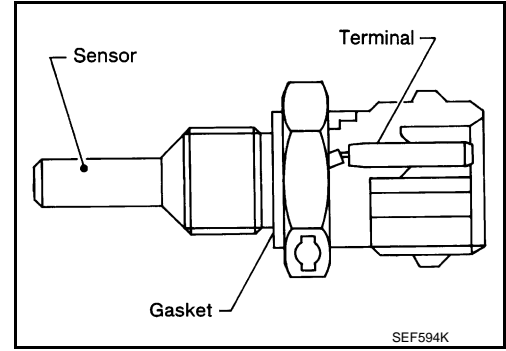
[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

Engine Coolant Temperature Sensor 1

INFOID:000000013591383

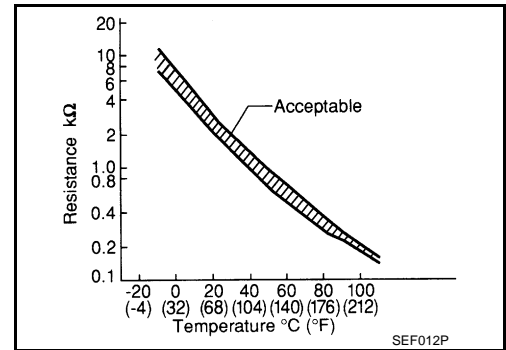
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

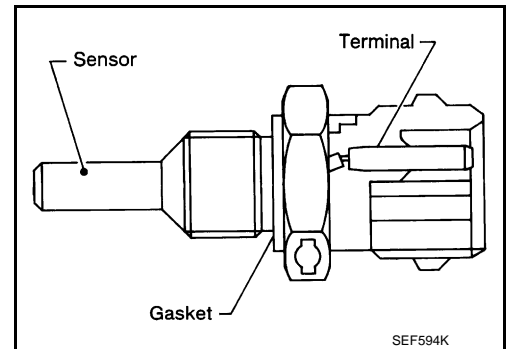
*: These data are reference values and are measured between ECM terminals and sensor ground.



Engine Coolant Temperature Sensor 2

INFOID:000000013591384

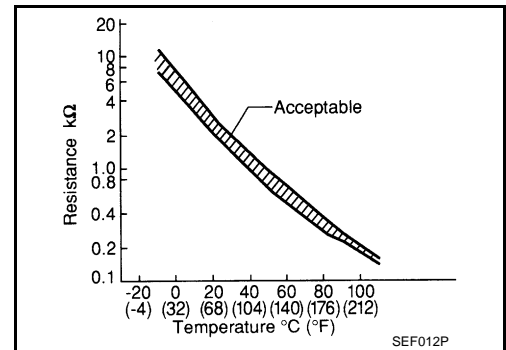
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

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



COMPONENT PARTS

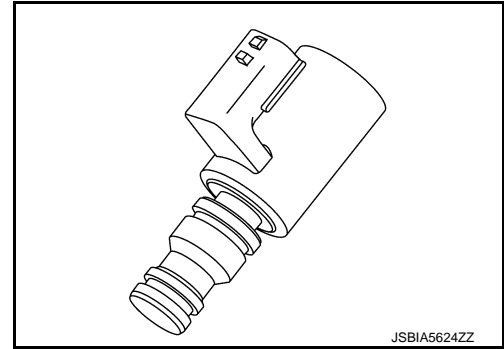
< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Engine Oil Pressure Control Solenoid Valve

INFOID:000000013591385

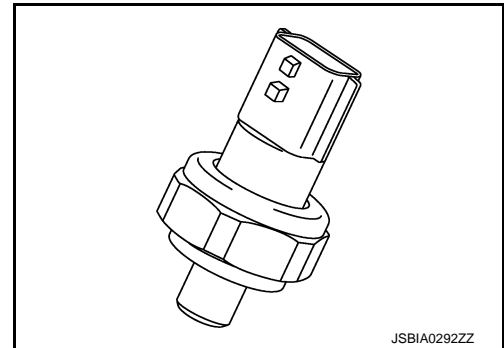
The engine oil pressure control solenoid valve performs the variable hydraulic control (low oil pressure control and high oil pressure control) according to oil temperature and engine load.



Engine Oil Pressure Sensor

INFOID:000000013591386

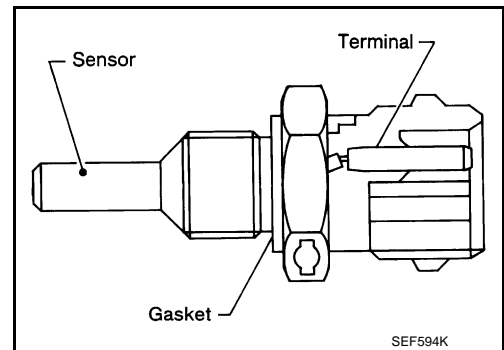
The engine oil pressure (EOP) sensor detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Temperature Sensor

INFOID:000000013591387

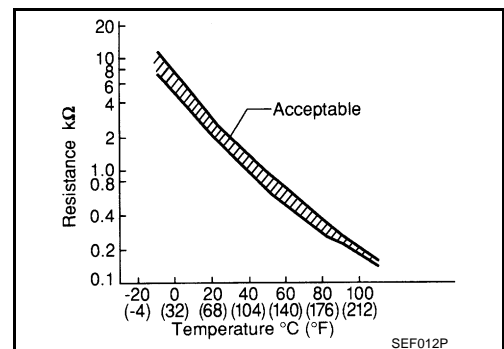
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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



<Reference data>

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

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



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COMPONENT PARTS

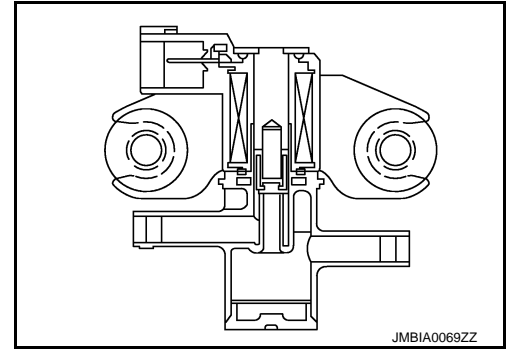
[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

EVAP Canister Purge Volume Control Solenoid Valve

INFOID:000000013591388

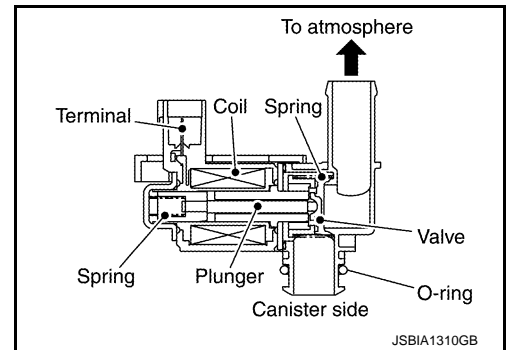
The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through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



EVAP Canister Vent Control Valve

INFOID:000000013591389

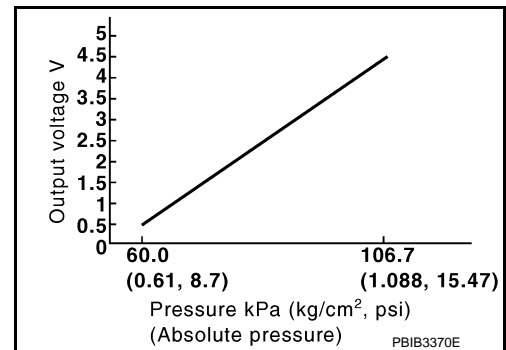
The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components. This solenoid valve is used only for diagnosis, and usually remains opened. When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.



EVAP Control System Pressure Sensor

INFOID:000000013591390

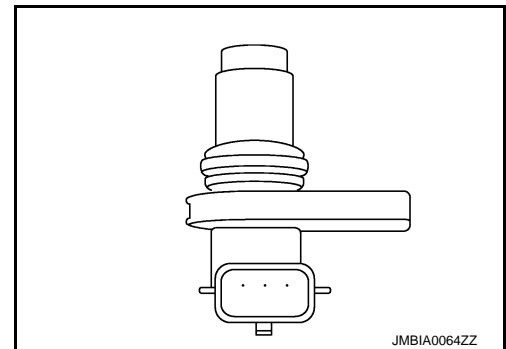
The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



Exhaust Camshaft Position Sensor

INFOID:000000013591391

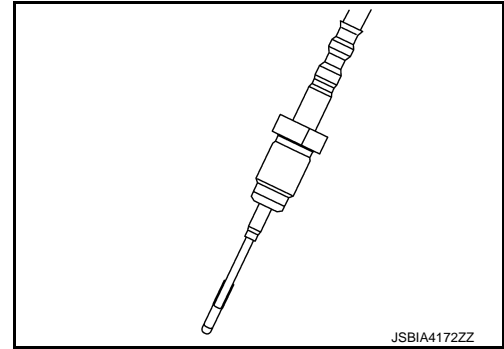
The exhaust camshaft position sensor senses the retraction of camshaft to identify a particular cylinder. The sensor senses piston position of the each cylinder for precise combustion. When the crankshaft position sensor system becomes inoperative, the camshaft position sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals. The cylinder identification is performed by the crankshaft position sensor and the camshaft position sensors (Bank 1 and Bank 2). For this reason, if one of the camshaft position sensors has a malfunction, the other camshaft position sensor can work with the crankshaft position sensor. The sensor consists of a permanent magnet and Hall IC. When engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes.



Exhaust Gas Temperature Sensor

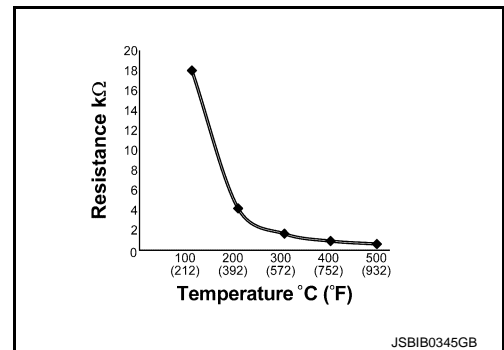
INFOID:000000013591392

The exhaust gas temperature sensor is installed to the turbine housing of turbocharger. This sensor uses a thermistor, and electric resistance changes according to temperature changes. The electrical resistance decreases with an increase in temperature.



<Reference data>

Fluid temperature [°C (°F)]	Resistance (kΩ)
100 (212)	18.2
200 (392)	4.0
300 (572)	1.4
400 (752)	0.65
500 (932)	0.35



Exhaust Valve Timing Control Solenoid Valve

INFOID:000000013591393

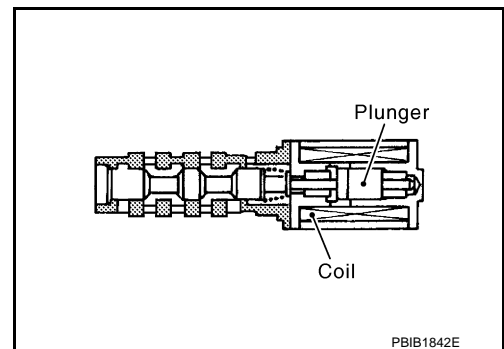
Exhaust valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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

The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.

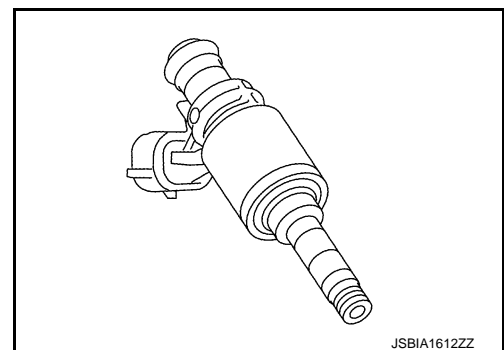
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the exhaust valve angle at the control position.



Fuel Injector

INFOID:000000013591394

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).

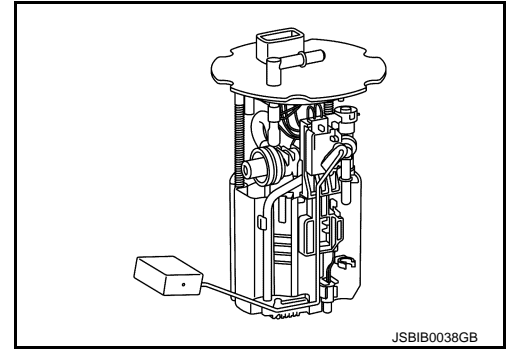


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Fuel Level Sensor

INFOID:000000013591395

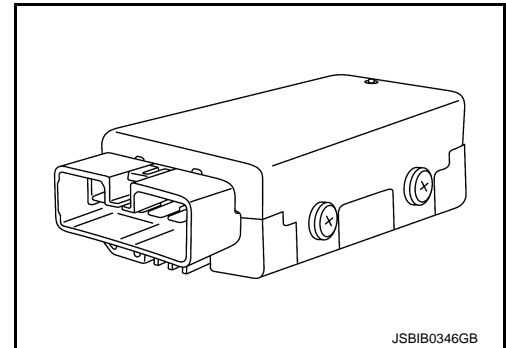
The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical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



Fuel Pump Control Module

INFOID:000000013591396

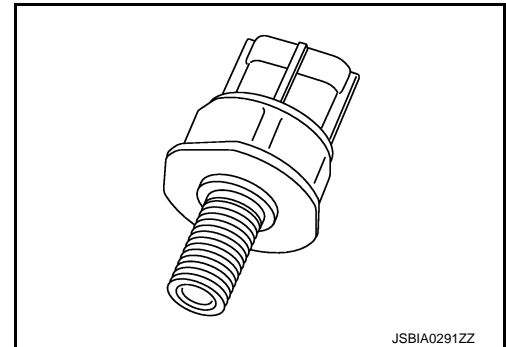
The fuel pump control module (FPCM) controls the fuel pump to satisfy a discharge rate suitable to a driving condition, according to the control from ECM. This reduces the electricity consumption of fuel pump during low load.



Fuel Rail Pressure Sensor

INFOID:000000013591397

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



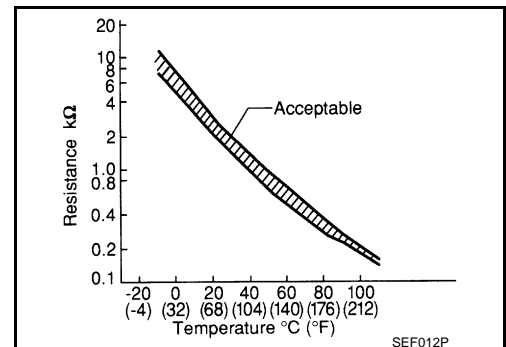
Fuel Tank Temperature Sensor

INFOID:000000013591398

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 and ECM ground.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Heated Oxygen Sensor 2

INFOID:000000013591399

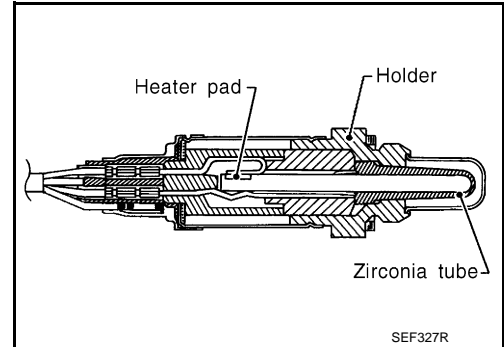
DESCRIPTION

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

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

If a malfunction occurs in air fuel ratio (A/F) sensor, air fuel ratio is controlled to become a theoretical air fuel ratio by heated oxygen sensor 2.

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.

Condition	Heated oxygen sensor 2 heater
Above 7,500 rpm	OFF
Below 7,500 rpm after the following conditions are met. <ul style="list-style-type: none"> • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	ON

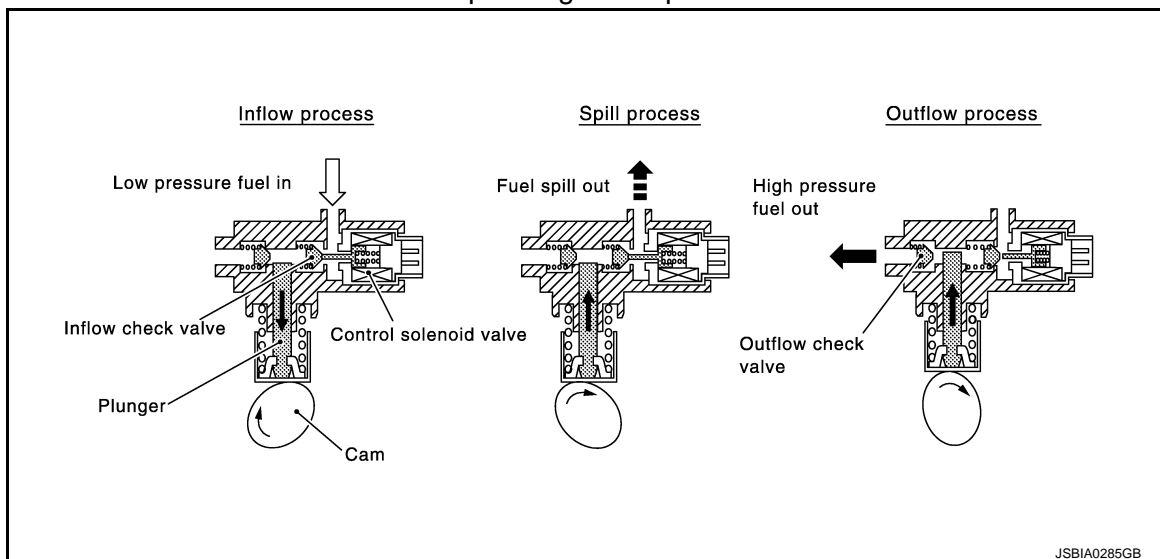
High Pressure Fuel Pump

INFOID:000000013591400

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.

Operating Description

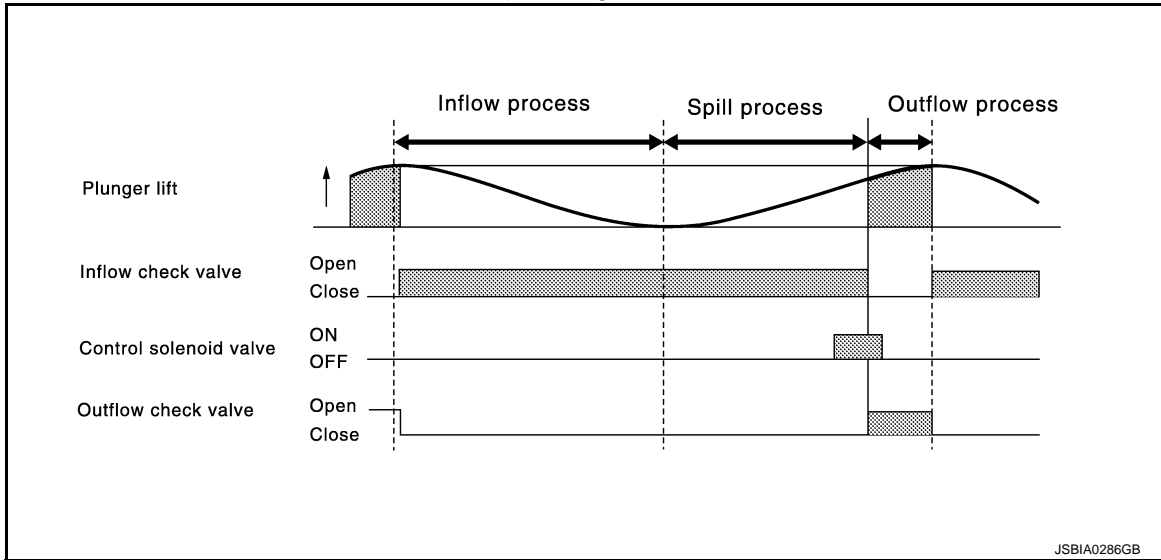


COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Operating Chart



ICC Steering Switch

INFOID:000000013591401

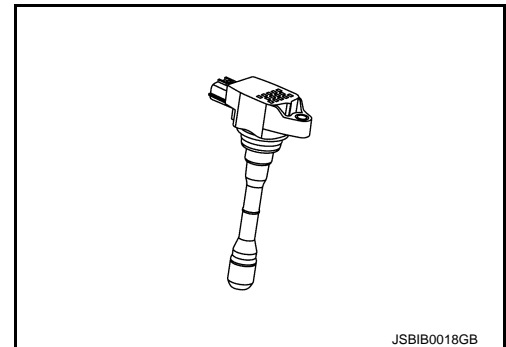
ICC steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated. Refer to [CCS-14, "System Description"](#) for the ICC function.

Ignition Coil and Spark Plug

INFOID:000000013591402

IGNITION COIL

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.



SPARK PLUG

The spark plug is installed to the cylinder head and performs ignitions to air-fuel mixture by discharging ignition coil-applied voltage in the gap between the center electrode and the ground electrode and generating sparks in the combustion chamber.

Intake Camshaft Position Sensor

INFOID:000000013591403

Intake camshaft position sensor detects the protrusion of the signal plate installed to the intake camshaft rear end.

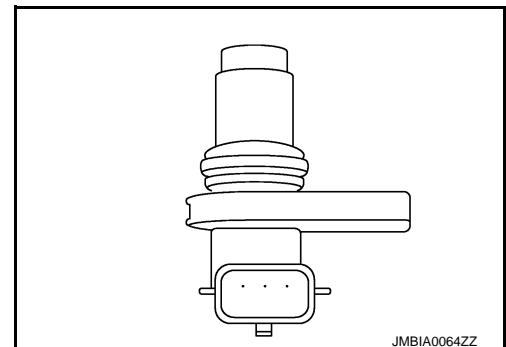
This sensor signal is used for sensing a position of the intake camshaft.

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.



COMPONENT PARTS

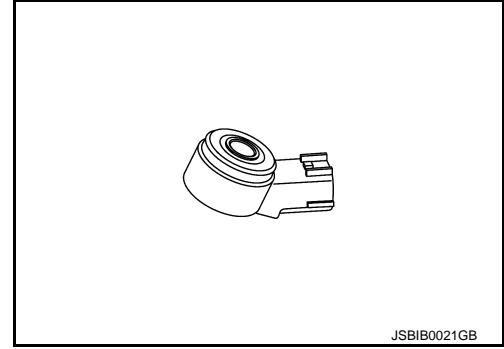
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[VR30DDTT FOR USA AND CANADA]

Knock Sensor

INFOID:000000013591404

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



Low Pressure Fuel Pump

INFOID:000000013591405

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor Exhaust camshaft position sensor	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

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

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

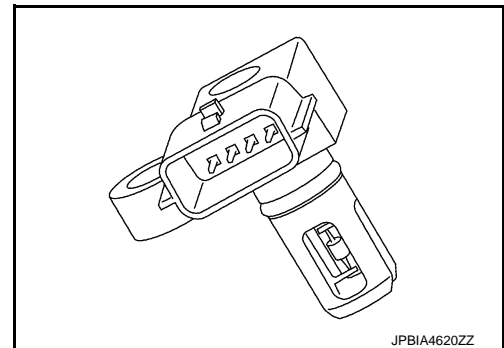
Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

Manifold Absolute Pressure Sensor

INFOID:000000013591406

The manifold absolute pressure (MAP) sensor is placed at intake manifold collector. It detects intake manifold pressure and sends the voltage signal to the ECM.

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



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

INFOID:000000013591407

MASS AIR FLOW SENSOR

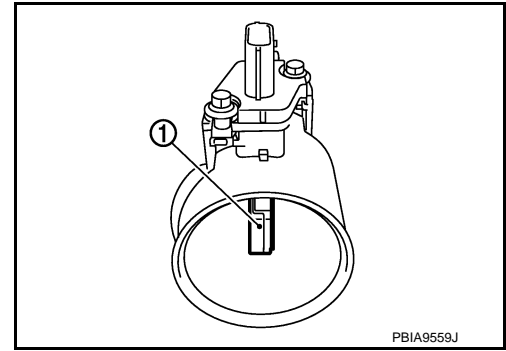
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[VR30DDTT FOR USA AND CANADA]

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



INTAKE AIR TEMPERATURE SENSOR 1

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

<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)
25 (77)	1.7 – 2.0
80 (176)	0.3 – 0.5

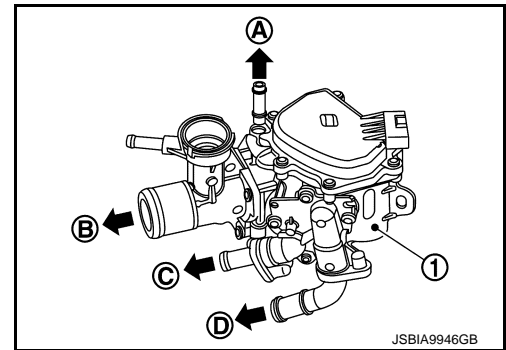
*: These data are reference values on the diagnosis tool.

Multi-way Control Valve

INFOID:000000013591408

A motor-driven valve that integrates the thermostat and water control valve and that can open and close the flow of water to radiator, heater, engine oil cooler and ATF warmer according to the coolant temperature is adopted.

- ① : Multi-way control valve
- Ⓐ : To turbocharger RH
- Ⓑ : To radiator
- Ⓒ : To engine oil cooler / ATF warmer
- Ⓓ : To heater



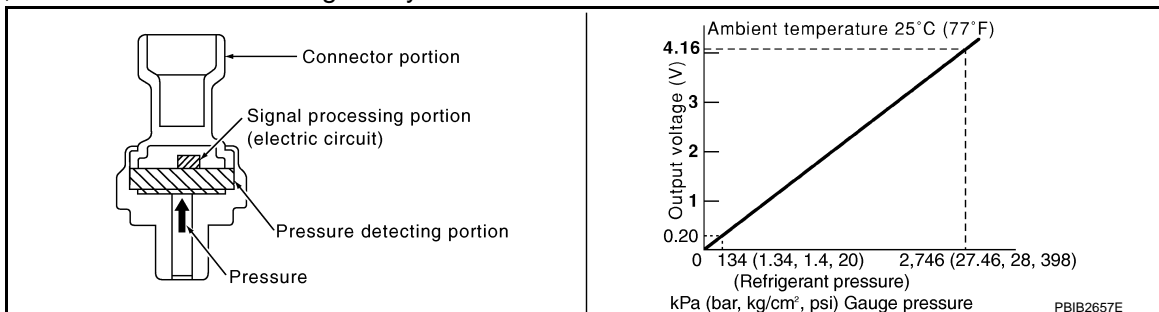
When the water temperature is low, the water channels to radiator, heater, engine oil cooler and ATF warmer are closed, accelerating warming of these parts.

For control, refer to [EC6-87. "THERMAL MANAGEMENT CONTROL : System Description"](#).

Refrigerant Pressure Sensor

INFOID:000000013591409

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.



COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Stop Lamp Switch & Brake Pedal Position Switch

INFOID:000000013591410

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).

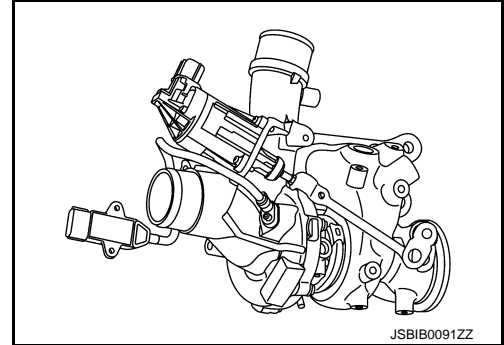
Brake pedal	Brake pedal position switch	Stop lamp switch
Released	ON	OFF
Depressed	OFF	ON

Turbocharger

INFOID:000000013591412

ELECTRIC WASTEGATE CONTROL ACTUATOR

The electric wastegate control actuator operates based on a signal from ECM and adjusts the turbocharger boost control valve angle via link rod. The electronic control allows the turbocharger wastegate control valve to be opened even in non-supercharging regions. This reduces pumping losses and contributes to the fuel economy. In charging regions, wastegate valve angles are controlled by the electronic control with a high degree of accuracy.

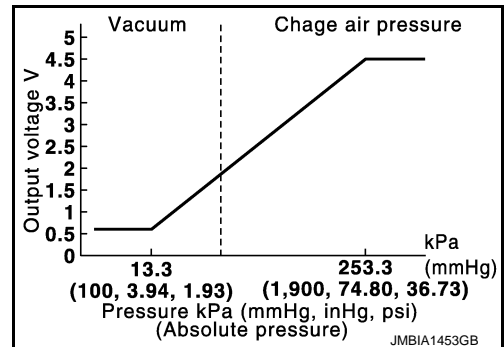
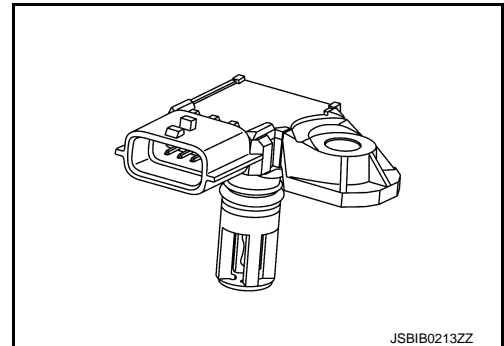


Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)

INFOID:000000013591413

TURBOCHARGER BOOST SENSOR

The turbocharger boost sensor detects the pressure of the outlet side of the charge air cooler. As the pressure increases, the voltage rises.



INTAKE AIR TEMPERATURE SENSOR 2

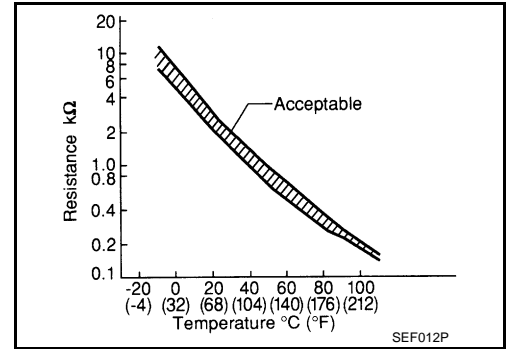
COMPONENT PARTS

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

The intake air temperature sensor 2 is built-into turbocharger boost sensor (bank 1). The sensor detects intake air temperature and transmits a signal to the ECM.

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



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.310 - 0.322

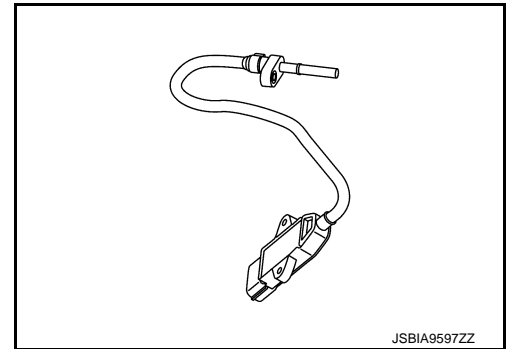
*: These data are reference values and are measured between ECM terminals.

Turbocharger Speed Sensor

INFOID:0000000013591414

The turbocharger speed sensor is installed to the compressor side of turbocharger and detects revolutions of turbocharger with the compressor wheel blade of turbocharger.

The use of eddy current sensor enables the detection of revolutions of turbocharger at high speed rotation.



STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:000000013591415

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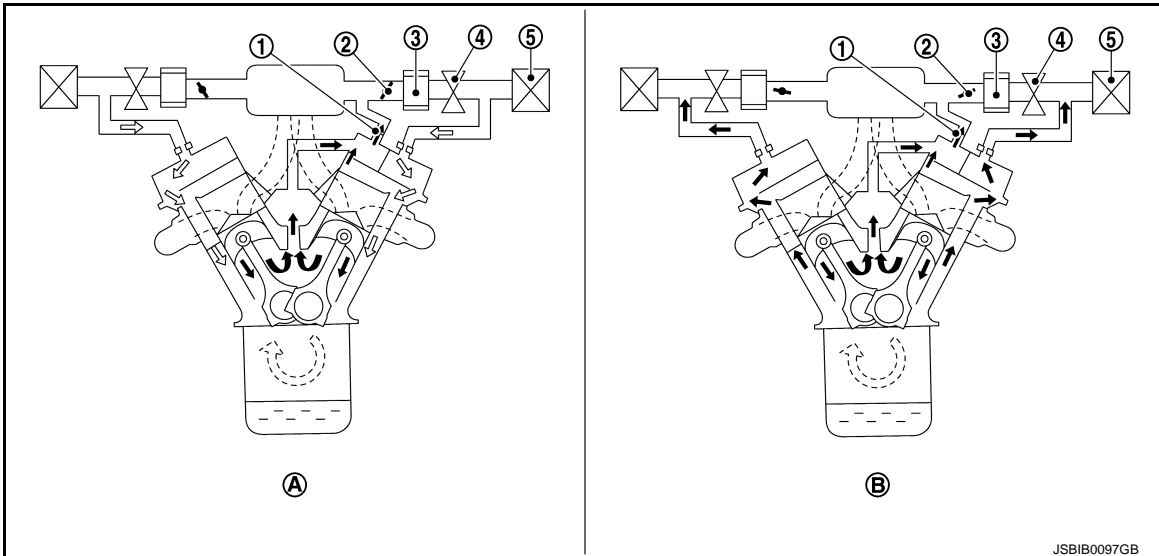
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- ① PCV valve
- ② Electric throttle control actuator
- ③ Charge air cooler
- ④ Turbocharger
- ⑤ Air cleaner
- Ⓐ Low-middle load condition
- Ⓑ Hi load condition
- ⇐: Fresh air
- ←: Blow-by air

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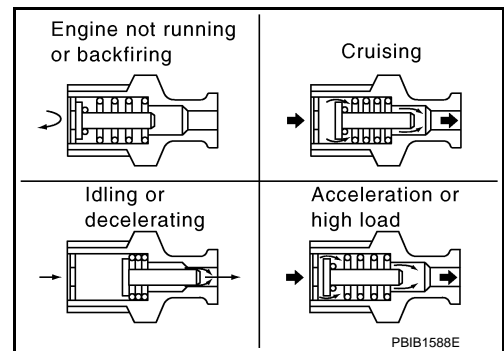
Blow-by gas in the crank case is returned to the intake manifold to improve ventilation efficiency. This allows the intervals of engine oil change to be extended.

When the engine is in the low-middle load condition as shown in the figure Ⓐ, the blow-by gas goes to the intake manifold via the PCV valve.

In the general driving conditions, the capacity of the PCV valve is sufficient for treating the blow-by gas and a little amount of the fresh air.

The fresh air enters to the rocker cover from the air duct via a hose, and is guided to the crankcase.

When the engine is in the high load condition as shown in the figure Ⓑ, blow-by gas flows backward in the blow-by hose and gets sucked into air duct.



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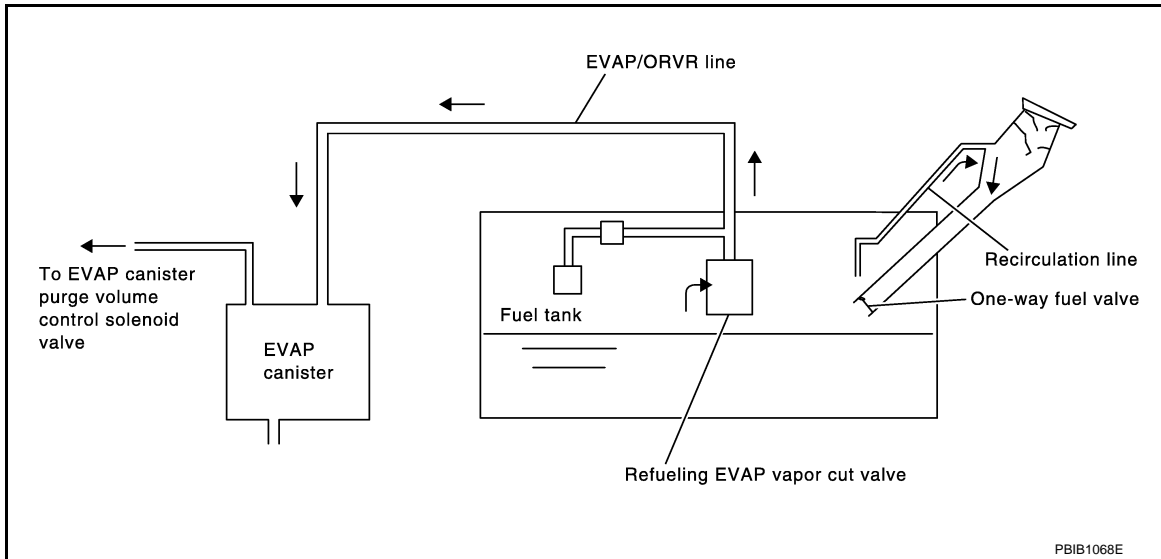
STRUCTURE AND OPERATION

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

On Board Refueling Vapor Recovery (ORVR)

INFOID:000000013591416



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

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

WARNING:

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

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

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
 - Put drained fuel in an explosion-proof container and put lid on securely.
 - Release fuel pressure from fuel line. Refer to [EC6-279, "Work Procedure"](#).
 - Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Never kink or twist hose and tube when they are installed.
- Never tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connections.
- Never attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

< SYSTEM DESCRIPTION >

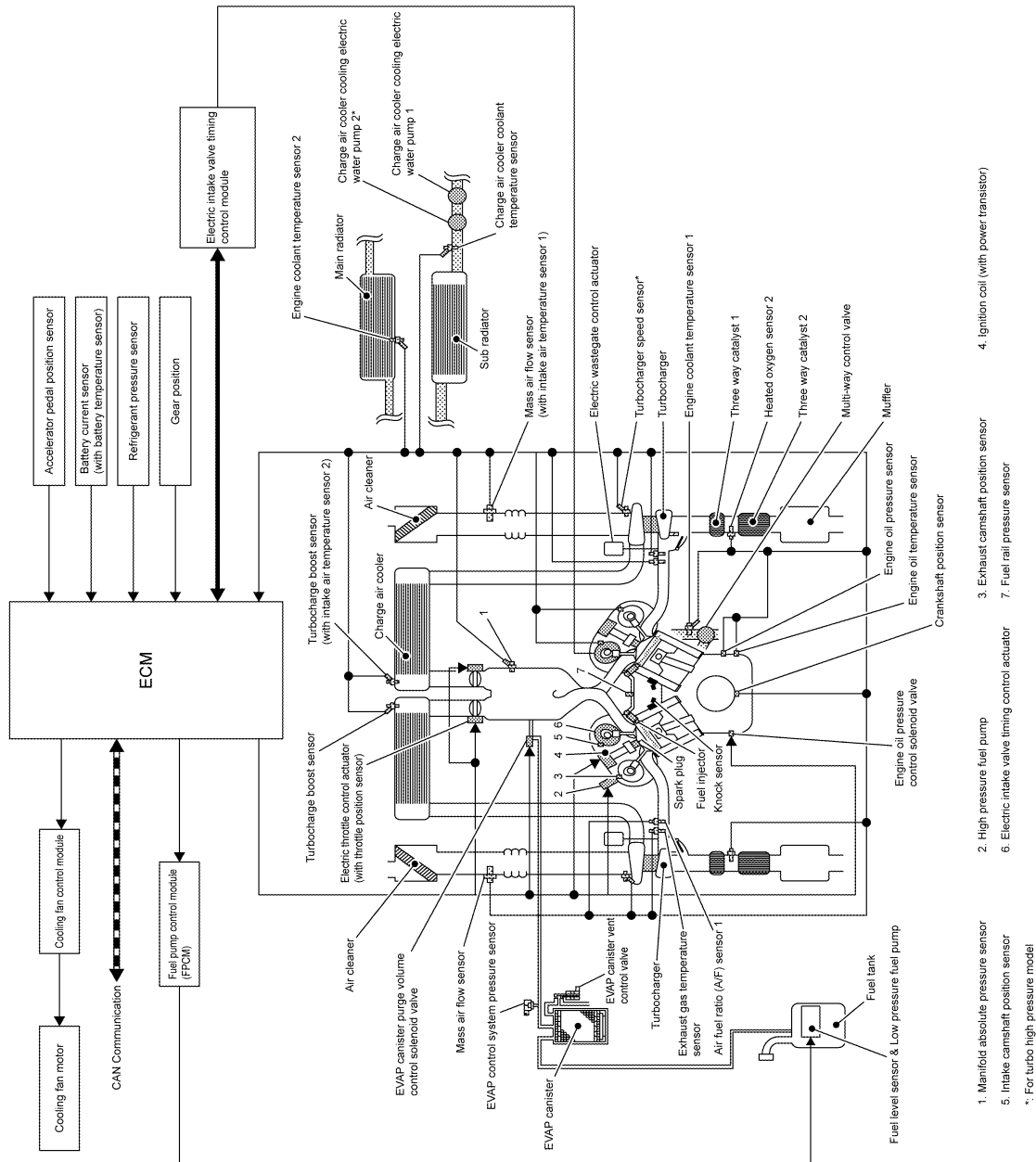
SYSTEM
ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Description

SYSTEM DIAGRAM

INFOID:000000013591417

EC6



- 1. Manifold absolute pressure sensor
 - 2. High pressure fuel pump
 - 3. Exhaust camshaft position sensor
 - 4. Ignition coil (with power transistor)
 - 5. Intake camshaft position sensor
 - 6. Electric intake valve timing control actuator
 - 7. Fuel rail pressure sensor
- *: For turbo high pressure model

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SYSTEM

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

ECM controls the engine by various functions.

Function	Reference
Direct injection gasoline system	EC6-77, "DIRECT INJECTION GASOLINE SYSTEM : System Description"
Fuel pressure control	EC6-79, "FUEL PRESSURE CONTROL : System Description"
Engine oil pressure control system	EC6-80, "ENGINE OIL PRESSURE CONTROL SYSTEM : System Description"
Electric ignition system	EC6-81, "ELECTRIC IGNITION SYSTEM : System Description"
Air conditioning cut system	EC6-82, "AIR CONDITIONING CUT CONTROL : System Description"
Automatic speed control device (ASCD)	EC6-83, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
CAN communication	EC6-84, "CAN COMMUNICATION : System Description"
Cooling fan control	EC6-85, "COOLING SYSTEM : System Description (Charge Air Cooler Cooling Control System)"
Thermal management control	EC6-87, "THERMAL MANAGEMENT CONTROL : System Description"
Evaporative emission system	EC6-88, "EVAPORATIVE EMISSION SYSTEM : System Description"
Fuel filler cap warning system	EC6-89, "FUEL FILLER CAP WARNING SYSTEM : System Description"
Intake valve timing control	EC6-90, "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC6-91, "EXHAUST VALVE TIMING CONTROL : System Description"
Turbocharger boost control	EC6-93, "TURBOCHARGER BOOST CONTROL : System Description"
Fuel pump control module (FPCM)	EC6-94, "FUEL PUMP CONTROL MODULE (FPCM) : System Description"
Infiniti Drive Mode Selector	EC6-95, "Infiniti Drive Mode Selector : System Description"
Oil control system	EC6-97, "OIL CONTROL SYSTEM : System Description"

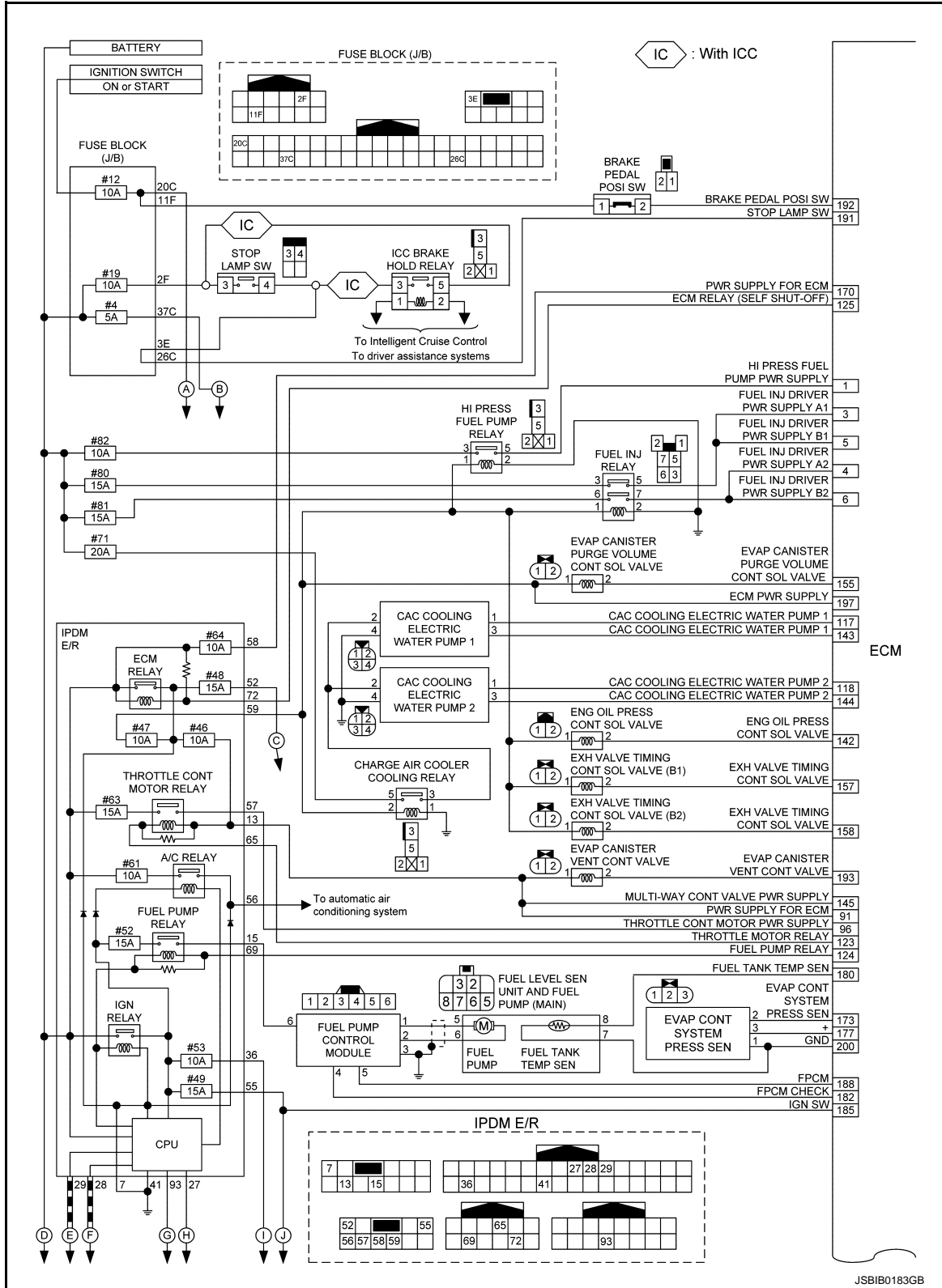
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[VR30DDTT FOR USA AND CANADA]

ENGINE CONTROL SYSTEM : Circuit Diagram (Turbo High Pressure Model)

INFOID:000000013591418



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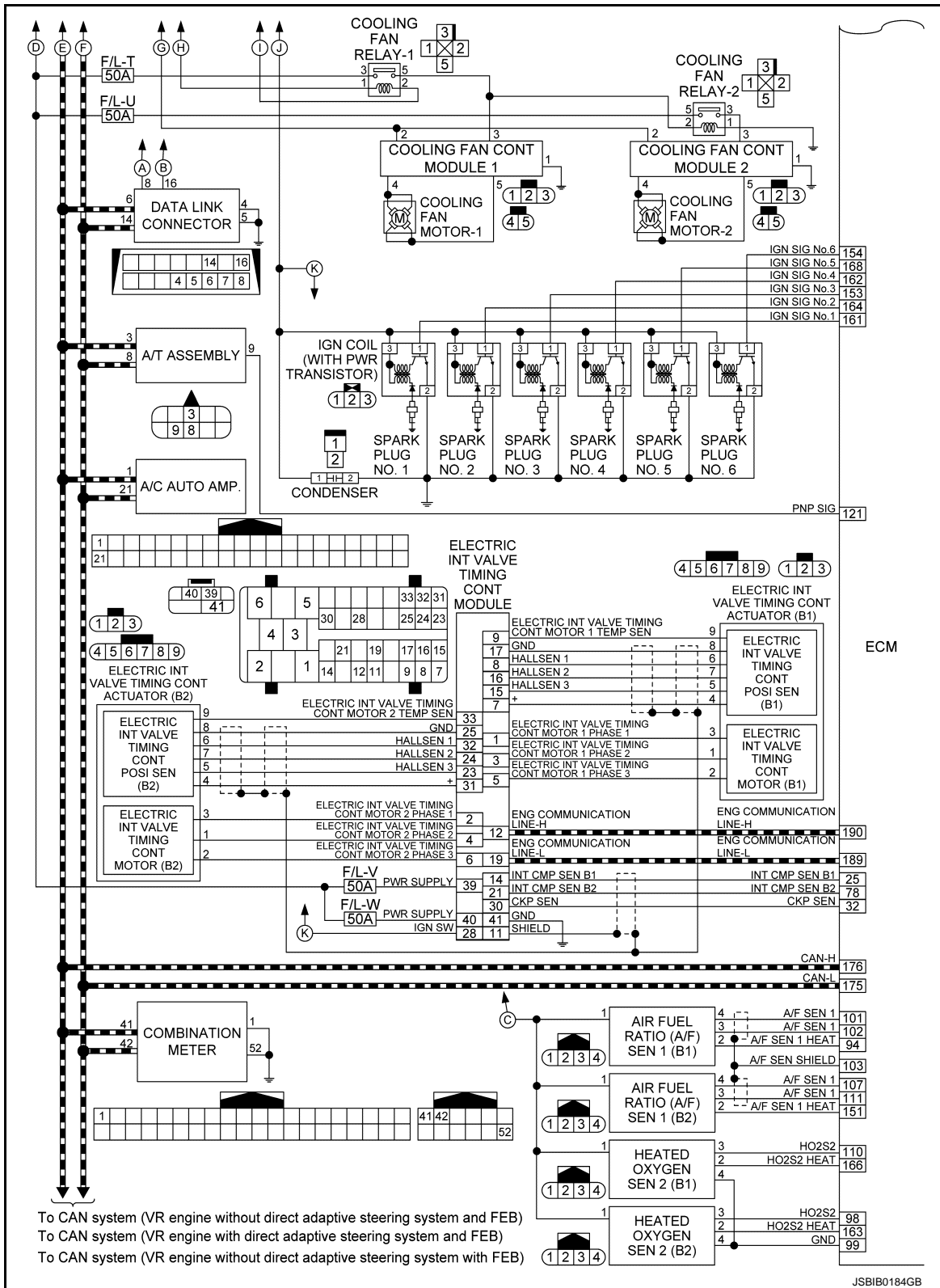
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[VR30DDTT FOR USA AND CANADA]

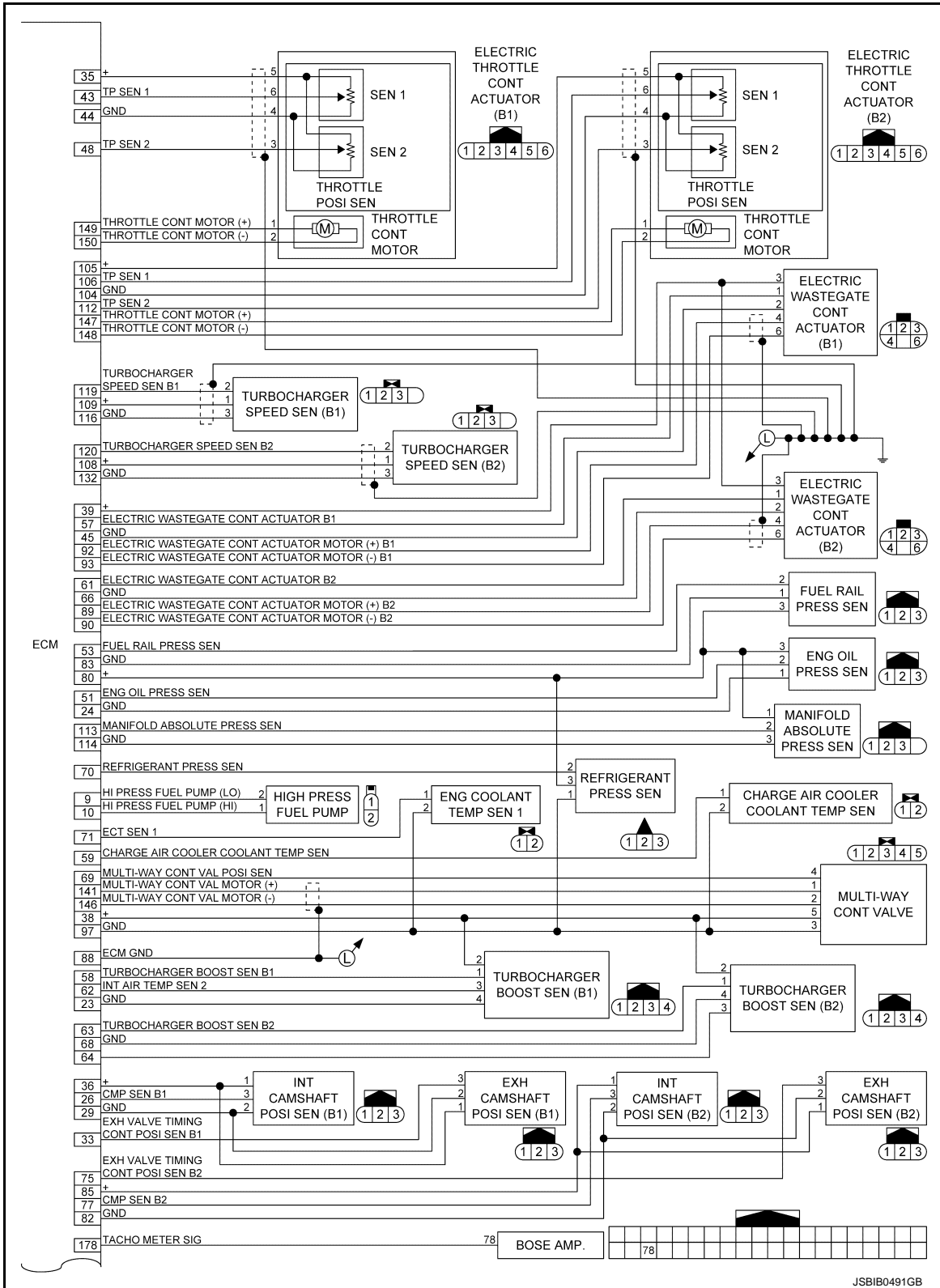


To CAN system (VR engine without direct adaptive steering system and FEB)
 To CAN system (VR engine with direct adaptive steering system and FEB)
 To CAN system (VR engine without direct adaptive steering system with FEB)

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[VR30DDTT FOR USA AND CANADA]



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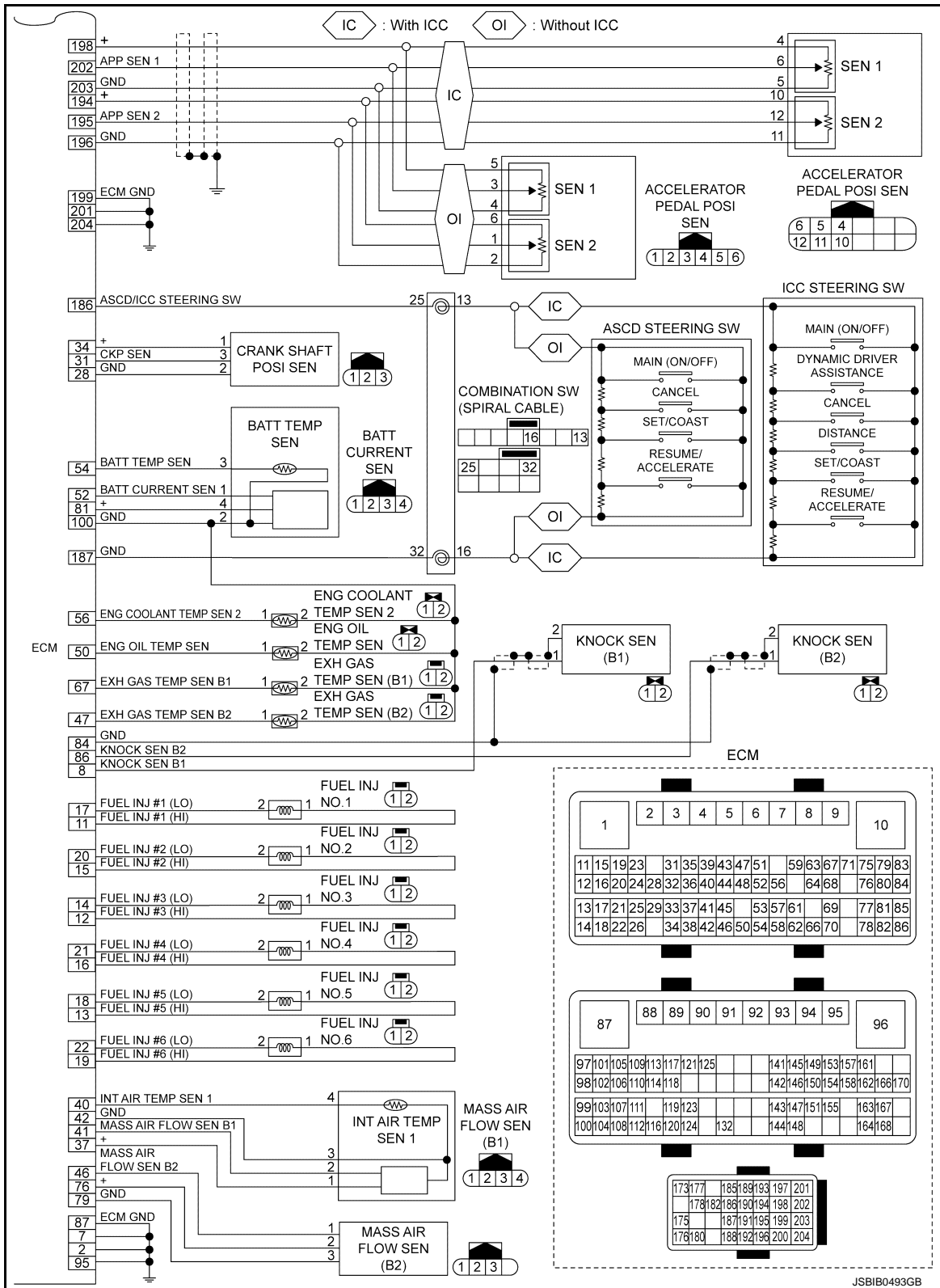
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[VR30DDTT FOR USA AND CANADA]



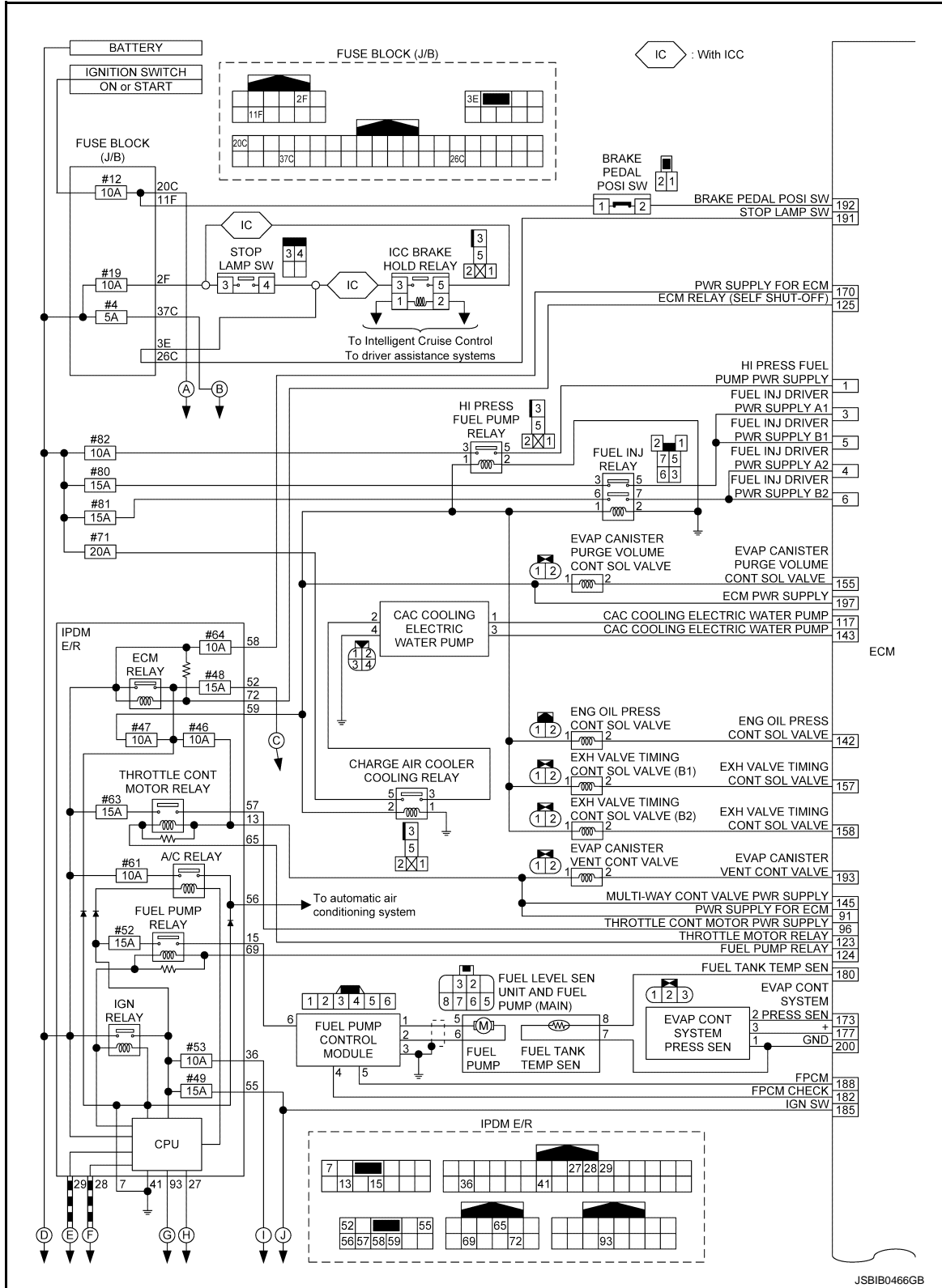
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[VR30DDTT FOR USA AND CANADA]

ENGINE CONTROL SYSTEM : Circuit Diagram (Turbo Low Pressure Model)

INFOID:000000013804703



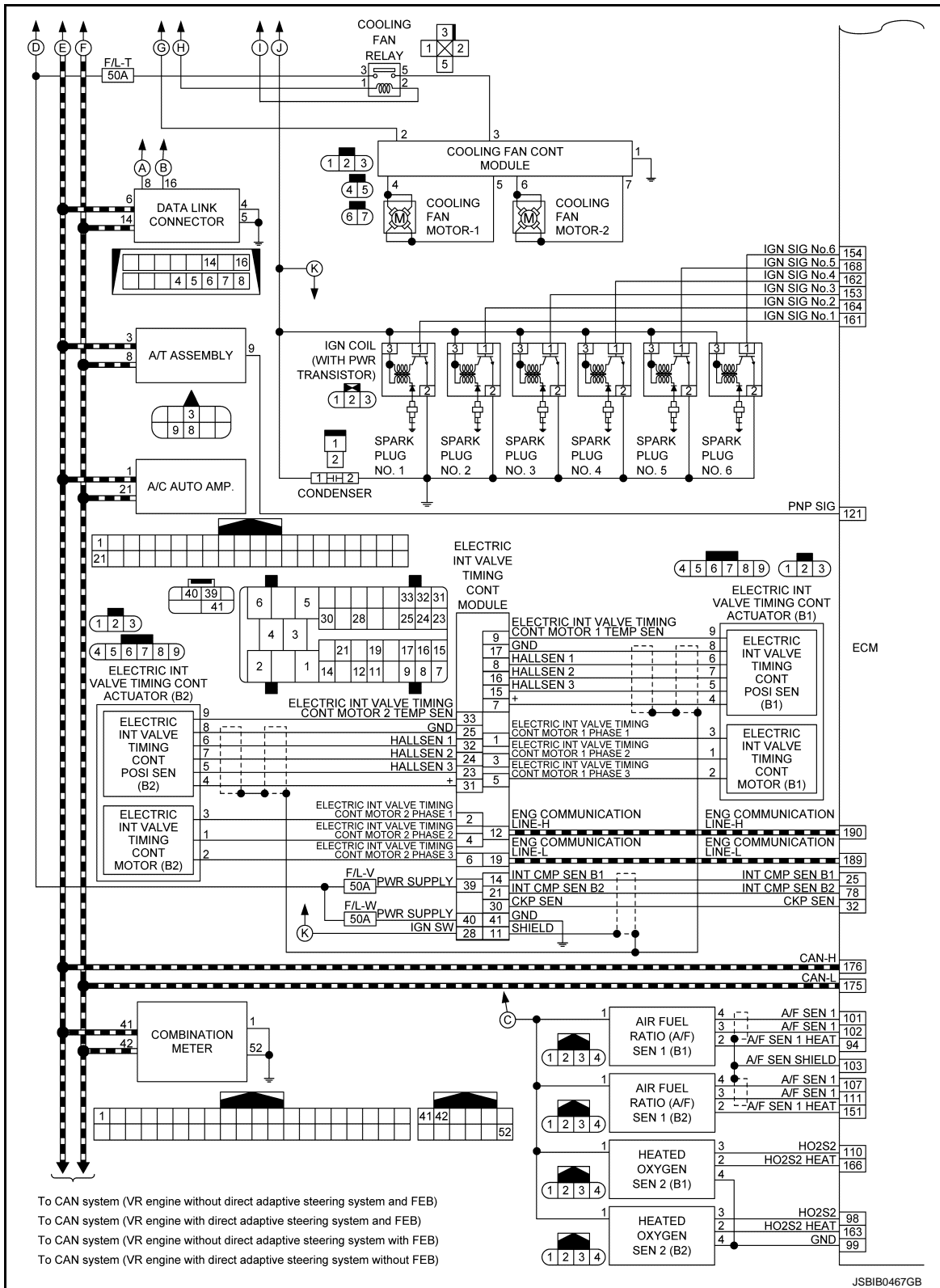
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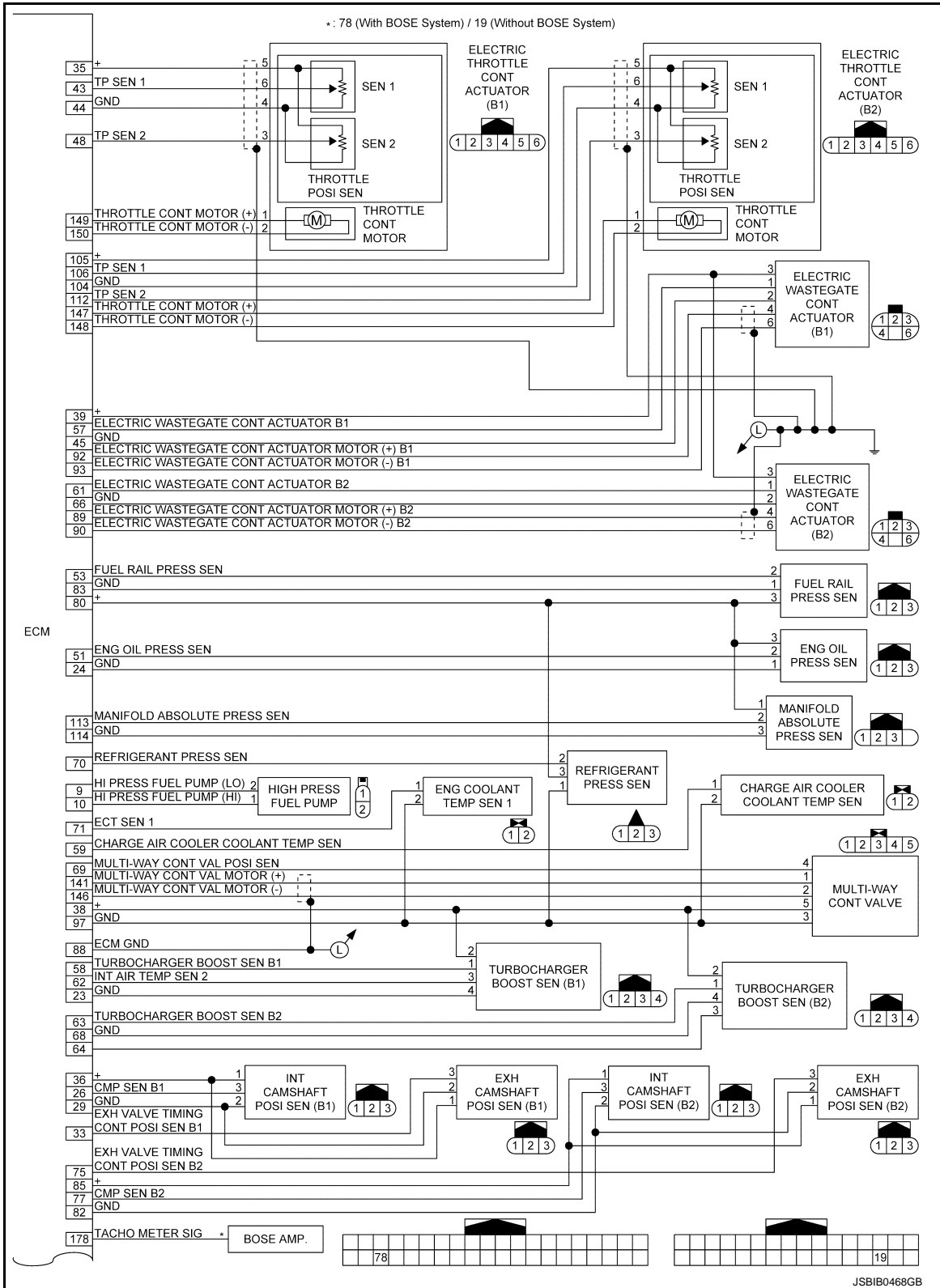
[VR30DDTT FOR USA AND CANADA]



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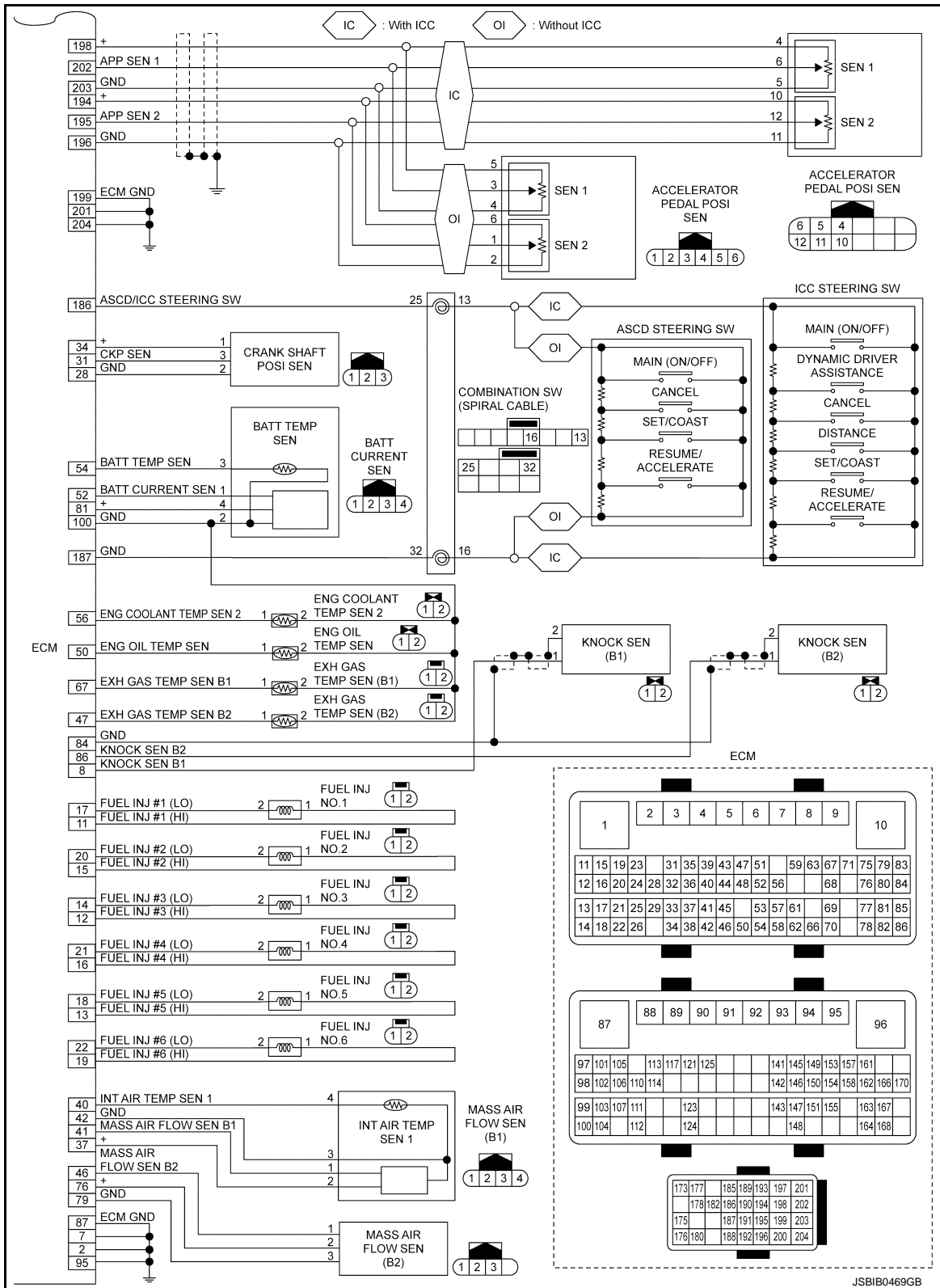
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SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]



ENGINE CONTROL SYSTEM : Fail safe (Turbo High Pressure Model)

INFOID:000000013930218

Description

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

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. <ul style="list-style-type: none"> Engine output control 1: Driving at 70 km/h or more is possible. Engine output control 2: Driving at 40 km/h or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode		<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control 1
C		Engine output control 2
D	Device fix mode	
E	Combustion control mode	Stratified charge combustion control at starting
F		<ul style="list-style-type: none"> Idle speed control Recovery speed control at decelerating Idle neutral control*
G		<ul style="list-style-type: none"> Ignition timing correction control Retardation control

*: Not applicable

Fail Safe List

×:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior							Others
		Pattern							
		A	B	C	D	E	F	G	
U012E U042F	Engine communication	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	
P0010 P0020	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0011 P0021	Intake valve timing control	—	—	—	×	—	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: When VTC mechanism sticks, camshaft position does not change from position of stuck angle.
P0014 P0024	Exhaust valve timing control	—	—	—	×	—	—	—	—
P0046 P004B	Electric wastegate actuator motor	—	×	—	×	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)
P0078 P0084	Exhaust valve timing control solenoid valve	—	—	—	×	—	—	—	—
P0087 P0088	Fuel rail pressure control	×	—	—	×	×	—	—	—
P0090	High pressure fuel pump	×	—	—	×	×	—	—	—
P0101 P010B	Mass air flow sensor	×	—	—	—	×	—	—	—
P0102 P0103 P010C P010D		—	×	—	×	—	—	×	—
P0117 P0118		—	—	—	—	—	×	—	—
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 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.
P0171 P0172 P0174 P0175	Fuel injection system	×	—	—	—	—	×	—	—
P0190	Fuel rail pressure sensor	×	—	—	×	—	×	—	—
P0191 P0192 P0193		×	—	—	—	×	—	—	—
P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	—	Exhaust valve timing control does not function.
P0201 P0202 P0203 P0204 P0205 P0206	Fuel injector	×	—	—	—	×	—	—	—
P0234 P1334	Turbocharger system	—	×	—	×	—	—	—	—

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							Others
		Pattern							
		A	B	C	D	E	F	G	
P0235 P0237 P0238 P0241 P0242	Turbocharger boost sensor	—	×	—	×	—	—	—	—
P0300 P0301 P0302 P0303 P0304 P0305 P0306	Misfire	×	—	—	—	—	×	—	—
P0335	Crankshaft position sensor	—	—	—	×	×	—	—	—
P0340 P0345	Intake camshaft position sensor	—	—	—	×	×	—	—	—
P1140 P1145		×	—	—	×	—	—	×	—
P0365 P0390	Exhaust camshaft position sensor	—	—	—	×	—	—	—	—
P0500	Vehicle speed sensor	×	—	—	—	—	×	—	—
P0524	Engine oil pressure	—	—	—	—	—	—	—	<ul style="list-style-type: none"> ECM illuminates engine oil pressure warning lamp on the combination meter. Engine speed will not rise more than 4,000rpm due to the fuel cut. Fail-safe is canceled when ignition switch OFF → ON.

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[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0603 P0607	ECM	—	—	—	—	—	—	—	—
		—	×	—	—	—	—	—	ASCSD operation may be deactivated.
P0604		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0605		—	—	—	—	—	—	—	—
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0606		—	—	—	—	—	—	—	—
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P060A		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
		—	×	—	×	—	—	—	<ul style="list-style-type: none"> • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • ASCSD operation may be deactivated.
P060B		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P062B		—	—	—	—	—	—	—	—
		×	—	—	—	×	—	—	—
P0641		Sensor power supply	—	—	—	×	×	—	—
	—		—	—	×	—	×	—	
P0643		—	—	—	×	—	—	—	—
P14A4 P14A5 P14AD P14AE	Charge air cooler cooling electric water pump	—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at the command speed.
P14A7 P14B0		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at full speed.
P14A9 P14AA P14AC P14B2 P14B3 P14B5		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump stops.
P1197	Out of gas	—	—	—	×	—	—	—	—
P119A P119B P119C	Fuel pressure sensor	×	—	—	—	×	—	—	—
P1233 P2101	Electric throttle control	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P1236 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.
P1238 P2119	Electric throttle control actuator	—	×	—	—	—	—	—	—
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1290 P2100 P2103	Throttle control motor relay	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
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					
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	—	—	—	×	—	—	—	—
P23E9 P23EA P2614 P2615	Intake camshaft position sensor	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	
		—	—	—	×	×	—	—	
		—	—	—	×	—	×	—	
P2562 P2566 P2586 P2590	Electric wastegate control valve position sensor	—	—	—	—	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)
		—	×	—	×	—	—	—	
P2563 P2564 P2565 P2587 P2588 P2589		—	×	—	×	—	—	—	—
P2578 P2593	Turbocharger speed sensor	—	—	—	—	—	—	—	Torque have to be limited to the operating range that does not generate the over speed of the turbocharger.
P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1	Electric intake valve timing control actuator	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P34C4 P34C5	Electric intake valve timing control actuator	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
P34C8	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	

ENGINE CONTROL SYSTEM : Fail safe (Turbo Low Pressure Model)

INFOID:000000013930219

Description

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

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. <ul style="list-style-type: none"> Engine output control 1: Driving at 70 km/h or more is possible. Engine output control 2: Driving at 40 km/h or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode		<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control 1
C		Engine output control 2
D	Device fix mode	

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Pattern	Fail safe mode	
E	Combustion control mode	Stratified charge combustion control at starting
F		<ul style="list-style-type: none"> • Idle speed control • Recovery speed control at decelerating • Idle neutral control*
G		<ul style="list-style-type: none"> • Ignition timing correction control • Retardation control

*: Not applicable

Fail Safe List

×: Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior							Others
		Pattern							
		A	B	C	D	E	F	G	
U012E U042F	Engine communication	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	
P0010 P0020	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	
P0011 P0021	Intake valve timing control	—	—	—	×	—	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: When VTC mechanism sticks, camshaft position does not change from position of stuck angle.
P0014 P0024	Exhaust valve timing control	—	—	—	×	—	—	—	—
P0046 P004B	Electric wastegate actuator motor	—	×	—	×	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)
P0078 P0084	Exhaust valve timing control solenoid valve	—	—	—	×	—	—	—	—
P0087 P0088	Fuel rail pressure control	×	—	—	×	×	—	—	—
		×	—	—	—	×	—	—	
P0090	High pressure fuel pump	×	—	—	×	×	—	—	—
P0101 P010B	Mass air flow sensor	×	—	—	—	×	—	—	—
		—	×	—	×	—	—	×	
P0102 P0103 P010C P010D		—	×	—	×	—	—	×	—
P0117 P0118	Engine coolant temperature sensor	—	—	—	—	—	×	—	—
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 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.
P0171 P0172 P0174 P0175	Fuel injection system	×	—	—	—	—	×	—	—

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0190	Fuel rail pressure sensor	×	—	—	×	—	×	—	—
P0191		×	—	—	—	×	—	—	—
P0192									
P0193									
P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	—	Exhaust valve timing control does not function.
P0201 P0202 P0203 P0204 P0205 P0206	Fuel injector	×	—	—	—	×	—	—	—
P0234 P1334	Turbocharger system	—	×	—	×	—	—	—	—
P0235 P0237 P0238 P0241 P0242	Turbocharger boost sensor	—	×	—	×	—	—	—	—
P0300 P0301 P0302 P0303 P0304 P0305 P0306	Misfire	×	—	—	—	—	×	—	—
P0335	Crankshaft position sensor	—	—	—	×	×	—	—	—
		—	—	—	×	—	×	—	
P0340 P0345	Intake camshaft position sensor	—	—	—	×	×	—	—	—
		—	—	—	×	—	×	—	
P1140 P1145		×	—	—	×	—	—	×	—
P0365 P0390	Exhaust camshaft position sensor	—	—	—	×	—	—	—	—
P0500	Vehicle speed sensor	×	—	—	—	—	×	—	—
P0524	Engine oil pressure	—	—	—	—	—	—	—	<ul style="list-style-type: none"> • ECM illuminates engine oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							Others	
		Pattern								
		A	B	C	D	E	F	G		
P0603 P0607	ECM	—	—	—	—	—	—	—	—	EC6
		—	×	—	—	—	—	—	ASCSD operation may be deactivated.	
P0604	ECM	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	C
P0605		—	—	—	—	—	—	—	—	D
P0606	ECM	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	E
		—	—	—	—	—	—	—	—	F
P060A	ECM	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	G
		—	×	—	×	—	—	—	<ul style="list-style-type: none"> • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • ASCD operation may be deactivated. 	H
P060B	ECM	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	I
P062B		—	—	—	—	—	—	—	—	J
P0641	Sensor power supply	×	—	—	—	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	K
		—	—	—	×	—	×	—		
P0643	Charge air cooler cooling electric water pump	—	—	—	×	—	—	—	—	L
P14A4 P14A5		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at the command speed.	M
P14A7		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at full speed.	
P14A9 P14AA P14AC		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump stops.	N
P1197	Out of gas	—	—	—	×	—	—	—	—	O
P119A P119B P119C	Fuel pressure sensor	×	—	—	—	×	—	—	—	P
P1233 P2101	Electric throttle control	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1236 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.	

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

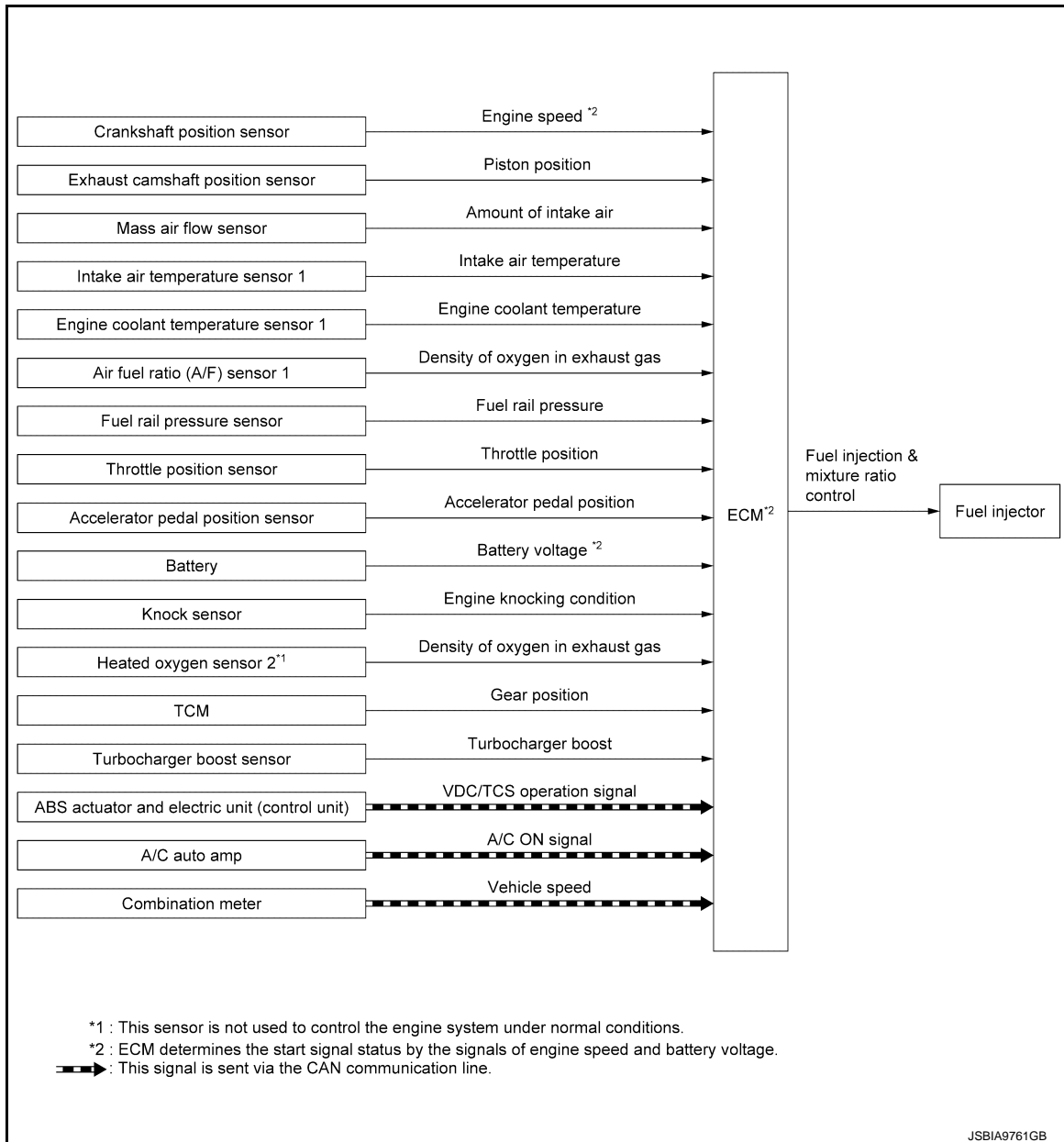
DTC No.	Detected items	Vehicle behavior								
		Pattern							Others	
		A	B	C	D	E	F	G		
P1238 P2119	Electric throttle control actuator	—	×	—	—	—	—	—	—	
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1290 P2100 P2103	Throttle control motor relay	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
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	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	—	—	—	×	—	—	—	—	
P23E9 P23EA P2614 P2615	Intake camshaft position sensor	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
		—	—	—	×	—	×	—		
		—	—	—	×	×	—	—		
		—	—	—	×	—	×	—		
P23EB P2616 P2617 P2618		—	—	—	×	×	—	—		
P2619		—	—	—	×	—	×	—		
P2562 P2566 P2586 P2590	Electric wastegate control valve position sensor	—	—	—	—	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)	
		—	×	—	×	—	—	—	—	
P2563 P2564 P2565 P2587 P2588 P2589		—	×	—	×	—	—	—		
P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1	Electric intake valve timing control actuator	—	—	—	—	—	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.	
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
		—	—	—	×	×	—	—		
P34C4 P34C5	Electric intake valve timing control actuator	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
P34C8	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
		—	—	—	×	—	×	—		

DIRECT INJECTION GASOLINE SYSTEM

DIRECT INJECTION GASOLINE SYSTEM : System Description

INFOID:000000013591420

SYSTEM DIAGRAM



*1 : This sensor is not used to control the engine system under normal conditions.
 *2 : ECM determines the start signal status by the signals of engine speed and battery voltage.
 - - - - - : This signal is sent via the CAN communication line.

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 pressure) from the crankshaft position sensor, exhaust 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

< SYSTEM DESCRIPTION >

- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever position is changed from N to D
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

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.

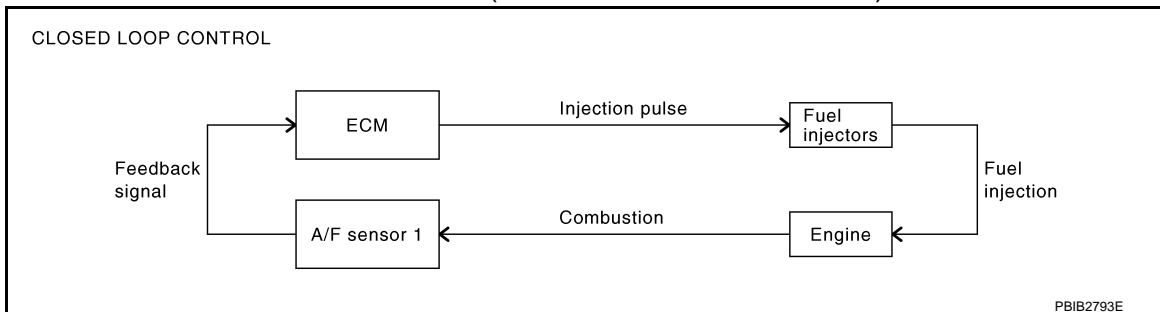
Right after a start with the engine cold, the catalyst warm-up is accelerated by stratified-charge combustion.

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 [EC6-40. "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 senses an oxygen concentration of exhaust gas at downstream of catalytic converter. Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

• Open Loop Control

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

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

MIXTURE RATIO SELF-LEARNING CONTROL

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

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

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

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

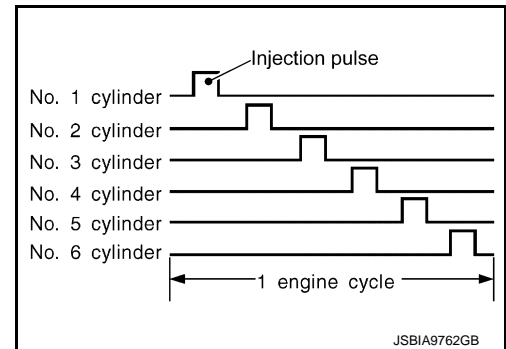
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture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

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

FUEL INJECTION TIMING

Sequential Direct Injection Gasoline System

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

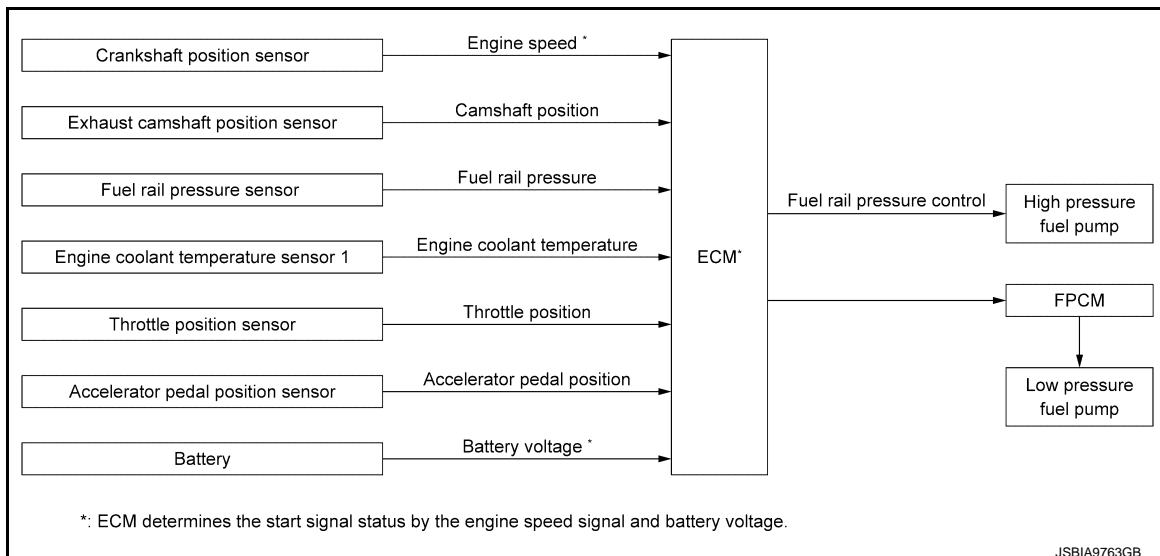
Fuel to each cylinder is shut-off during deceleration, operation of the engine at excessively high speed or operation of the vehicle at excessively high speed.

FUEL PRESSURE CONTROL

FUEL PRESSURE CONTROL : System Description

INFOID:0000000013591421

SYSTEM DIAGRAM

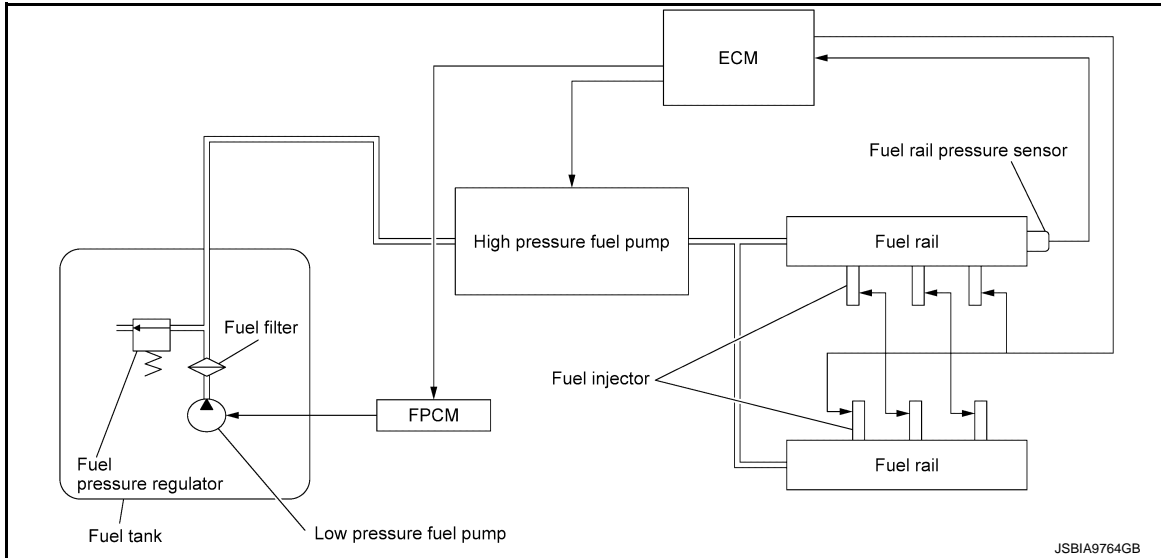


SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

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

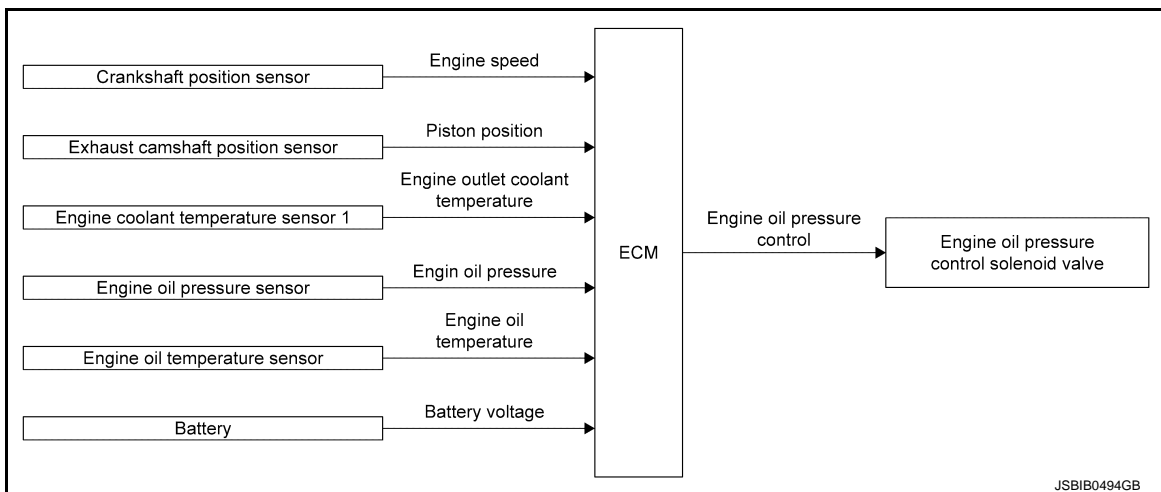
The high pressure fuel pump raises the pressure of the fuel sent from the low pressure fuel pump. Actuated by the exhaust camshaft, the high pressure fuel pump activates the high pressure fuel pump solenoid based on a signal received from ECM, and adjusts the amount of discharge by changing the timing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

ENGINE OIL PRESSURE CONTROL SYSTEM

ENGINE OIL PRESSURE CONTROL SYSTEM : System Description

INFOID:000000013591422

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

ECM performs the variable hydraulic control (low oil pressure control and high oil pressure control) based on signals from each sensor according to oil temperature and engine load. ECM activates the engine oil pressure control solenoid valve and switches to the low oil pressure control and high oil pressure control. ECM uses the low oil pressure control for 80-90% of the operating area to maintain low oil pressure and stops piston cooling jet (i.e. achievement of less than or equal to jet injection valve opening pressure).

High oil pressure control start condition

- High oil pressure control start condition
- High engine speed

< SYSTEM DESCRIPTION >

- Coolant temperature is 60°C (140°F) or more under high engine load condition

Low oil pressure control start condition

- Coolant temperature is less than 60°C (140°F) under low engine speed condition
- Coolant temperature is 60°C (140°F) or more under low engine load and low engine speed conditions

ELECTRIC IGNITION SYSTEM

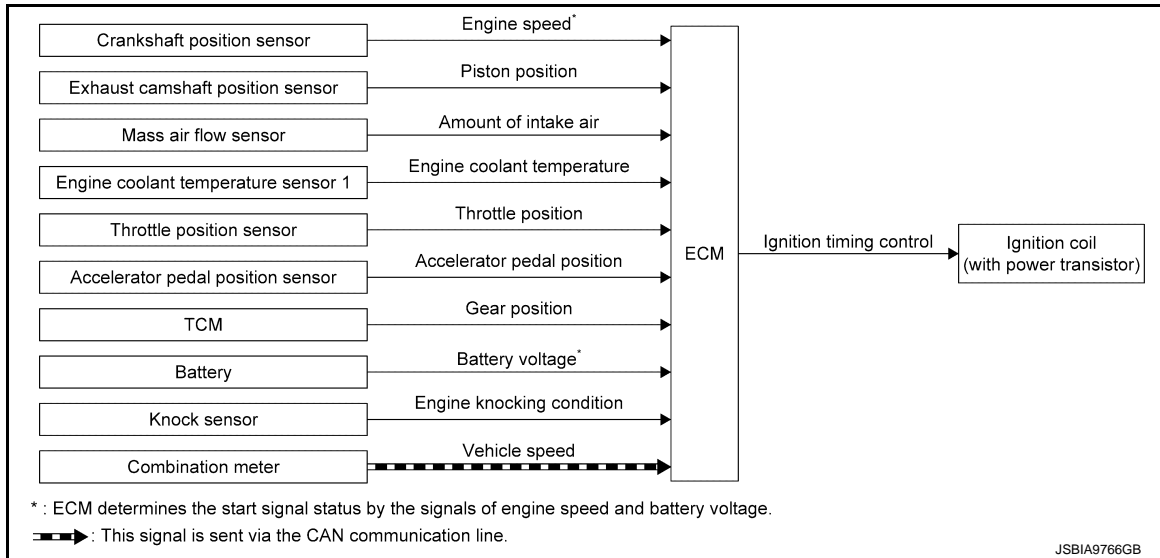
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EC6

ELECTRIC IGNITION SYSTEM : System Description

INFOID:000000013591423

SYSTEM DIAGRAM



C

D

E

F

G

H

SYSTEM DESCRIPTION

Ignition order: 1 - 2 - 3 - 4 - 5 - 6

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 exhaust camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.

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

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

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

I

J

K

L

M

N

O

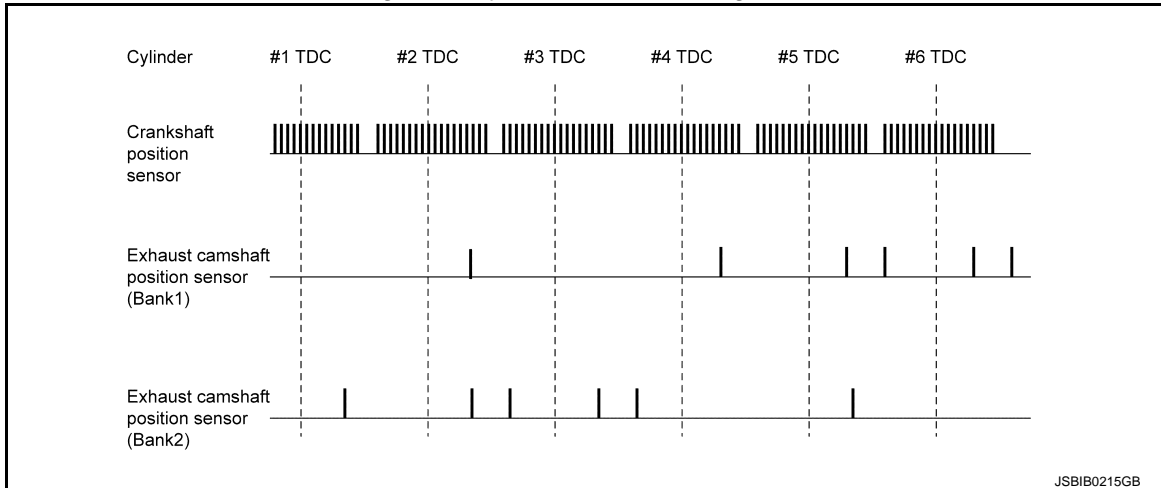
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SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Ignition cylinder detection signals

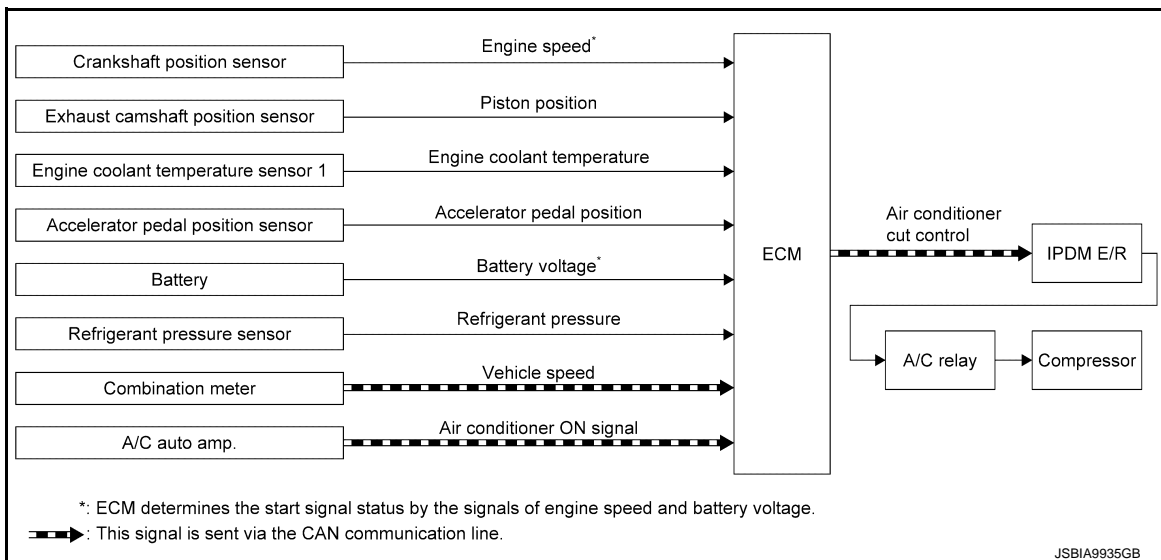


AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Description

INFOID:0000000013591424

SYSTEM DIAGRAM



Exhaust camshaft position sensor is not used for engine control operation.

SYSTEM DESCRIPTION

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

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

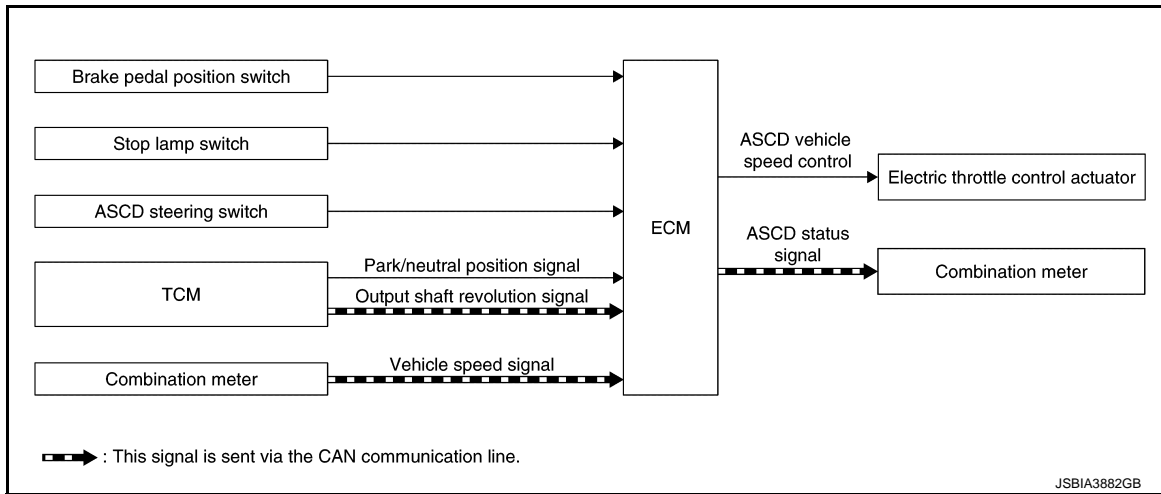
- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:000000013591425

SYSTEM DIAGRAM



BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

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

NOTE:

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

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 (89 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

And then ASCD will maintain the new set speed.

CANCEL OPERATION

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

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

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

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

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

- Malfunction for some self-diagnoses regarding ASCD control: SET indicator will blink quickly.

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

COAST OPERATION

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

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

RESUME OPERATION

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

- Brake pedal is released
- A/T selector lever is in the P and N positions
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:000000013591426

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.

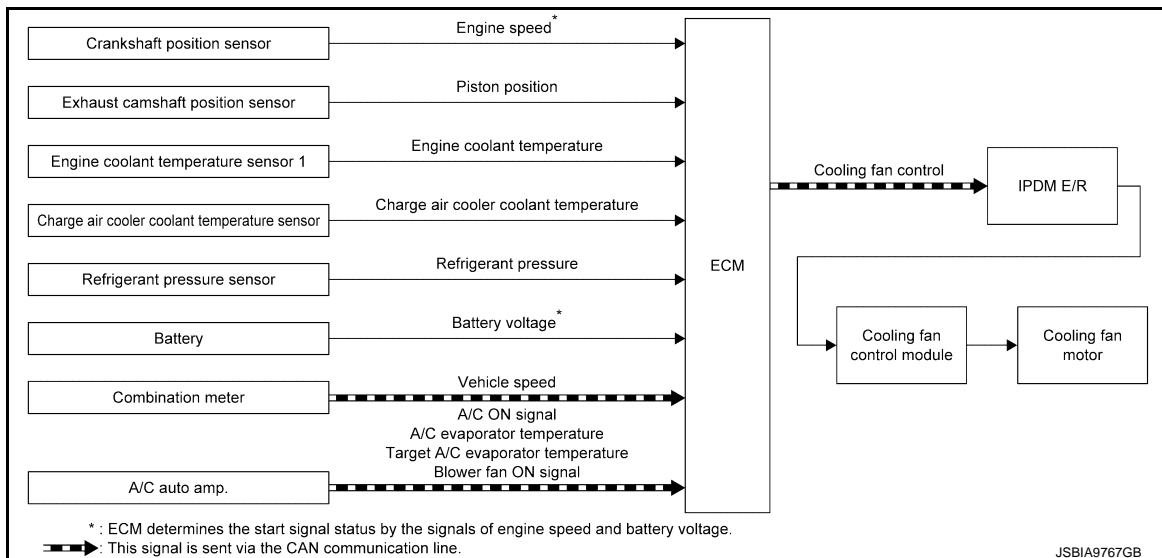
Refer to [LAN-60. "CAN COMMUNICATION SYSTEM : CAN Communication Control Circuit"](#), about CAN communication for detail.

COOLING SYSTEM

COOLING SYSTEM : System Description (Cooling Fan Control System)

INFOID:000000013591427

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The cooling fan system of this vehicle cools both engine cooling main radiator and charge air cooler (CAC) cooling sub radiator with the same cooling fan. There are two cooling fan speed requests as follows:

- Cooling fan speed request for cooling the engine.
- Cooling fan request for cooling the charge air cooler.

ECM compares these requested speeds and transmits faster one to IPDM E/R as a cooling fan control signal. 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.

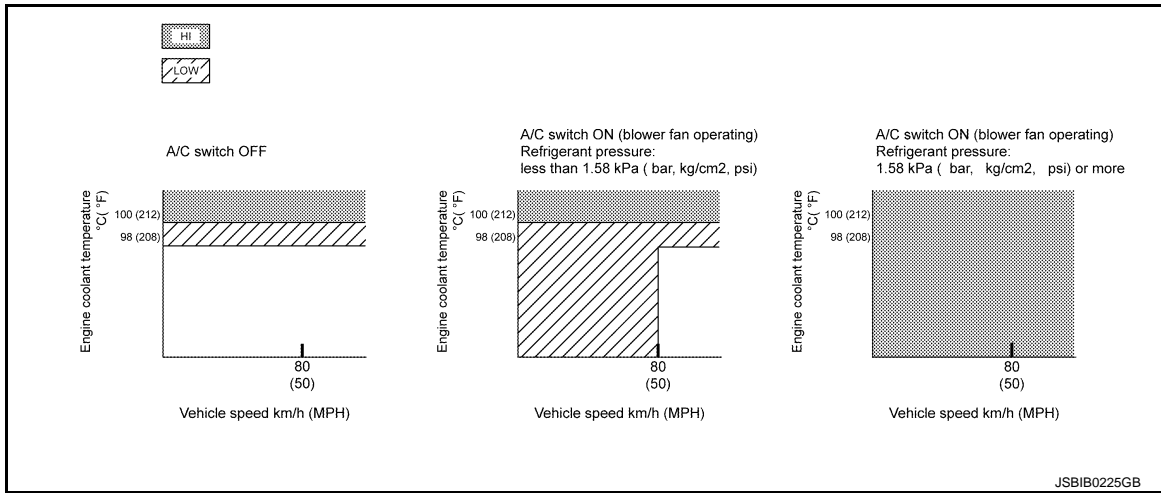
Cooling Fan Speed Request for Cooling the Engine

SYSTEM

< SYSTEM DESCRIPTION >

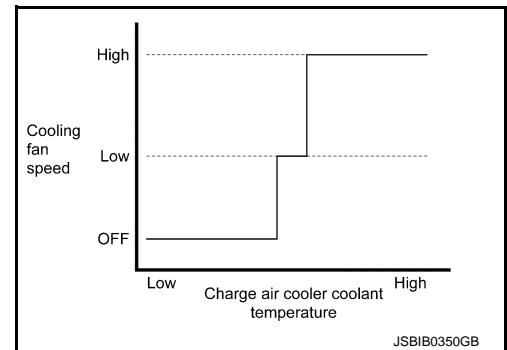
[VR30DDTT FOR USA AND CANADA]

Cooling fan speed for cooling the engine is judged based on vehicle speed, engine coolant temperature, air conditioner ON signal, refrigerant pressure, target A/C evaporator temperature, and A/C evaporator temperature.



Cooling Fan Speed Request for Cooling the Charge Air Cooler

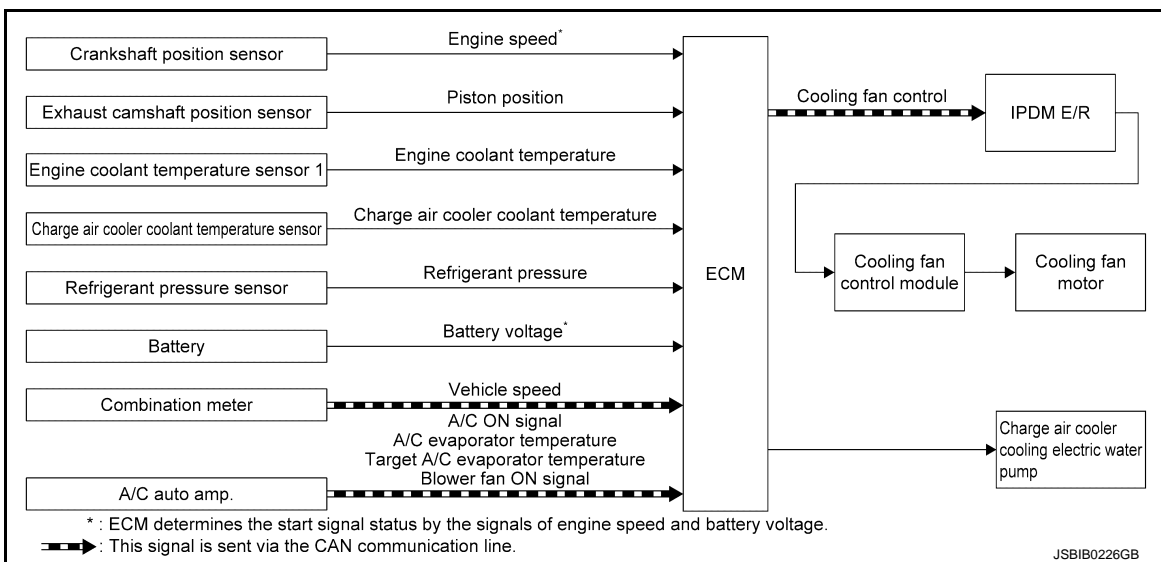
To judge a cooling fan speed for cooling the charge air cooler, ECM monitors an estimated ambient temperature and a CAC coolant temperature calculated based on a CAC coolant temperature sensor signal.



COOLING SYSTEM : System Description (Charge Air Cooler Cooling Control System)

INFOID:000000013591428

SYSTEM DIAGRAM

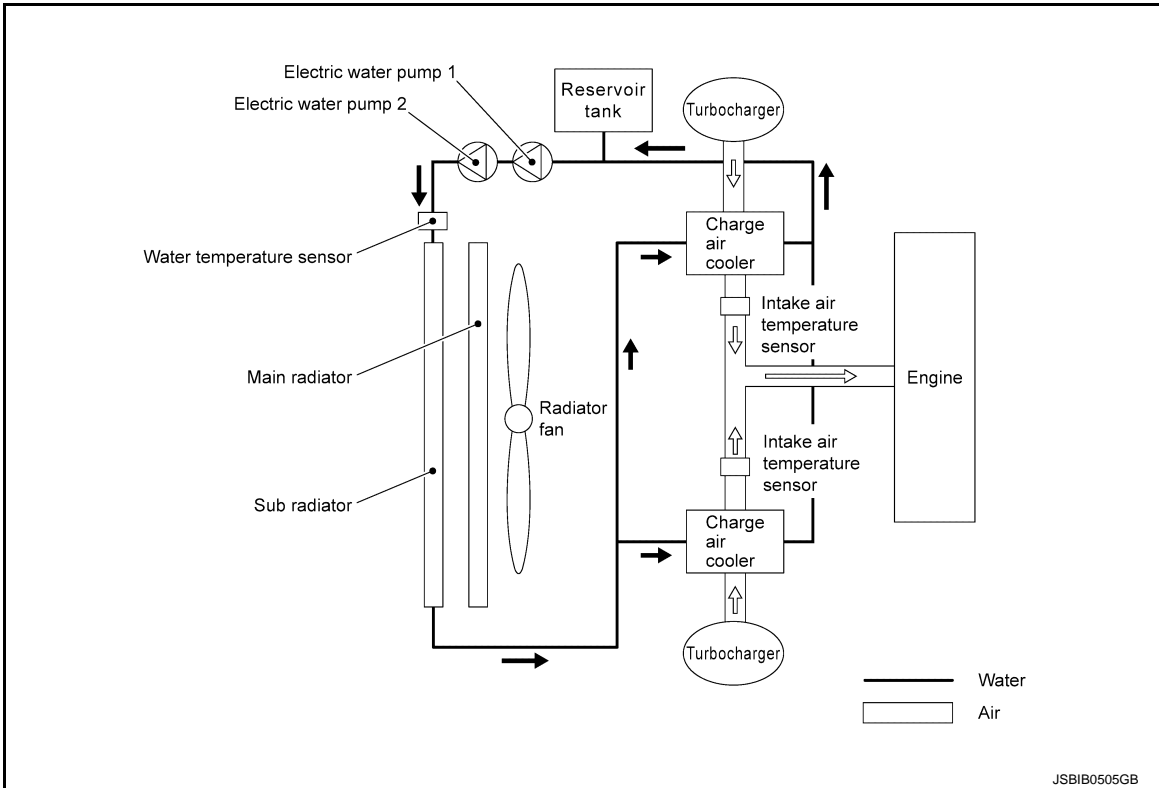


SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

SYSTEM DESCRIPTION



This engine uses a water-cooled charge air cooler (CAC).

The CAC charging system has an independent cooling water circuit and circulates coolant from charge air cooler to sub radiator by using electric water pumps.

Electric water pump 2 is not used for turbo low pressure model.

Water Pump and Cooling Fan Control During Engine Running

The charge air cooler (CAC) cooling water pump is controlled by two-stage speeds (High/Low) method.

ECM judges revolution speed of the water pump by calculating engine speeds and engine load and applying this information to the ECM-memorized control MAP.

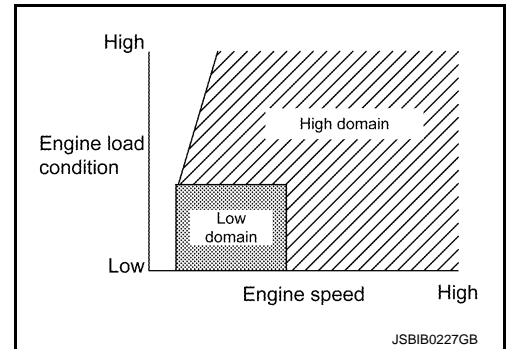
Furthermore, ECM monitors an estimated ambient temperature calculated based on an intake air temperature sensor signal and a CAC coolant temperature calculated based on a CAC coolant temperature sensor signal.

When the temperature difference between these two becomes wide during the low-speed control of the water pump, the water pump is switched to the high speed control and the cooling fan is activated.

ECM inhibits the operation of the water pump when the following condition is satisfied.

- Source voltage is abnormally high or low.
- CAC coolant temperature is -40°C (-40°F) or less.

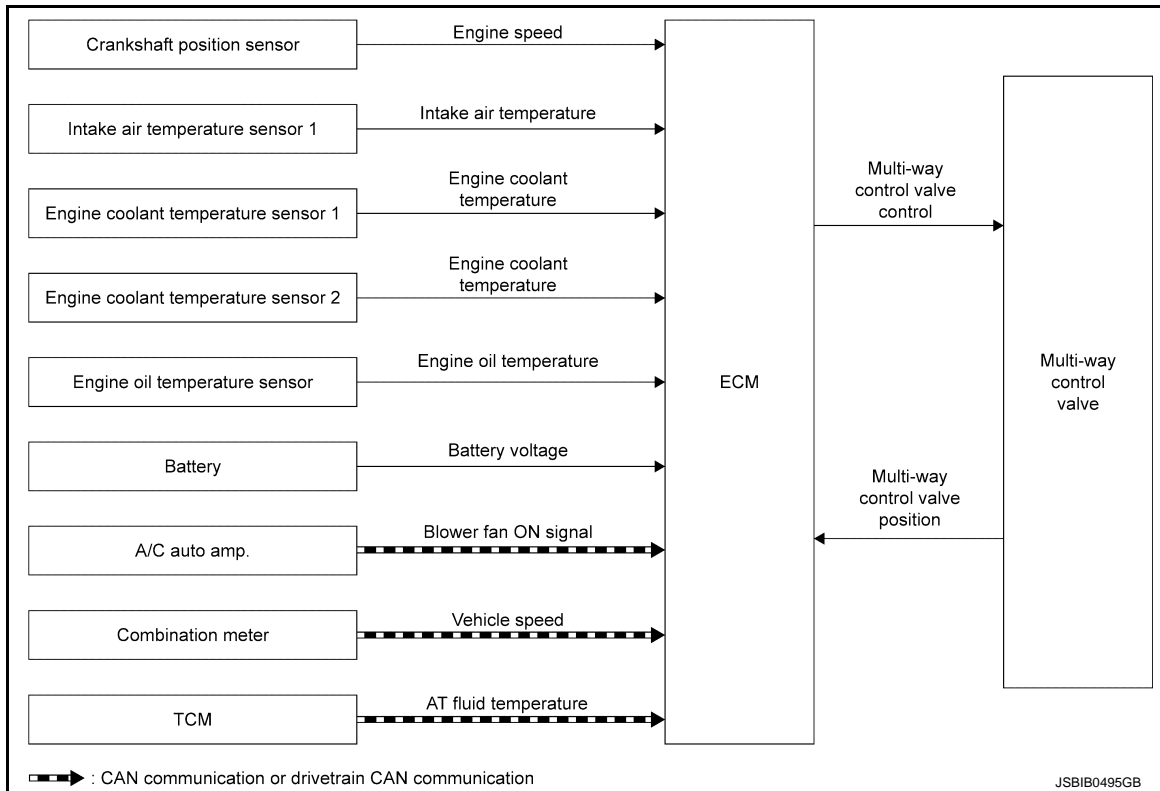
THERMAL MANAGEMENT CONTROL



THERMAL MANAGEMENT CONTROL : System Description

INFOID:000000013591429

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The multi-way control valve changes the paths to radiator, heater, engine oil cooler and ATF warmer according to engine coolant temperature and driving conditions.

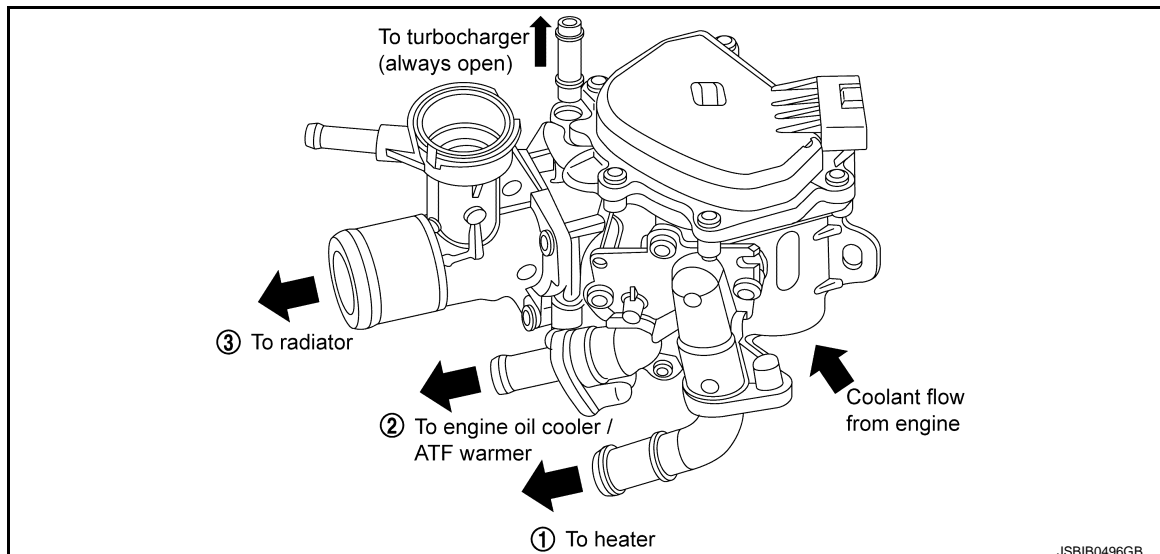
When coolant temperature is low, the paths to radiator, heater, engine oil cooler and ATF warmer are closed and coolant is circulated only inside the engine to accelerate engine warm-up.

When coolant temperature is high, the paths to radiator, heater, engine oil cooler and ATF warmer are opened and coolant is refrigerated. This raises the coolant temperature and oil temperature rapidly and improves the fuel economy by reducing friction among parts.

Operation

When the ignition switch is OFF, the valve is fully opened to accelerate bleeding the coolant channels.

When receiving a blower fan ON signal ECM opens the flow path to the heater even when coolant temperature is low.

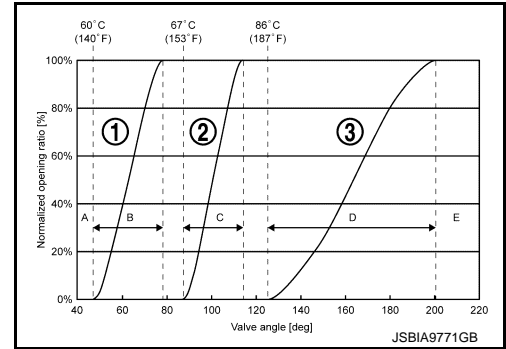


SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Valve position	①	②	③
	Heater	Engine oil cooler / ATF warmer	Radiator
A	Full close	Full close	Full close
B	Open	Full close	Full close
C	Full open	Open	Full close
D	Full open	Full open	Open
E	Full open	Full open	Full open



A: Closes all flow paths ①, ②, and ③ and circulates coolant only inside the engine.

B: Opens the flow path to heater and circulates coolant to heater.

C: Opens the flow path to engine oil cooler / ATF warmer and circulates coolant to heater and engine oil cooler & ATF warmer.

D: Opens the flow path to radiator and circulates coolant to heater, engine oil cooler / ATF warmer and radiator.

E: Opens all the flow paths ①, ②, and ③.

NOTE:

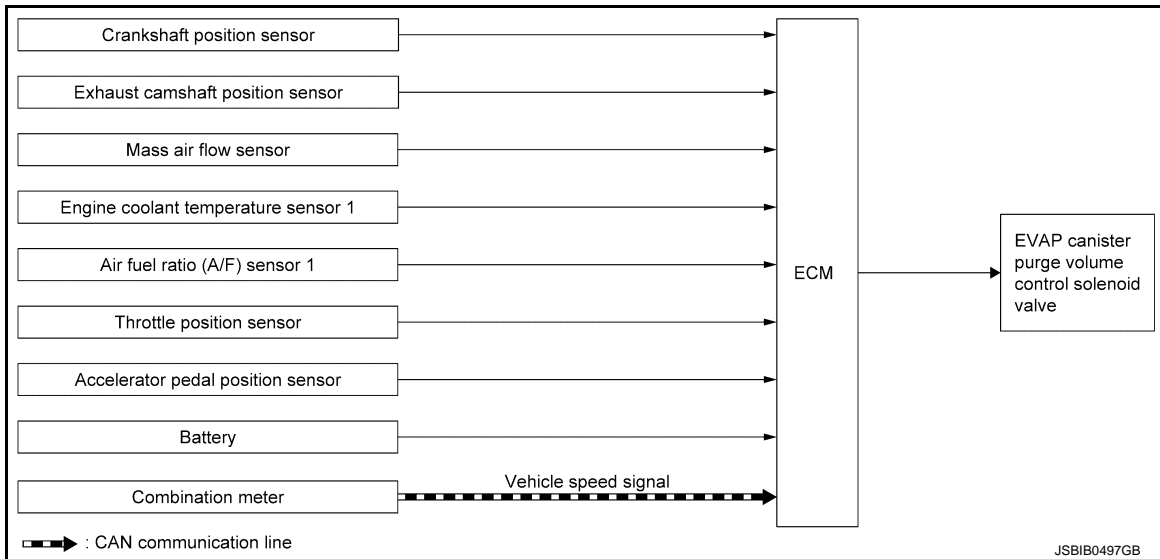
- The flow paths to the turbocharger are constantly ON.
- When detecting a malfunction in multi-way control valve, ECM fully opens the valve to secure cooling paths.

EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Description

INFOID:000000013591430

SYSTEM DIAGRAM



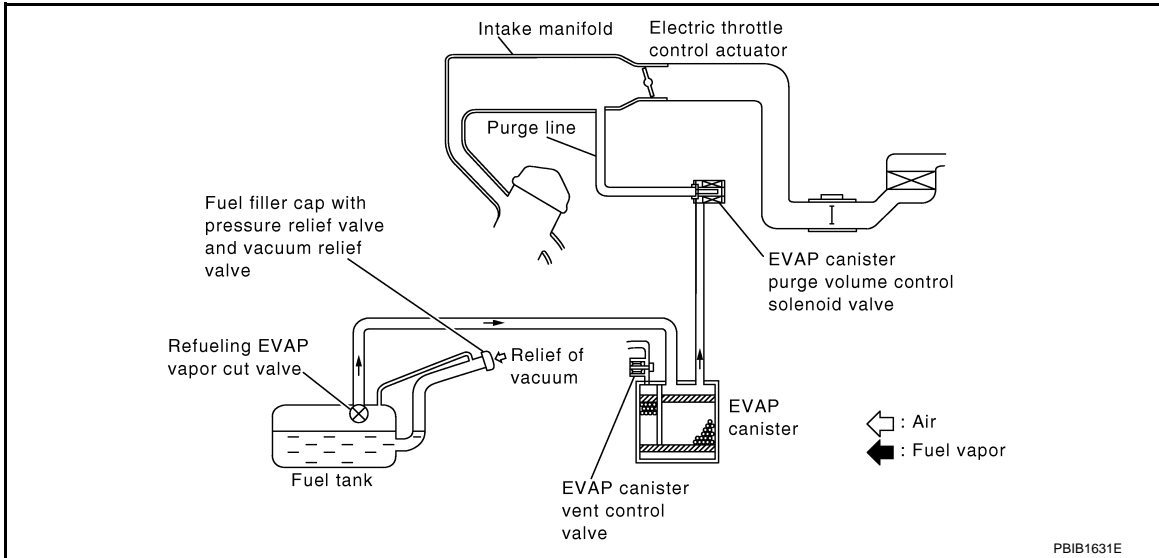
JSBIB0497GB

SYSTEM

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[VR30DDTT FOR USA AND CANADA]

SYSTEM DESCRIPTION



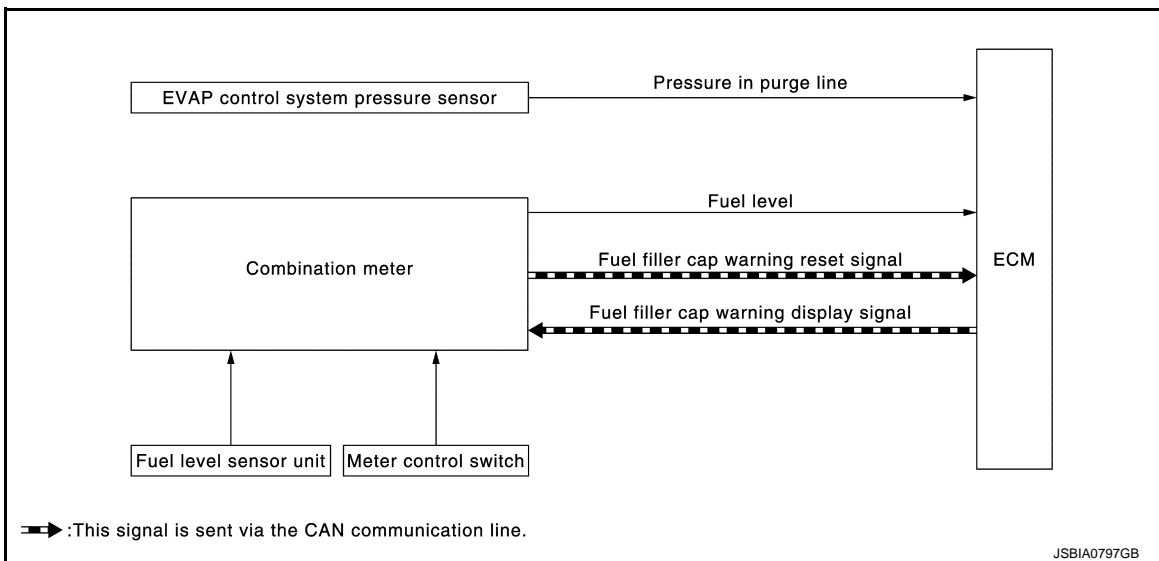
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon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

FUEL FILLER CAP WARNING SYSTEM

FUEL FILLER CAP WARNING SYSTEM : System Description

INFOID:000000013591431

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

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

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

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

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

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

CAUTION:

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

Reset Operation

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

- Reset operation is performed by operating the meter control switch on the combination meter. Refer to [MWI-61, "INFORMATION DISPLAY : System Description"](#).
- 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:

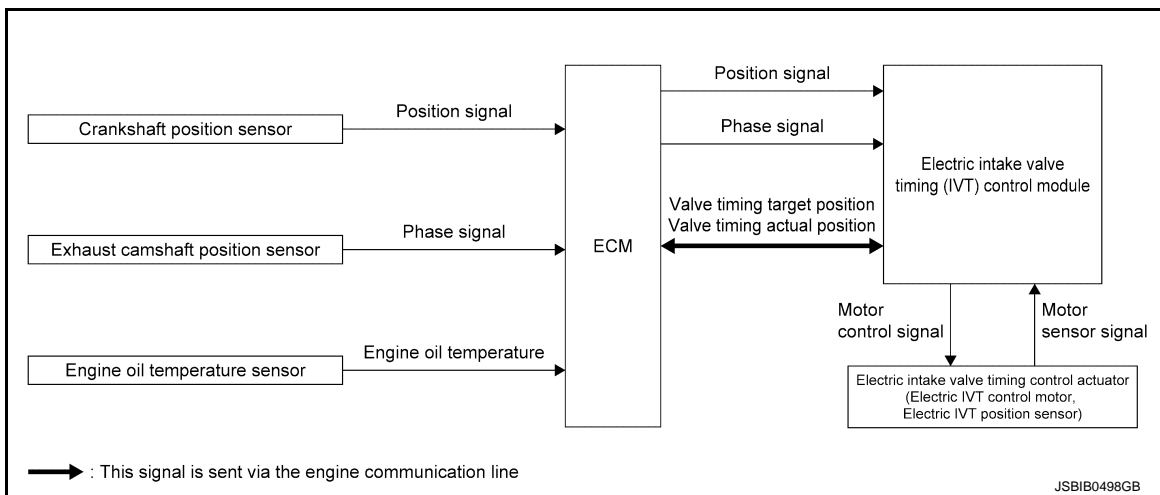
MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Description

INFOID:000000013591432

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

This engine uses an electric VTC. The electric VTC responds faster than hydraulic VTC and allows operating under low engine speed condition. This improves the fuel economy, engine output, and exhaust performance. This mechanism continuously controls the phase of camshaft by the electric intake valve timing (IVT) control actuator with the amount of intake valve operation held constant.

ECM transmits a crankshaft position signal and an intake camshaft position signal to the electric IVT control module and transmits target values of electric IVT control actuator via engine communication (CAN).

The electric IVT control module controls the electric IVT control actuator according to a signal from ECM and changes the opening and closing timing of intake valve. Furthermore, the electric IVT control actuator has a diagnostic function and transmits a DTC detection signal to ECM via engine communication when detecting a system error.

Status of electric intake valve timing control actuator	Electric intake valve timing control actuator activation
Advanced angle	Electric IVT control motor rotates faster than camshaft. This allows the camshaft position (cam phase) against camshaft sprocket to move toward the advanced angle.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Status of electric intake valve timing control actuator	Electric intake valve timing control actuator activation
Maintained	Electric IVT control motor and camshaft rotate at the same speed.
Retard angle	Electric IVT control motor rotates slower than camshaft. This allows the camshaft position (cam phase) against camshaft sprocket to move toward the retard angle.

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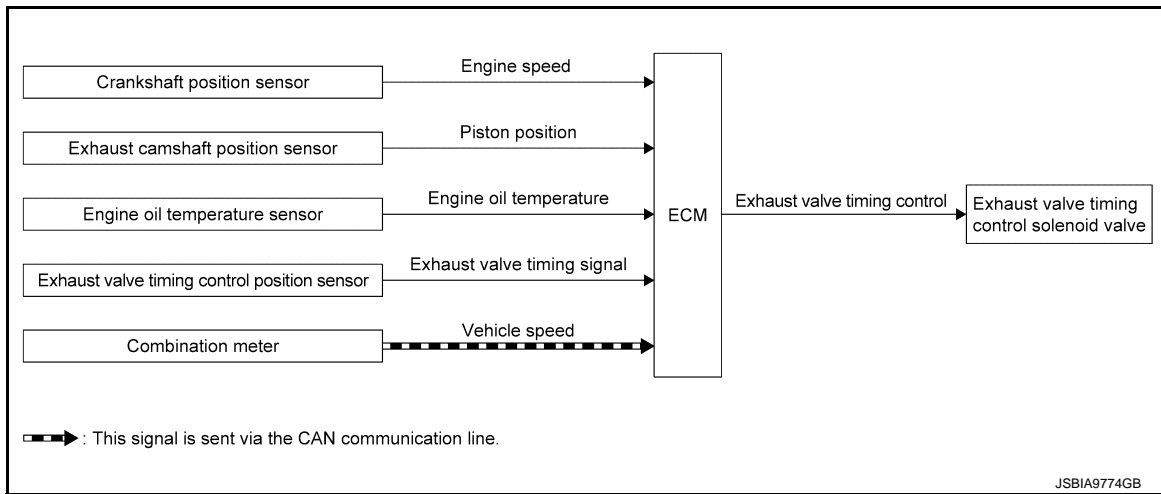
EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL : System Description

INFOID:0000000013591433

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SYSTEM DIAGRAM



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SYSTEM DESCRIPTION

With the exhaust valve timing controller which controls the phase of exhaust camshaft to optional position continuously, ECM improves both low-middle speed torque and high speed performance, emission and fuel efficiency by optimizing the exhaust valve open/close timing according to driving conditions.

The exhaust valve timing controller is hydraulically controlled by the exhaust valve timing control solenoid valve.

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 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.

EXHAUST VALVE TIMING CONTROL SOLENOID VALVE CONTROL

The exhaust valve timing control solenoid valve is driven ON-OFF (duty control) by ECM output signal, and controls the open/close timing of the exhaust valve to the optimum by changing its duty ratio according to the vehicle's driving condition.

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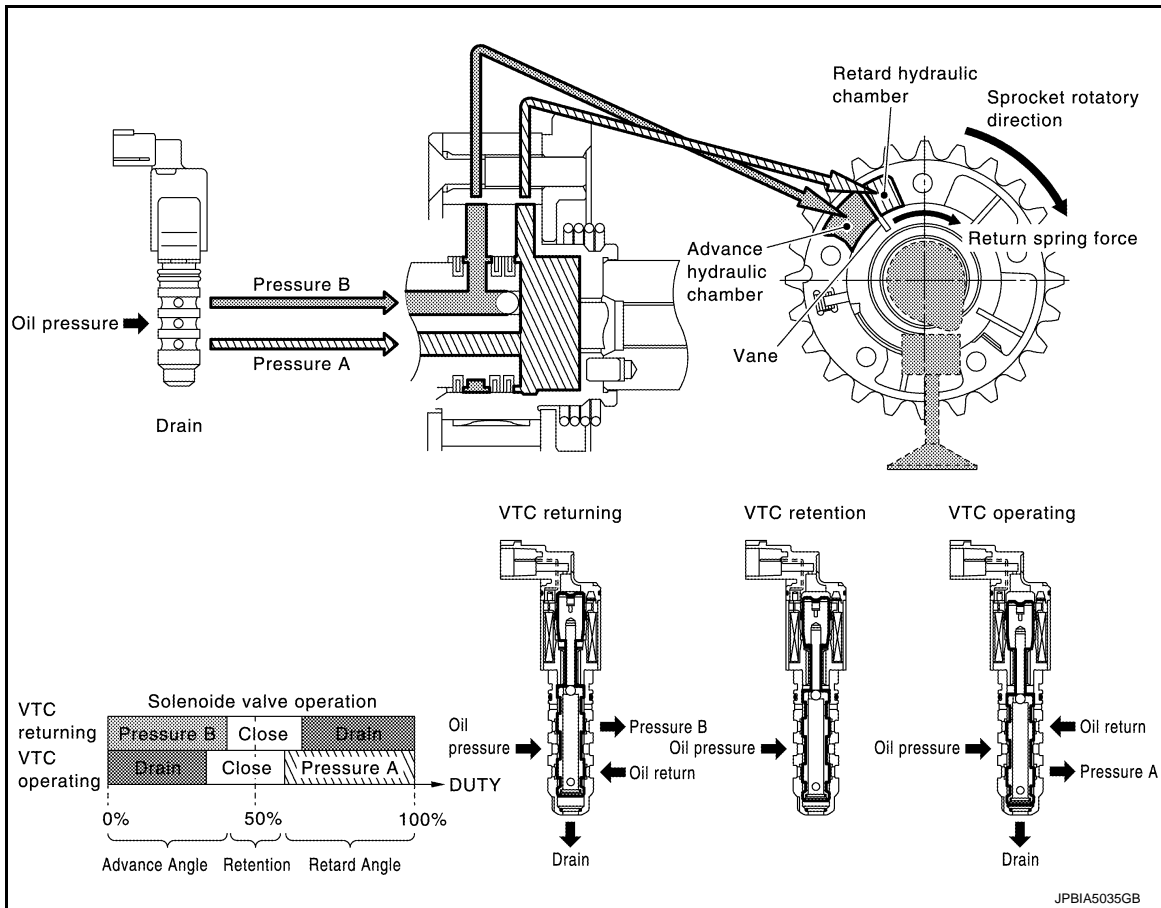
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SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]



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

EXHAUST VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

The exhaust camshaft position sensor detects a cam position, by using the groove on the plate located at the rear of the exhaust camshaft.

Feedback Control

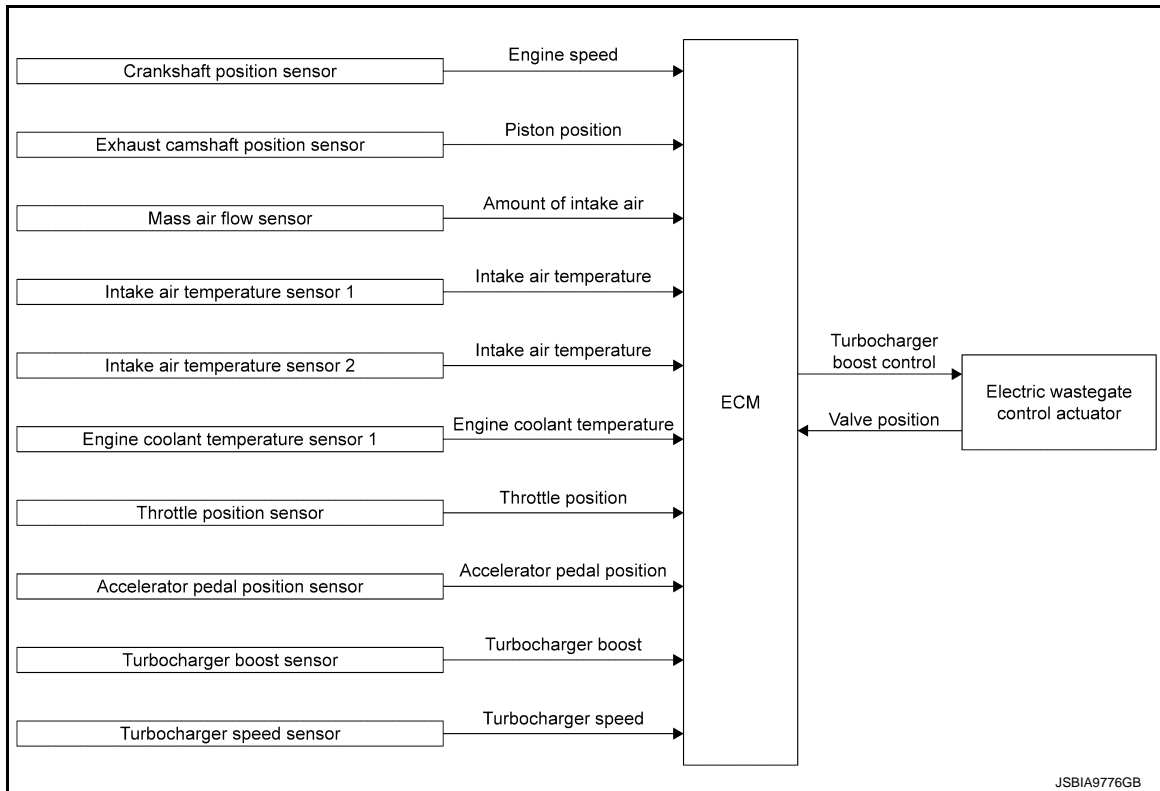
The exhaust camshaft position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the exhaust valve timing control solenoid valve to satisfy the optimum target valve opening/closing timing according to a driving condition.

TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : System Description

INFOID:000000013591434

SYSTEM DIAGRAM



*: Turbocharger speed sensor is not used for turbo low pressure model

SYSTEM DESCRIPTION

The wastegate is installed inside the exhaust side housing of turbocharger and connected via electric wastegate control actuator and link rod. When the wastegate opens, part of exhaust gas directly flows into exhaust pipe through bypass without passing the turbine. This limits the rise in boost pressure.

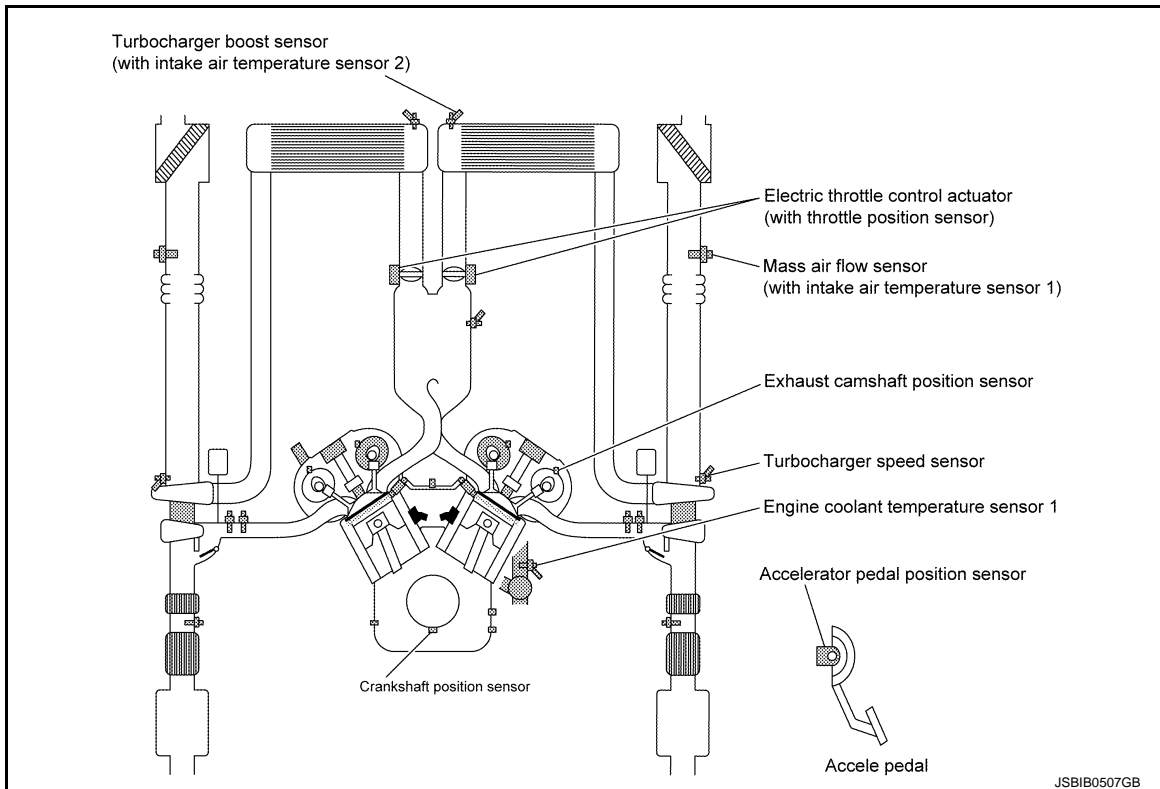
Furthermore, the introduction of electrically-controlled wastegate control valve enables the wastegate valve to be opened even in non-supercharging area, improving fuel consumption by the reduction of pumping loss.

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SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]



*: Turbocharger speed sensor is not used for turbo low pressure model

ECM controls boost pressure to make it suitable for driving conditions by controlling the electric wastegate control actuator.

ECM judges a target boost pressure based on engine speed, accelerator pedal position, and throttle valve position and calculates suction pressure near the entrance of compressor according to the amount of intake air and intake air pressure. Based on the above mentioned information, ECM judges wastegate valve opening angle to satisfy the target boost pressure.

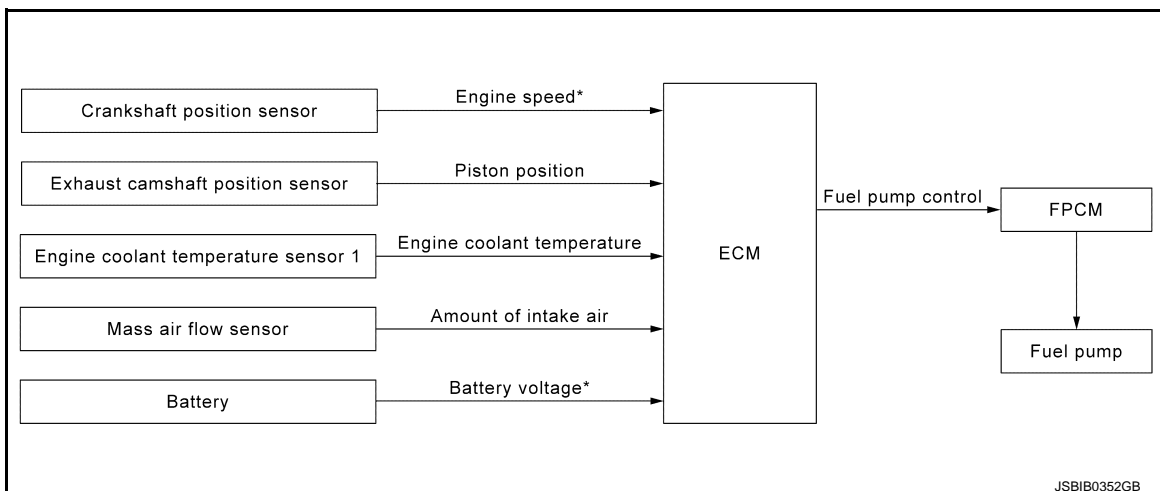
Furthermore, the revolution speed of compressor blade is directly monitored with a turbocharger speed sensor. This enables more accurate control of boost pressure and reduces damage to turbocharger caused by excess rise in revolution.

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : System Description

INFOID:000000013591435

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

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

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

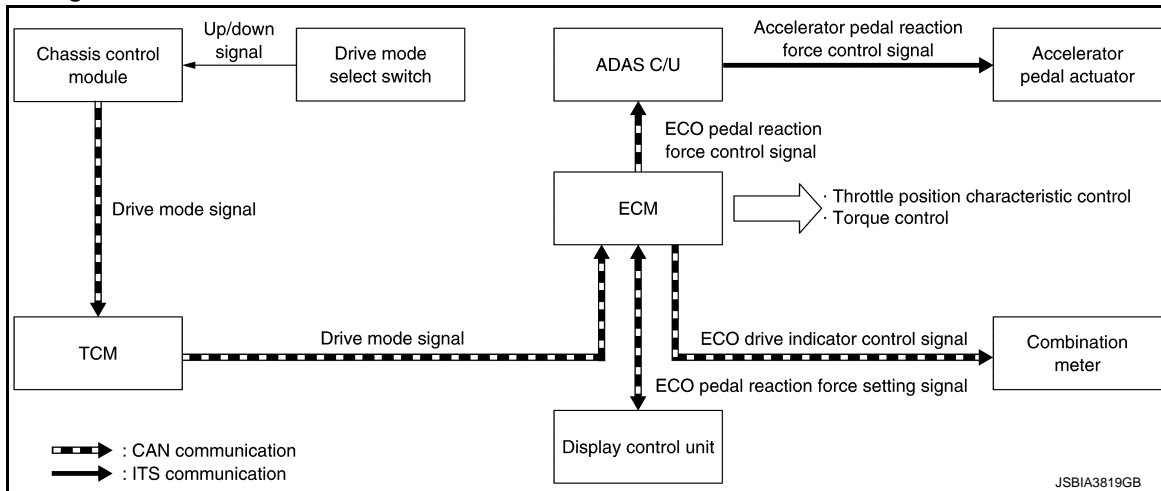
Conditions	Amount of fuel flow	Supplied voltage
For 1 second after turning ignition switch ON	Low/Mid	Approximately 9.9 V
<ul style="list-style-type: none"> • Engine cranking • Engine coolant temperature is below 10°C (50°F) • Engine is running under high load and high speed conditions 	High	Battery voltage (11 – 14 V)
Except the above	Low/Mid	Approximately 9.9 V

Infiniti Drive Mode Selector

Infiniti Drive Mode Selector : System Description

INFOID:000000013591436

System Diagram



NOTE:

- This section provides descriptions only about the control by ECM. For overall control, refer to [DMS-15, "Infiniti Drive Mode Selector : System Description \(For VR30DDTT Engine Models\)"](#).
- ECO pedal control is only for vehicles with Distance Control Assist.

ECO Pedal Control

- The display control unit transmits an ECO pedal reaction force setting signal (Standard/Soft/OFF) to ECM via CAN communication.

NOTE:

- An ECO pedal reaction force setting signal which determines reaction force of the accelerator pedal can be selected on the settings screen of the Multi AV system.
- ECM transmits an ECO pedal reaction force control signal to the ADAS control unit via CAN communication, based on a ECO mode signal received from TCM via CAN communication and an ECO pedal reaction force setting signal received from the display control unit via CAN communication.
- ECM sends back an ECO pedal reaction force setting signal received from the display control unit to the display control unit for confirmation.
- The ADAS control unit controls pedal reaction force of the accelerator pedal actuator via ITS communication, based on an ECO pedal reaction force control signal received from the ECM.

CONTROL

- With the drive mode selector, a drive mode select switch installed at the top of the center console switches a vehicle drive mode, changes throttle angle characteristics, and controls torque and ECO pedal.
- Vehicle characteristics are controlled in the following modes, on the basis of STANDARD mode.
 - PERSONAL: Driver may set the vehicle characteristic optionally.
 - SPORT/SPORT+: Changing throttle angle characteristics allows to use a high engine performance range and increases driving performance.
 - ECO: Changing throttle angle characteristics and controlling torque, ECO drive indicator, and ECO pedal enhance fuel economy in actual traffic.
 - SNOW: Changing throttle angle characteristics enhances driving performance on roads with a low coefficient of friction.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Control item	Vehicle drive mode				Description
	PERSONAL ^{*1}	SPORT	ECO	SNOW	
Engine	×	×	×	×	Changes throttle angle and controls torque ^{*2} and the ECO drive indicator ^{*2} .
ECO pedal ^{*3}	×		×		Controls ECO pedal (Accelerator pedal reaction force control).

*1: When the driver operates integral switch to turn ON/OFF the control or set some mode.

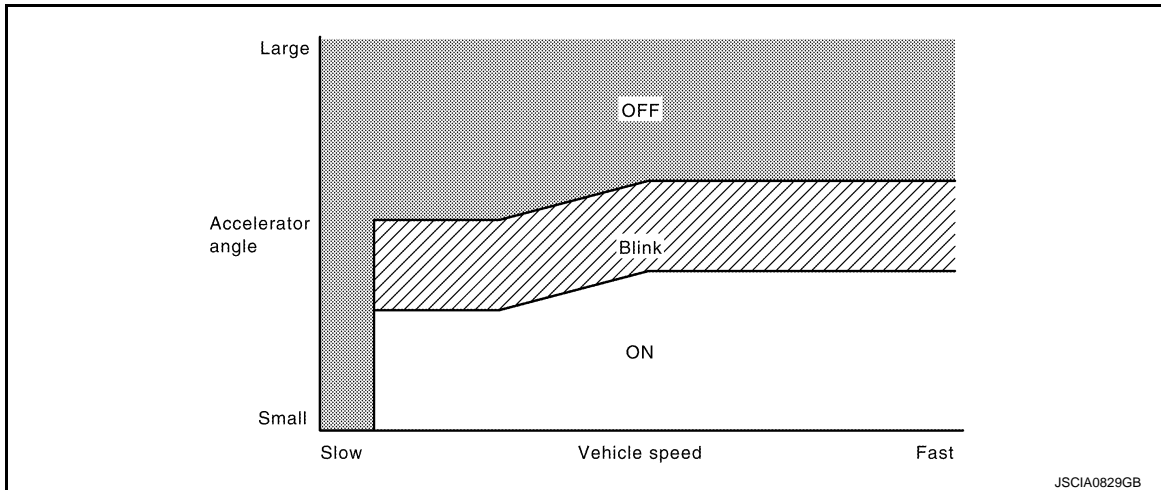
*2: Torque control and the ECO drive indicator is available only when in ECO mode.

*3: ECO pedal control is only for vehicles with Distance Control Assist.

ECO Drive Indicator Control

- ECO drive indicator turns ON or blinks when in ECO mode, according to the operation of the accelerator pedal.
- The blinking timing of the ECO drive indicator synchronizes to the generation timing of ECO pedal reaction force.

ECO drive indicator	Driving condition
ON	Within the ECO drive range.
Blink	Likely over the ECO drive range.
OFF	Low-speed range [approx. 2 MPH (3.2 km/h) or less] and high-speed range [approx. 90 MPH (144 km/h) or more]



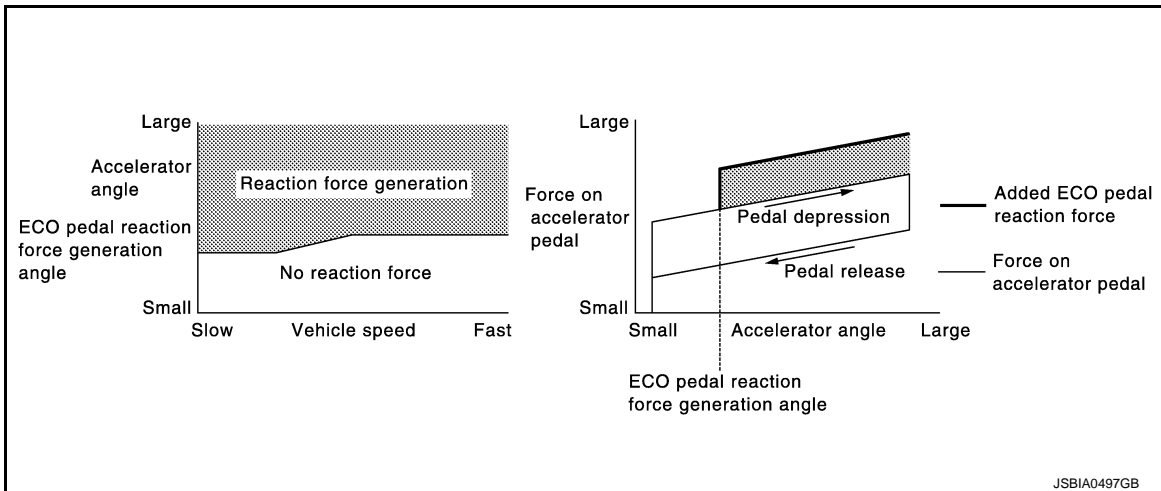
NOTE:

ECO drive indicator turns OFF under the following conditions.

- Intelligent cruise control in operation.
- Selector lever is in R range.

ECO Pedal Control

- Increasing reaction force of the accelerator pedal supports ECO driving in accordance with the accelerator pedal operation when in ECO mode.
- The level of reaction force to the accelerator pedal can be changed among Standard/Soft/OFF on the navigation screen. ECO pedal reaction force can be turned OFF even when in ECO mode.
- The generation timing of ECO pedal reaction force synchronizes to the blinking timing of the ECO drive indicator.



NOTE:

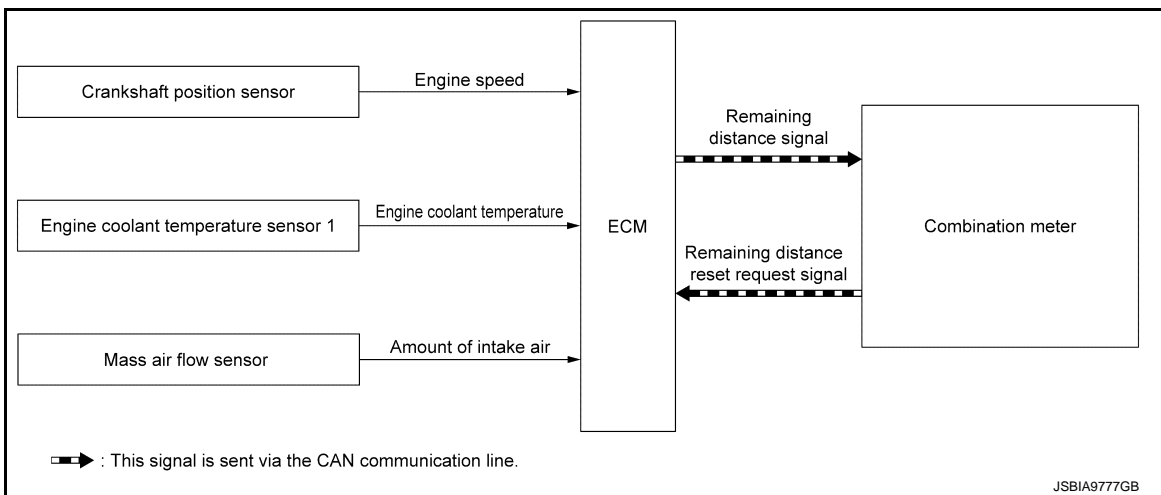
- When switching from ECO mode to the other mode by operating the drive mode select switch, ECO pedal reaction force is generated in common with ECO mode until the accelerator pedal is released.
- ECO pedal reaction force is not generated under the following conditions.
 - Intelligent cruise control is in operation.
 - Accelerator pedal is depressed quickly.
 - Selector lever is in N or R range.

OIL CONTROL SYSTEM

OIL CONTROL SYSTEM : System Description

INFOID:0000000013591437

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

ECM calculates engine load, engine coolant temperature, and engine speed based on signals from the mass air flow sensor, engine coolant temperature sensor, and crankshaft position sensor and monitors the deterioration state of engine oil.

When the mileage before engine oil change comes to approximately 1,500 km or less, pre-alert message is displayed to inform the driver that the maintenance timing is close as shown in the following table.

Remaining mileage to the engine oil change timing	Alert timing
1,000 km < the mileage ≤ 1,500 km (630 mile < the mileage ≤ 940 mile)	The first IGN ON after reaching 1,500 km (940 mile)
500 km < the mileage ≤ 1,000 km (310 mile < the mileage ≤ 630 mile)	The first IGN ON after reaching 1,000 km (630 mile)
500 km or less (310 mile or less)	The first IGN ON every 100 km (60 mile)

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Furthermore, when the timing is passed, alert message is displayed every time when ignition switch is turned ON to inform the driver that engine oil change is necessary.

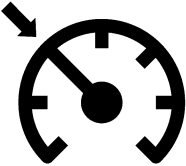
At oil change, the mileage must be reset using vehicle information display function.

NOTE:

Alerted mileage might be different from actual mileage.

INFORMATION DISPLAY (COMBINATION METER)




INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information INFOID:000000013591438

Item	Symbol	Function
ASCD indicator	 <small>JSCIA0831ZZ</small> Message: - - Km/h / - - MPH	For detail of ASCD function, refer to EC6-83, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" .

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Item	Symbol	Function
Oil control system (OCS) indicator	<p>Engine Oil</p>  <p>Service in 25 miles</p> <p style="font-size: small;">JSBIA9685GB</p>	<p>For detail of OCS function, refer to EC6-97, "OIL CONTROL SYSTEM : System Description".</p>
	<p>Engine Oil</p>  <p>Service due now</p> <p><input type="checkbox"/> Push & HOLD : RESET</p> <p style="font-size: small;">JSBIA9686GB</p> <p>Message: Push & HOLD: RESET</p>	<p>For detail of OCS function, refer to EC6-97, "OIL CONTROL SYSTEM : System Description".</p>
	<p>Engine Oil</p>  <p>Service in --- miles</p> <p style="font-size: small;">JSBIA9687GB</p> <p>Message: --- Km/h / --- MPH</p>	<p>For detail of OCS function, refer to EC6-97, "OIL CONTROL SYSTEM : System Description".</p>

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INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning

INFOID:000000013591439

DESIGN/PURPOSE

When engine oil pressure is low, the engine oil pressure warning informs the driver of low oil pressure to prevent damage to the engine.

Symbol	Message
 <p style="font-size: x-small; margin-top: 10px;">JPNIA1881ZZ</p>	<ul style="list-style-type: none"> Low Oil Pressure Stop Vehicle

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< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

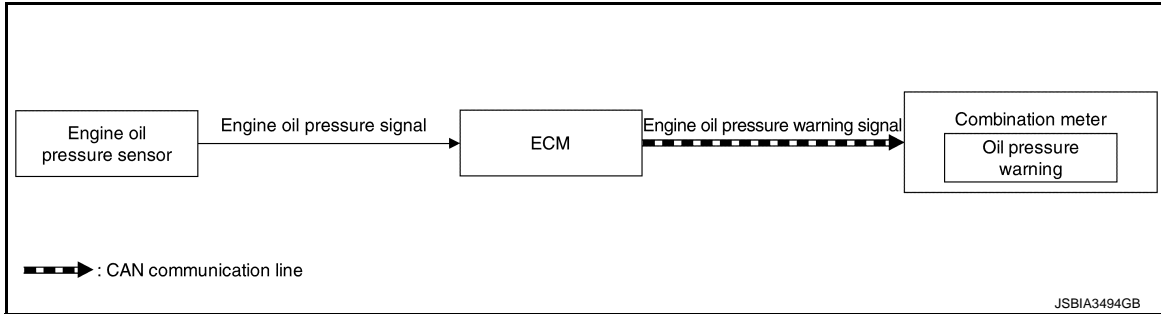
BULB CHECK

Not applicable

OPERATION AT COMBINATION METER CAN COMMUNICATION CUT-OFF OR UNUSUAL SIGNAL

For the operation for CAN communications blackout or abnormal signal reception, refer to [MWI-86, "Fail-Safe"](#).

SYSTEM DIAGRAM



SIGNAL PATH

ECM calculates an engine oil pressure according to a signal transmitted from the engine oil pressure sensor. After engine running when the engine oil pressure is low and at least 5 seconds, ECM transmits the engine oil pressure warning signal to combination meter via CAN communication. Then the engine oil pressure warning displays.

LIGHTING CONDITION

When all of the following conditions for at least 5 seconds are satisfied:

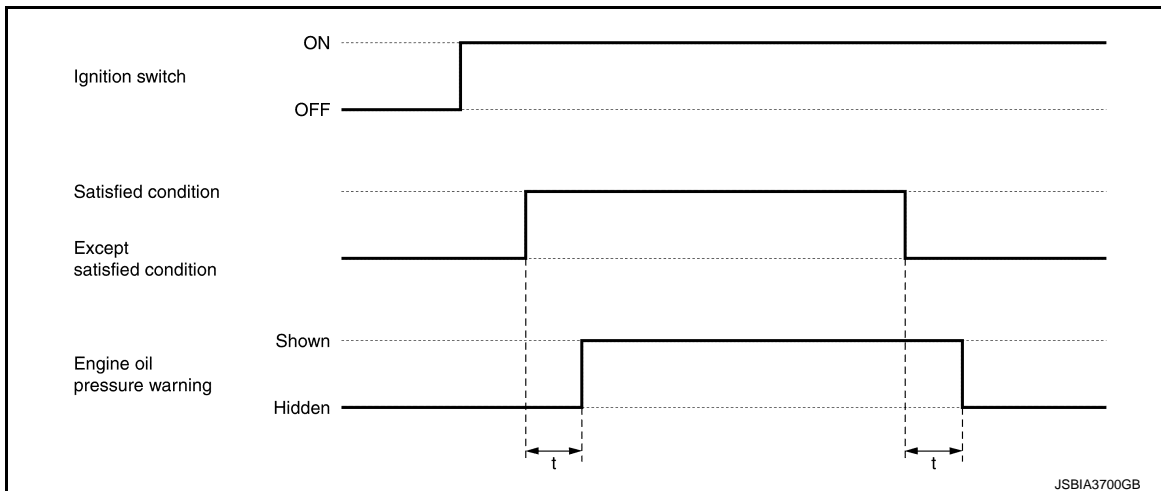
- Ignition switch: ON
- Engine oil pressure is less than specified value.
- Engine speed is more than 170 rpm.

SHUTOFF CONDITION

When any of the following conditions is satisfied:

- Ignition switch: OFF
- Engine oil pressure is the specified value or more.
- Engine speed is less than 170 rpm.

TIMING CHART



t: 100 ms

INFORMATION DISPLAY (COMBINATION METER) : Fuel Filler Cap Warning

INFOID:000000013591440

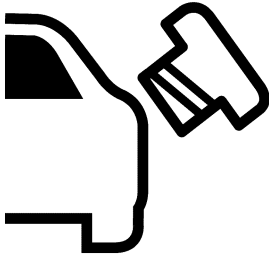
DESIGN/PURPOSE

Warn the driver that the fuel filler cap is left opened.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Symbol	Message
 <p style="text-align: right; font-size: small;">JSBIA3176GB</p>	<p>Loose Fuel Cap</p>

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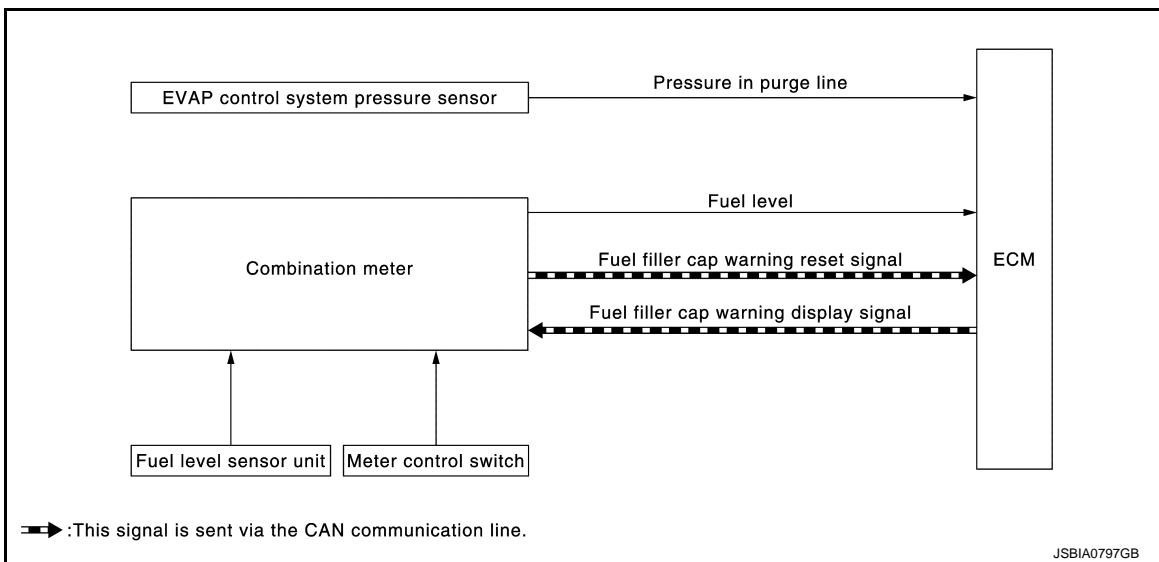
BULB CHECK

Not applicable

OPERATION AT COMBINATION METER CAN COMMUNICATION CUT-OFF OR UNUSUAL SIGNAL

For the operation for CAN communications blackout or abnormal signal reception, refer to [MWI-86. "Fail-Safe"](#).

SYSTEM DIAGRAM



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NOTE:

For details about the fuel filler cap warning system, refer to [EC6-89. "FUEL FILLER CAP WARNING SYSTEM : System Description"](#).

SIGNAL PATH

- ECM find out that the fuel filler cap is left opened and transmit the fuel filler cap warning display signal to the combination meter.
- The combination meter show or hide the fuel filler cap warning based on the received fuel filler cap warning display signal.

LIGHTING CONDITION

When all of the following conditions for at least 5 seconds are satisfied:

- Ignition switch: ON
- Fuel filler cap warning signal: ON

SHUTOFF CONDITION

When any of the following conditions is satisfied:

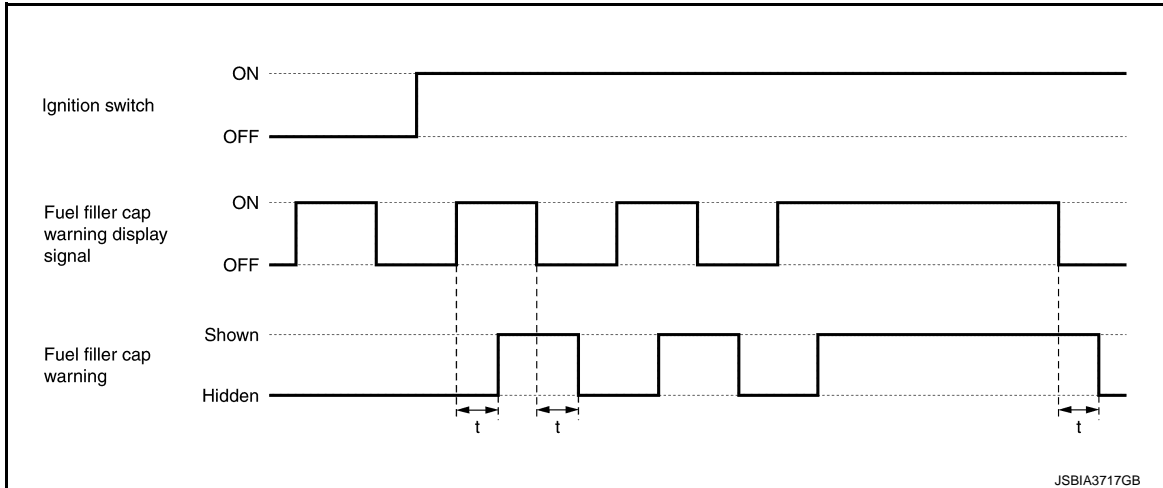
- Ignition switch: OFF
- Fuel filler cap warning signal: OFF

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TIMING CHART



t: 100ms



WARNING/INDICATOR/CHIME LIST

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

INFOID:000000013591441

NOTE:

Regarding the arrangement. Refer to [MWI-9, "METER SYSTEM : Design"](#).

Item	Design	Reference
Malfunction indicator lamp (MIL)		Regarding the function. Refer to MWI-35, "WARNING LAMPS/INDICATOR LAMPS : Malfunction Indicator Lamp (MIL)" .
ECO drive indicator lamp		Regarding the function. Refer to MWI-26, "WARNING LAMPS/INDICATOR LAMPS : ECO Drive Indicator Lamp" .

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

INFOID:000000013591442

Item	Reference
Engine oil pressure warning	Refer to EC6-99, "INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning" .
Fuel filler cap warning	Refer to EC6-100, "INFORMATION DISPLAY (COMBINATION METER) : Fuel Filler Cap Warning" .
ASCD indicator	Refer to EC6-98, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .
Oil control system (OCS) indicator	Refer to EC6-98, "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .

OPERATION

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

OPERATION

AUTMATIC SPEED CONTROL DEVICE (ASCD)

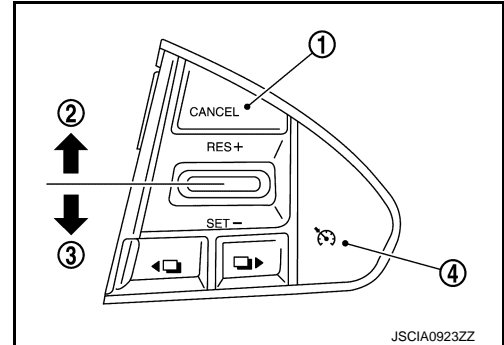
AUTMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:000000013591443

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Functions of each switch are listed in the following table.



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No.	Name	Function
①	CANCEL switch	When the switch is pressed, the ASCD control is cancelled.
②	RESUME/ACCEL switch (RES/+)	<ul style="list-style-type: none"> When the switch is pressed after the cruise control is cancelled in any method other than main switch operation, the vehicle speed is reset to the previous speed setting before the cancellation*. When the switch is pressed during cruise control, the setting speed is increased and the vehicle speed increases.
③	SET/COAST switch (SET/-)	<ul style="list-style-type: none"> When the switch is pressed at the preferred vehicle speed, the cruise control starts to operate. When the switch is pressed during cruise control, the set speed is reduced and the vehicle speed reduces.
④	ASCD MAIN switch	Turns the ASCD ON/OFF.

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*: To reset vehicle speed, the vehicle condition must be as follows:

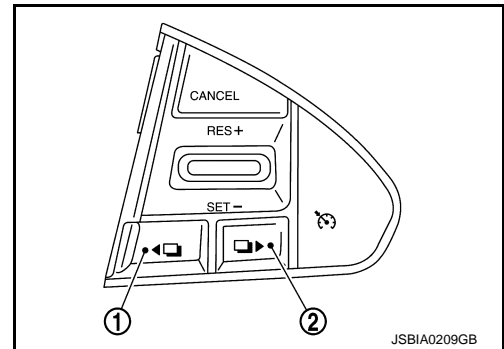
- Brake pedal is released.
- Selector lever is in a position other than P, R, and N.
- Vehicle speed is greater than 40 km/h (25 MPH) and 144 km/h (89 MPH).

OIL CONTROL SYSTEM

OIL CONTROL SYSTEM : Switch Name and Function

INFOID:000000013591444

Function of each switch are listed in the following table.



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No.	Name	Function
①	Display back switch	<ul style="list-style-type: none"> • The information display screen can be switched. • The distance to oil change can be erased.
②	Display next switch	

Operation status of OCS reset, refer to [EC6-278. "Description"](#).

HANDLING PRECAUTION

Infiniti Drive Mode Selector

INFOID:000000013591445

ECO DRIVE INDICATOR LAMP CONTROL

- ECO drive indicator turns OFF under the following conditions.
 - While driving at low speeds [3 MPH (4.8 km/h) or less] or high speeds [90 MPH (144 km/h) or more].
 - Intelligent cruise control is in operation.
 - Selector lever is in R range.

ECO PEDAL CONTROL

- When switching from ECO mode to the other mode by operating the drive mode select switch, ECO pedal reaction force is generated in common with ECO mode until the accelerator pedal is released.
- ECO pedal reaction force is not generated under the following conditions.
 - Intelligent cruise control is in operation.
 - Accelerator pedal is depressed quickly.
 - Selector lever is in N or R range.
 - ECO pedal reaction force setting is OFF.

NOTE:

ECO pedal control is only for vehicles with an intelligent pedal (distance control assist).

ENGINE OUTPUT CHARACTERISTICS AFTER SWITCHING MODE

- Engine output characteristics after switching mode by operating the drive mode select switch are as follows.
 - After switching mode to a mode that engine output increase, engine output characteristics are changed by releasing the accelerator pedal.
 - After switching mode to a mode that engine output decreases, engine output characteristics are changed immediately.
- When an accelerator angle is constant, engine output characteristics are as follows.
 - SPORT/SPORT+ > STANDARD > ECO > SNOW

Output characteristics of each mode

Control mode	Engine output
SPORT/SPORT+	Increase
STANDARD	Normal
ECO	Decrease
SNOW	Decrease (More reduction than ECO mode)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000013591446

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

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GST (Generic Scan Tool)

INFOID:0000000013591447

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to [EC6-105, "Diagnosis Description"](#).

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NOTE:

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

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DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (ECM)

DIAGNOSIS DESCRIPTION

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

INFOID:0000000013591448

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Illuminate	Blinking	Illuminate				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses. Refer to EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index" (For turbo high pressure model) or EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index" (For turbo low pressure model)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000013591449

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

For malfunctions in which 1st trip DTCs are displayed, refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model). These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

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

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC6-257, "Work Flow"](#). Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

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

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

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

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

DIAGNOSIS DESCRIPTION : Counter System

INFOID:000000013591450

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

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

COUNTER SYSTEM CHART

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

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

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

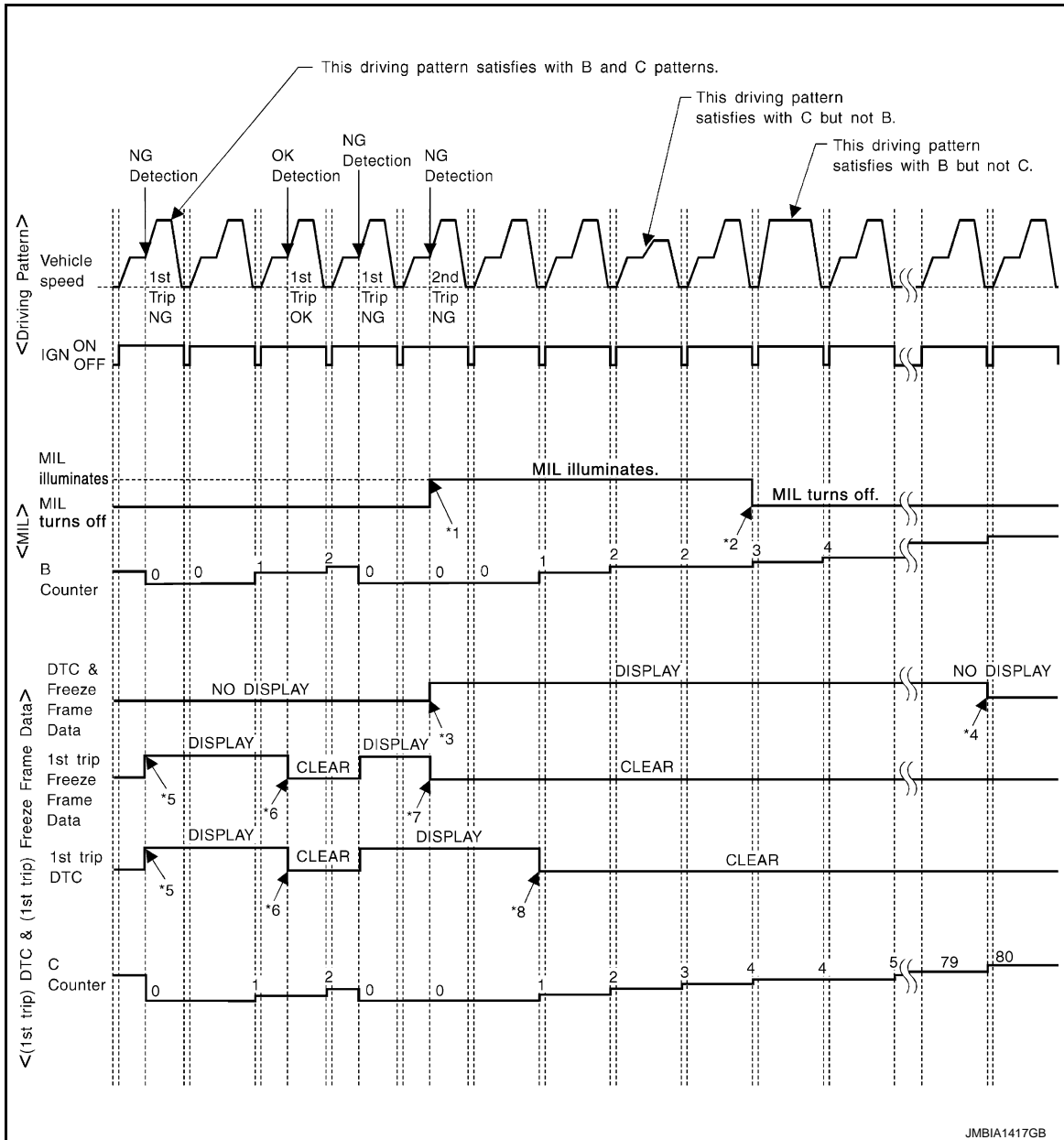
DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

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

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



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

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

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

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

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

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

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

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

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

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

Driving Pattern B

Refer to [EC6-111, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

Driving Pattern C

Refer to [EC6-111, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

Example:

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

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

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

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

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

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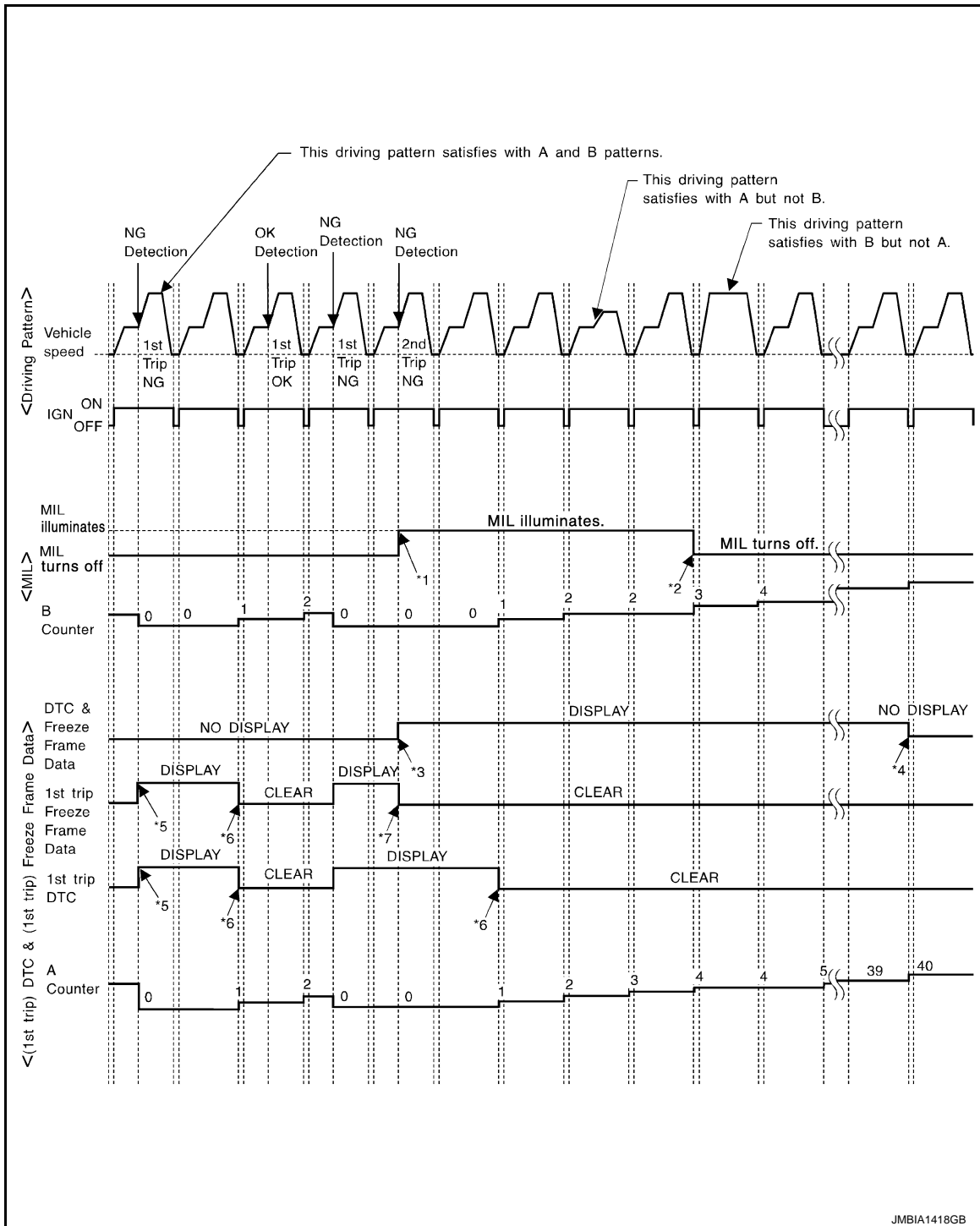
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DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]



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

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

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

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

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

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

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

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

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

Driving Pattern A

Refer to [EC6-111, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

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Driving Pattern B

Refer to [EC6-111, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

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DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000013591451

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CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (32°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

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

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DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

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

NOTE:

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

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DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

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

Calculated load value: (Calculated load value in the freeze frame data) $\times (1 \pm 0.1)$ [%]

Engine coolant temperature condition:

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

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DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

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

NOTE:

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

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

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

NOTE:

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

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:0000000013591452

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

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

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

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

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

NOTE:

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

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

NOTE:

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

SRT SET TIMING

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

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

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

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

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

—: Self-diagnosis is not carried out.

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

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

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

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

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

NOTE:

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

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

INFOID:000000013591453

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

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

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

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

NOTE:

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

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

PERMANENT DTC SET TIMING

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

On Board Diagnosis Function

INFOID:000000013591455

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.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC6-271, "Description" .
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC6-271, "Description" .
Wastegate actuator posi learn value clear	The initial position of the wastegate valve position can be adjusted. Refer to EC6-277, "Description" .
Electric intake valve timing control learning	The initial position of the electric intake valve timing control actuator can be adjusted. Refer to EC6-276, "Description" .
OCS reset	Engine oil date reset. Refer to EC6-278, "Description" .

BLUB CHECK MODE

Description

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

Operation Procedure

1. Turn ignition switch ON.
2. The MIL on the instrument panel should stay ON.
If it remains OFF, check MIL circuit. Refer to [EC6-988, "Diagnosis Procedure"](#).

SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to [EC6-112, "DIAGNOSIS DESCRIPTION : System Readiness Test \(SRT\) Code"](#).

Operation Procedure

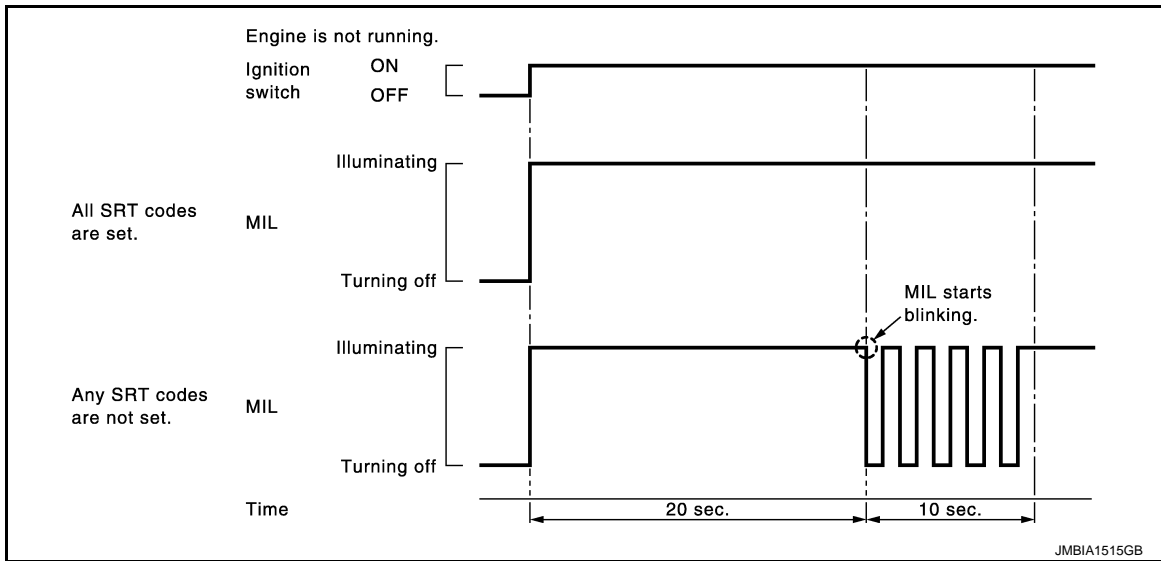
1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
 - ECM continues to illuminate MIL if all SRT codes are set.

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



MALFUNCTION WARNING MODE

Description

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

Operation Procedure

- Turn ignition switch ON.
- Check that MIL illuminates.
If it remains OFF, check MIL circuit. Refer to [EC6-988, "Diagnosis Procedure"](#).
- 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).

CONSULT Function

INFOID:0000000013591456

FUNCTION

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

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

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

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SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

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.

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code that is displayed as PXXXX. Refer to EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index" (For turbo high pressure model) or EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index" (For turbo low pressure model).
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 schedule.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed
ABSOL TH-P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed
FUEL SYS-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 enrichment) 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
INT MANI PRES [kPa]	These items are displayed but are not applicable to this model.
COMBUST CONDITION	
FUEL RAIL PRESSURE [MPa]	The fuel rail pressure at the moment a malfunction is detected is displayed.
TARGET FUEL RAIL PRESSURE [MPa]	The target fuel rail pressure at the moment a malfunction is detected is displayed.
BATTERY VOLTAGE [V]	The battery voltage at the moment a malfunction is detected is displayed.
FUEL LEVEL [%]	The fuel level at the moment a malfunction is detected is displayed.

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

DATA MONITOR MODE

NOTE:

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

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- For reference values of the following items, refer to [EC6-131, "TURBO HIGH PRESSURE MODEL : Reference Value"](#) (For turbo high pressure model) or [EC6-172, "TURBO LOW PRESSURE MODEL : Reference Value"](#) (For turbo low pressure model).

Monitored Item

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
COOLANT TEMP/S	°C or °F	×	×	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE	km/h or mph	×	×	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed. 	
BATTERY VOLT	V			<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
INT/A TEMP SE	°C or °F	×	×	<ul style="list-style-type: none"> The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated. 	
TURBO BST SEN	V			<ul style="list-style-type: none"> The turbocharger boost sensor signal voltage is displayed. 	
PURG VOL C/V	%			<ul style="list-style-type: none"> 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. 	
FUEL T/TMP SE	°C or °F			<ul style="list-style-type: none"> The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed. 	
FUEL LEVEL SE	V	×		<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
EVAP SYS PRES	V			<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
CAL/LD VALUE	%			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current air flow divided by peak air flow. 	
HO2S2 (B1)	V	×	×	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 is displayed. 	
HO2S2 (B2)					
ENG OIL TEMP	°C or °F			<ul style="list-style-type: none"> The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed. 	
A/F ALPHA-B1	%			<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. When engine is running, specification range is indicated in "SPEC".
A/F ALPHA-B2					

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
A/F S1 HTR (B1)	%			<ul style="list-style-type: none"> 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. 	
A/F S1 HTR (B2)					
TC/SC SPEED B1	rpm			<ul style="list-style-type: none"> The turbocharge revolution speed (determined by the signal voltage of the turbocharge speed sensor) is displayed. 	
TC/SC SPEED B2					
EXH/V TIM B1	°CA			<ul style="list-style-type: none"> Indicates [°CA] of exhaust camshaft retard angle. 	
EXH/V TIM B2					
W/GATE V CLSD LEARN B2	INCMP/CMPLT			Displays "full close position learning" experience of wastegate actuator. <ul style="list-style-type: none"> INCMP: Learning is incomplete. There is no memory of the full close position voltage in the ECM. CMPLT: Learning is complete. Full close position voltage is memory in the ECM. 	
W/GATE V CLSD LEARN B1					
W/G ACTUATOR POSITION B1	m			<ul style="list-style-type: none"> Indicates real stroke position of turbocharger wastegate actuator. The value is calculated by ECM based on the difference voltage between position sensor output and valve close position. 	
W/G ACTUATOR POSITION B2					
RADIATOR COOLANT TEMP	°C			<ul style="list-style-type: none"> The radiator coolant temperature (determined by the signal voltage of the radiator coolant temperature sensor) is displayed. 	
Ignition timing	deg	×	×	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. NOTE: Indicates degree from BTDC (Before Top Dead Center) of compression stroke.	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
Fuel injection timing	deg			<ul style="list-style-type: none"> Indicates the fuel injection timing computed by ECM according to the input signals. NOTE: Indicates degree from BTDC (Before Top Dead Center) of intake stroke.	
FAN DUTY	%			<ul style="list-style-type: none"> Indicates a command value for cooling fan. The value is calculated by ECM based on input signals. 	
Charge air cooler coolant temp	deg			<ul style="list-style-type: none"> The charge air cooler coolant temperature (determined by the signal voltage of the charge air cooler coolant temperature sensor) is displayed. 	

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
AC EVA TEMP	°C or °F			<ul style="list-style-type: none"> Indicates A/C evaporator temperature sent from "unified meter and A/C amp". 	
AC EVA TARGET	°C or °F			<ul style="list-style-type: none"> Indicates target A/C evaporator temperature sent from "unified meter and A/C amp". 	
ALT DUTY	%			<ul style="list-style-type: none"> Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal. 	
FUEL PUMP DUTY	%			<ul style="list-style-type: none"> The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signals) is indicated. 	
BAT TEMP SEN	V			<ul style="list-style-type: none"> The signal voltage from the battery temperature sensor is displayed. 	
THRTL STK CNT B1	—			NOTE: The item is indicated, but not used.	
THRTL STK CNT B2					
ENG SPEED	rpm	×	×	<ul style="list-style-type: none"> Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE). 	<ul style="list-style-type: none"> 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.
TRVL AFTER MIL	km or mile			<ul style="list-style-type: none"> Distance traveled while MIL is activated. 	
B/FUEL SCHDL	ms	×	×	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> When engine is running, specification range is indicated in "SPEC".
MASS AIRFLOW	g/s			<ul style="list-style-type: none"> Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor. 	
FUEL PRES SEN	MPa			<ul style="list-style-type: none"> Indicates the fuel rail pressure computed by ECM according to the input signals. 	
ACCEL SEN 1	V			<ul style="list-style-type: none"> The accelerator pedal position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> ACCEL SEN 2 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
ACCEL SEN 2					
TP SEN 1-B1	V	×	×	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> TP SEN 2-B1 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 2-B1					
FUEL INJ B1	msec			<ul style="list-style-type: none"> ECM-calculated injection pulse width of the fuel injector on the Bank 1 side. 	
FUEL INJ B2					
IDLE FUEL PRES MIN	MPa			<ul style="list-style-type: none"> Lower limit of fuel pressure at idle state. 	
IDLE FUEL PRES MAX		<ul style="list-style-type: none"> Upper limit of fuel pressure at idle state. 			

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
I/P PULLY SPD	rpm			<ul style="list-style-type: none"> Indicates the engine speed computed from the input speed sensor signal. 	
VEHICLE SPEED	km/h or mph			<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from TCM is displayed. 	
AC PRESS SEN	V			<ul style="list-style-type: none"> The signal voltage from the refrigerant pressure sensor is displayed. 	
A/F SEN1 (B1)	V	×	×	<ul style="list-style-type: none"> The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed. 	
A/F SEN1 (B2)					
VHCL SPEED SE	km/h or mph			<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed. 	
SET VHCL SPD	km/h			<ul style="list-style-type: none"> The preset vehicle speed is displayed. 	
VTC DTY EX B1	%			<ul style="list-style-type: none"> The control condition of the exhaust valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. 	
VTC DTY EX B2					
BAT CUR SEN	mV			<ul style="list-style-type: none"> The signal voltage of battery current sensor is displayed. 	
MILEAGE FOR EONV	km			<ul style="list-style-type: none"> Mileage counter for EONV upper byte is displayed. 	
A/F ADJ-B1	—			<ul style="list-style-type: none"> Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal. 	
A/F ADJ-B2					
TP SEN 1-B2	mV			<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> TP SEN 2-B2 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 2-B2					
INT/V TIM (B1)	°CA			<ul style="list-style-type: none"> Indicates [°CA] of intake camshaft advance angle. 	
INT/V TIM (B2)					
BOOST S/V DUTY	%			<ul style="list-style-type: none"> The turbocharger boost control valve control condition (determined by ECM according to the input signals) is indicated. 	
H/P FUEL PUMP DEG	deg			<ul style="list-style-type: none"> Displays ECM-calculated fuel discharge position of the high pressure fuel pump. 	
FUEL PRES SEN V	V			<ul style="list-style-type: none"> The signal voltage of FRP sensor is displayed. 	
EOP SENSOR	V			<ul style="list-style-type: none"> The signal voltage of EOP sensor is displayed. 	
ECM TEMP 1	°C			<ul style="list-style-type: none"> The ECM temperature is indicated. 	
ECM TEMP 2					

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
MASS AIR FLOW SENSOR (Hz)	Hz			<ul style="list-style-type: none"> The signal frequency of the mass air flow sensor is displayed. 	
A/F-S ATMSPHRC CRCT B2	—			<ul style="list-style-type: none"> Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure. 	
A/F-S ATMSPHRC CRCT B1	—			<ul style="list-style-type: none"> Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure. 	
A/F-S ATMSPHRC CRCT UP B2	count			<ul style="list-style-type: none"> Displays the number of updates of the A/F sensor atmospheric correction factor. 	
A/F-S ATMSPHRC CRCT UP B1	count			<ul style="list-style-type: none"> Displays the number of updates of the A/F sensor atmospheric correction factor. 	
EXHAUST GAS TEMP SEN 1 B1	V			<ul style="list-style-type: none"> The signal voltage of exhaust gas temperature sensor is displayed. 	
EXHAUST GAS TEMP SEN 1 B2					
Electric water pump 1 duty	%			<ul style="list-style-type: none"> The control condition of the charge air cooler cooling electric water pump (determined by ECM according to the input signals) is indicated. 	
Electric water pump 2 duty					
AFM output	V			<ul style="list-style-type: none"> Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor. 	
W/G ACTUATOR POSI SEN B1	V			<ul style="list-style-type: none"> Indicates position sensor output voltage of turbocharger wastegate actuator. 	
W/G ACTUATOR POSI SEN B2					
ENGINE COOLANT B/V POSI	deg			<ul style="list-style-type: none"> The Multi-way Control Valve position detected by the position sensor is displayed. 	
TOTAL DISTANC - OCS RST 1	km			<ul style="list-style-type: none"> The Multi-way Control Valve position detected by the position sensor is displayed. 	
TOTAL DISTANC - OCS RST 2	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System is reset. 	
TOTAL DISTANC - OCS RST 3	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System is reset. (two times ago) 	

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
DETERIORTN VL - OCS RST 1	—			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System is reset. (three times ago) 	
DETERIORTN VL - OCS RST 2	—			<ul style="list-style-type: none"> Insicates deterioration conditon of the engine oil when Oil Control System is reset. 	
DETERIORTN VL - OCS RST 3	—			<ul style="list-style-type: none"> Insicates deterioration conditon of the engine oil when Oil Control System is reset. (three times ago) 	
TOTAL DISTANC - OCS WRN 1	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System remaining distance is zero. 	
TOTAL DISTANC - OCS WRN 2	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System remaining distance is zero. (two times ago) 	
TOTAL DISTANC - OCS WRN 3	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System remaining distance is zero. (two times ago) 	
DETERIORTN VL - OCS WRN 1	—			<ul style="list-style-type: none"> Insicates deterioration conditon of the engine oil when Oil Control System remaining distance is zero. 	
DETERIORTN VL - OCS WRN 2	—			<ul style="list-style-type: none"> Insicates deterioration conditon of the engine oil when Oil Control System remaining distance is zero. (two times ago) 	
DETERIORTN VL - OCS WRN 3	—			<ul style="list-style-type: none"> Insicates deterioration conditon of the engine oil when Oil Control System remaining distance is zero. (three times ago) 	
CURRENT DETERIORATN VAL	—			<ul style="list-style-type: none"> Insicates deterioration conditon of the engine oil. 	
LOAD SIGNAL	On/Off	×	×	<ul style="list-style-type: none"> 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. 	
AIR COND SIG	On/Off	×	×	<ul style="list-style-type: none"> Indicates [On/Off] condition of the air conditioner switch as determined by the air conditioner signal. 	
PW/ST SIGNAL	On/Off	×	×	<ul style="list-style-type: none"> [On/Off] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated. 	
P/N POSI SW	On/Off	×	×	<ul style="list-style-type: none"> Indicates [On/Off] condition from the park/neutral position (PNP) signal. 	

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
START SIGNAL	On/Off			<ul style="list-style-type: none"> Indicates start signal status [On/Off] computed by the ECM according to the signals of engine speed and battery voltage. 	<ul style="list-style-type: none"> After starting the engine, [Off] is displayed regardless of the starter signal.
CLSD THL POS	On/Off	×	×	<ul style="list-style-type: none"> Indicates idle position [On/Off] computed by ECM according to the accelerator pedal position sensor signal. 	
HO2S2 MNTR (B1)	RICH/ LEAN		×	<ul style="list-style-type: none"> Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2)			×		
IGNITION SW	On/Off	×	×	<ul style="list-style-type: none"> Indicates [On/Off] condition from ignition switch signal. 	
HEATER FAN SW	On/Off	×		<ul style="list-style-type: none"> Indicates [On/Off] condition from the heater fan switch signal. 	
IDL A/V LEARN	YET/ CMPLT			<ul style="list-style-type: none"> Displays the condition of Idle Air Volume Learning Yet: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully. 	
BRAKE SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from the stop lamp switch signal. 	
COMBUSTION	—			<ul style="list-style-type: none"> These items are displayed but are not applicable to this model. 	
AIR COND RLY	On/Off			<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signals) is indicated. 	
FUEL PUMP RLY	On/Off			<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
FPCM	Hi/Mid/ Low/Off			<ul style="list-style-type: none"> The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signals) is indicated. 	
VENT CONT/V	On/Off			<ul style="list-style-type: none"> The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. On: Closed Off: Open 	
THRTL RELAY	On/Off			<ul style="list-style-type: none"> Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. 	

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
HO2S2 HTR (B1)	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. 	
HO2S2 HTR (B2)					
BRAKE SW1	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from brake pedal position switch signal. 	
BRAKE SW2	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of stop lamp switch signal. 	
SET SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from SET switch signal. 	
RESUME/ACC SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from RESUME/ACCELERATE switch signal. 	
CANCEL SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from CANCEL switch signal. 	
MAIN SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from MAIN switch signal. 	
SET LAMP	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of SET lamp determined by the ECM according to the input signals. 	
AT OD CANCEL	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of CVT O/D according to the input signal from the TCM. 	For M/T models, always "OFF" is displayed.
AT OD MONITOR	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of CVT O/D according to the input signal from the TCM. 	For M/T models, always "OFF" is displayed.
CRUISE LAMP	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of CRUISE lamp determined by the ECM according to the input signals. 	
LO SPEED CUT	NON/CUT			<ul style="list-style-type: none"> 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. 	
VHCL SPD CUT	NON/CUT			<ul style="list-style-type: none"> 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. 	
ALT DUTY SIG	On/Off			<ul style="list-style-type: none"> The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. On: Power generation voltage variable control is active. Off: Power generation voltage variable control is inactive. 	

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
HO2 S2 DIAG1 (B2)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P0159 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
HO2 S2 DIAG1 (B1)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
HO2 S2 DIAG2 (B2)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P0159 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
HO2 S2 DIAG2 (B1)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
EVAP LEAK DIAG	YET/ CMPLT			<ul style="list-style-type: none"> 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			<ul style="list-style-type: none"> Indicates the ready condition of EVAP leak diagnosis. On: Diagnosis has been ready condition. Off: Diagnosis has not been ready condition. 	
SYSTEM 1 DIAGNOSIS A B2	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P219B self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete. 	
SYSTEM 1 DIAGNOSIS A B1	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P219A self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG1 (B2)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P015C or P015D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	

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DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[VR30DDTT FOR USA AND CANADA]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
A/F SEN1 DIAG1 (B1)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P015A or P015B self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG2 (B2)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P014E or P014F self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG2 (B1)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
SYSTEM 1 DIAGNOSIS B B2	ABSNT/ PRSNT			<ul style="list-style-type: none"> Indicates DTC P219B self-diagnosis condition. - ABSNT: Self-diagnosis standby - PRSNT: Under self-diagnosis 	
SYSTEM 1 DIAGNOSIS B B1	ABSNT/ PRSNT			<ul style="list-style-type: none"> Indicates DTC P219A self-diagnosis condition. - ABSNT: Self-diagnosis standby - PRSNT: Under self-diagnosis 	
A/F SEN1 DIAG3 (B2)	ABSNT/ PRSNT			<ul style="list-style-type: none"> Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. 	
A/F SEN1 DIAG3 (B1)	ABSNT/ PRSNT			<ul style="list-style-type: none"> Indicates DTC P014E, P014F, P015C or P015D self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. 	
VALVE TIMING ADJUSTMENT	YET/ CMPLT			<ul style="list-style-type: none"> Displays the learning completion flag with the VTC. 	
V/D DEFAULT POSITION LEARN	YET/ CMPLT			<ul style="list-style-type: none"> Displays the condition of VTC standard position learning end flag. 	

NOTE:

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

WORK SUPPORT MODE

Work Item

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

WORK ITEM	CONDITION	USAGE
VIN REGISTRATION	<ul style="list-style-type: none"> In this mode, VIN is registered in ECM. 	When registering VIN in ECM
EVAP SYSTEM CLOSE	<p>Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions.</p> <ul style="list-style-type: none"> Ignition switch ON Engine not running Ambient temperature is above 0°C (32°F). No vacuum and no high pressure in EVAP system Fuel tank temp. is more than 0°C (32°F). Within 10 minutes after starting "EVAP SYSTEM CLOSE" When trying to execute "EVAP SYSTEM CLOSE" Under the condition except above, CONSULT will discontinue it and display appropriate instruction. <p>NOTE: When starting engine, CONSULT may display "Battery voltage is low. Charge battery", even when using a charged battery.</p>	When detecting EVAP vapor leak in the EVAP system
IDLE AIR VOL LEARN	<ul style="list-style-type: none"> The idle air volume that keeps the engine within the specified range is memorized in ECM. 	When learning the idle air volume
SELF-LEARNING CONT	<ul style="list-style-type: none"> The coefficient of self-learning control mixture ratio returns to the original coefficient. 	When clearing mixture ratio self-learning value
CLSD THL POS LEARN	<ul style="list-style-type: none"> Ignition switch ON and engine stopped. 	When learning the throttle valve closed position
TARGET IGN TIM ADJ*	<ul style="list-style-type: none"> Idle condition 	When adjusting target ignition timing
TARGET IDLE RPM ADJ*	<ul style="list-style-type: none"> Idle condition 	When setting target idle speed
SAVING DATA FOR REPLC CPU	<ul style="list-style-type: none"> In this mode, save data that is in ECM. 	When ECM is replaced.
WRITING DATA FOR REPLC CPU	<ul style="list-style-type: none"> In this mode, write data stored by "SAVE DATA FOR CPU REPLC" in work support mode to ECM. 	When ECM is replaced.
WASTEGATE ACTUATOR POSI LEARN VALUE CLEAR	<ul style="list-style-type: none"> Ignition switch is ON and Engine running 	When learning full close position of wastegate actuator after ECM or turbocharger assembly is replaced.
ENGINE COOLANT BYPASS VALVE	<ul style="list-style-type: none"> Condition: The valve is in the full opening position 	When filling with coolant.
ELECTRIC INTAKE VALVE TIMING CONTROL LEARNING	<ul style="list-style-type: none"> Ignition switch ON and engine stopped. 	<p>After the following parts are replaced.</p> <ul style="list-style-type: none"> Electric intake valve timing control actuator Electric intake valve timing control module camshaft, timing chain, camshaft sprocket piston, connecting rod, crankshaft position sensor

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Harness and connectors Solenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature using CONSULT.		
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N Cut off each injector signal one at a time using CONSULT. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
EXT V/T ASSIGN ANGLE	<ul style="list-style-type: none"> Engine: Return to the original non-standard condition Change exhaust valve timing using CONSULT. 	If malfunctioning symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Exhaust valve timing control solenoid valve
VENT CONTROL/V	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Harness and connectors Solenoid valve
FAN DUTY CONTROL*	<ul style="list-style-type: none"> Ignition switch: ON Change duty ratio using CONSULT. 	Cooling fan speed changes.	<ul style="list-style-type: none"> Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R
ALTERNATOR DUTY	<ul style="list-style-type: none"> Engine: Idle Change duty ratio using CONSULT. 	Battery voltage changes.	<ul style="list-style-type: none"> Harness and connectors IPDM E/R Alternator
FPCM	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Select "LOW", "MID" and "HI" with CONSULT. 	Fuel pump speed changes or stops.	<ul style="list-style-type: none"> Harness and connectors Fuel pump control module (FPCM)
IGNITION TIMING	<ul style="list-style-type: none"> 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.
WASTEGATE ACTUATOR	<ul style="list-style-type: none"> Ignition switch: ON Engine stopped Change valve of wastegate actuator target angle using CONSULT 	Wastegate valve position sensor voltage changes according to valve target angle	<ul style="list-style-type: none"> Harness and connectors Electric wastegate control actuator (Removal bypass valve from turbocharger is NG) Turbocharger assembly
ENGINE OIL PRESSURE CONTROL SOLENOID VALVE	<ul style="list-style-type: none"> Water temperature: > -10°C Engine oil temperature: < 120°C (248°F) Engine speed: < 4000rpm 	Engine oil pressure change	<ul style="list-style-type: none"> Harness and connectors Engine oil pressure control solenoid valve Engine oil pressure sensor Engine oil pump
Charge air cooler cooling electric water pump	<ul style="list-style-type: none"> Engine: Idle 	Change the driving mode of charge air cooler cooling electric water pump.	<ul style="list-style-type: none"> Charge air cooler coolant temperature sensor Intake air temperature sensor Engine oil pressure sensor Charge air cooler cooling electric water pump 1, 2

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

DTC WORK SUPPORT MODE

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

Test mode	Test item	Corresponding DTC No.	Reference page
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC6-423
	A/F SEN1 (B2) P1286	P0150	EC6-423
EVAPORATIVE SYSTEM	PURG VOL CN/V P1444	P0443	EC6-552
	PURG FLOW P0441	P0441	EC6-546
HO2S2	HO2S2 (B1) P1146	P0138	EC6-439
	HO2S2 (B1) P1147	P0137	EC6-433
	HO2S2 (B1) P0139	P0139	EC6-447
	HO2S2 (B2) P1166	P0158	EC6-439
	HO2S2 (B2) P1167	P0157	EC6-433
	HO2S2 (B2) P0159	P0159	EC6-447

SRT & P-DTC MODE

SRT STATUS Mode

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

PERMANENT DTC STATUS Mode

How to Display Permanent DTC Status

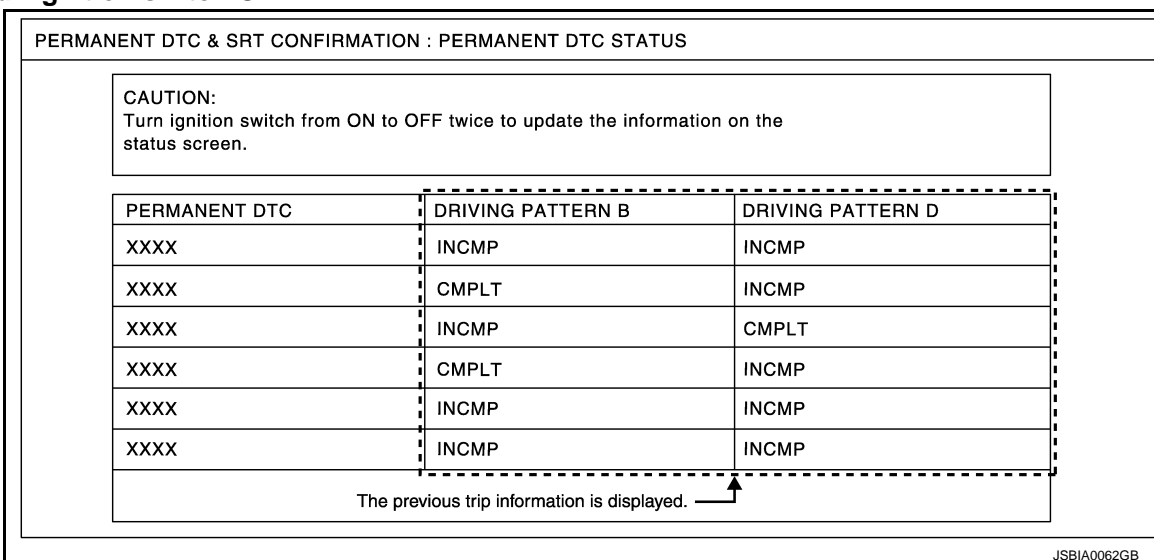
1. Turn ignition switch OFF and wait at 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” in “DTC & SRT CONFIRMATION” mode with CONSULT.

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”.



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

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

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

NOTE:

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

ECU DIAGNOSIS INFORMATION

ECM

TURBO HIGH PRESSURE MODEL

TURBO HIGH PRESSURE MODEL : Reference Value

INFOID:000000013591457

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations.
Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor.
This occurs because the timing light shows a value calculated by ECM according to signals received from the camshaft position sensor and other sensors related to ignition timing.
- For outlines of following items, refer to [EC6-115, "CONSULT Function"](#).

CONSULT MONITOR ITEM

Monitor Item	Condition		Values/Status
COOLANT TEMP/S	Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature
TURBO BST SEN	Ignition switch: ON		Indicates intake boost
PURG VOL C/V	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
		2,000 rpm	—
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank temperature
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
CAL/LD VALUE	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	5% - 35%
		2,500 rpm	5% - 35%
HO2S2 (B1)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> • Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 (B2)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> • Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F ALPHA-B1	See EC6-294, "Description" .		
A/F ALPHA-B2	See EC6-294, "Description" .		
A/F S1 HTR(B1)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Monitor Item	Condition	Values/Status
A/F S1 HTR(B2)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)	4 - 100%
TC/SC SPEED B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	3,200 rpm 15,000 - 30,000 rpm
TC/SC SPEED B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	3,200 rpm 15,000 - 30,000 rpm
EXH/V TIM B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle 0.0°C
		2,000 rpm 3.0°C
EXH/V TIM B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle -0.5°C
		2,000 rpm 2.0°C
W/GATE V CLSD LEARN B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle CMPLT
		2,000 rpm CMPLT
W/GATE V CLSD LEARN B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle CMPLT
		2,000 rpm CMPLT
W/G ACTUATOR POSITION B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle 0.0061- 0.0098 m
		2,000 rpm 0.0061- 0.0098 m
W/G ACTUATOR POSITION B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle 0.0061- 0.0098 m
		2,000 rpm 0.0061- 0.0098 m
RADIATOR COOLANT TEMP	Engine: Running	More than 70°C (158°F)
Ignition timing	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle 10 deg
		2,000 rpm 44 deg
Fuel injection timing	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle -38 deg
		2,000 rpm -34 deg
FAN DUTY	Engine: Running	0 - 100%
Charge air cooler coolant temp	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle Indicates charge air cooler temperature
AC EVA TEMP	Engine: Running	Indicates A/C evaporator temperature sent from "unified meter and A/C amp."
AC EVA TARGET	Engine: Running	Indicates target A/C evaporator temperature sent from "unified meter and A/C amp."
ALT DUTY	Engine: Idle	0 - 80%

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Monitor Item	Condition		Values/Status
FUEL PUMP DUTY	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N position Air conditioner switch: OFF No load 	Idle	60 – 70
BAT TEMP SEN	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N A/C switch: OFF No load 	Idle	Indicates the temperature around the battery.
THRTL STK CNT B1	This item is displayed but is not applicable to this model.		
THRTL STK CNT B2	This item is displayed but is not applicable to this model.		
ENG SPEED	Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 655,350 km (0 - 407,234 miles)
B/FUEL SCHDL	See EC6-294, "Description" .		
MASS AIRFLOW	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	1.2 - 2.0 g/s
		2,500 rpm	4.6 - 7.6 g/s
FUEL PRES SEN	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	2.0 - 4.0 MPa
		2,000 rpm	2.0 - 4.0 MPa
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.45 - 1.00 V
		Accelerator pedal: Fully depressed	4.4 - 4.8 V
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.45 - 1.00 V
		Accelerator pedal: Fully depressed	4.3 - 4.8 V
TP SEN 1-B1	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Selector lever: D 	Accelerator pedal: Fully released	More than 0.360 V
		Accelerator pedal: Fully depressed	Less than 4.750 V
TP SEN 2-B1*1	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Selector lever: D 	Accelerator pedal: Fully released	More than 0.360 V
		Accelerator pedal: Fully depressed	Less than 4.750 V
FUEL INJ B1	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N A/C switch: OFF No load 	Idle	1.1 msec
		2,000 rpm	0.6 msec
FUEL INJ B2	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N A/C switch: OFF No load 	Idle	1.1 msec
		2,000 rpm	0.6 msec
IDLE FUEL PRES MIN	Engine: After warming up		2.0 MPa
IDLE FUEL PRES MAX	Engine: After warming up		4.0 MPa
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
AC PRESS SEN	<ul style="list-style-type: none"> Engine: Idle Both A/C switch and blower fan switch: ON (Compressor operates) 		1.0 - 4.0 V
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Monitor Item	Condition	Values/Status
SET VHCL SPD	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle 0 km/h
		2,000 rpm 0 km/h
VTC DTY EX B1	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle 0%
		2,000 rpm 0%
VTC DTY EX B2	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle 0%
		2,000 rpm 0%
BAT CUR SEN	• Engine speed: Idle • Battery: Fully charged*2 • Selector lever: P or N • Air conditioner switch: OFF • No load	Approx. 2.600 - 3.500 V
MILEAGE FOR EONV	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle Varies depending on vehicle environment.
A/F ADJ-B1	Engine: Running	-0.330 - 0.330
A/F ADJ-B2	Engine: Running	-0.330 - 0.330
TP SEN 1-B2	• Ignition switch: ON (Engine stopped) • Selector lever: D	Accelerator pedal: Fully released More than 0.360 V
		Accelerator pedal: Fully depressed Less than 4.750 V
TP SEN 2-B2*1	• Ignition switch: ON (Engine stopped) • Selector lever: D	Accelerator pedal: Fully released More than 0.360 V
		Accelerator pedal: Fully depressed Less than 4.750 V
INT/V TIM (B1)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle - 5 - 5°C
		2,000 rpm Approx. 0 - 30°C
INT/V TIM (B2)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle - 5 - 5°C
		2,000 rpm Approx. 0 - 30°C
BOOST S/V DUTY	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 0.00000000%
		2,000 rpm 0.00000000%
H/P FUEL PUMP DEG	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 286 - 308 deg
		2,000 rpm 294 - 316 deg
FUEL PRES SEN V	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 0.7 - 1.0 V
		2,000 rpm 0.6 - 1.0 V
EOP SENSOR	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 1.385 V
		2,000 rpm 1.945 V
ECM TEMP 1	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 56.375°C
		2,000 rpm 48.750°C

ECM

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[VR30DDTT FOR USA AND CANADA]

Monitor Item	Condition		Values/Status
ECM TEMP 2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	54.875°C
		2,000 rpm	47.125°C
MASS AIR FLOW SENSOR (Hz)	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2800 - 3100 Hz
		2,000 rpm	2200 - 2600 Hz
A/F-S ATMSPHRC CRCT B2	Engine: After warming up, idle the engine		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the engine		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT UP B2	Engine: Running		Varies depending on the number of updates.
A/F-S ATMSPHRC CRCT UP B1	Engine: Running		Varies depending on the number of updates.
EXHAUST GAS TEMP SEN 1 B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2.53250 V
		2,000 rpm	1.29500 V
EXHAUST GAS TEMP SEN 1 B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2.45625 V
		2,000 rpm	1.33125 V
Electric water pump 1 duty	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	40 %
Electric water pump 2 duty	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	40 %
AFM output	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2800 - 3100 Hz
		2,000 rpm	2200 - 2600 Hz
W/G ACTUATOR POSI SEN B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	3.240 - 4.480 V
		2,000 rpm	3.240 - 4.480 V
W/G ACTUATOR POSI SEN B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	3.240 - 4.480 V
		2,000 rpm	3.240 - 4.480 V
ENGINE COOLANT B/V POSI	Ignition switch: ON		Approx. 207 deg
	Engine: Idle	Engine coolant temperature: 60°C (140°F)	Approx. 47 deg
		Engine coolant temperature: 67°C (153°F)	Approx. 87 deg
		Engine coolant temperature: 86°C (187°F)	Approx. 125 deg
TOTAL DISTNC - OCS RST 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS RST 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)

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[VR30DDTT FOR USA AND CANADA]

Monitor Item	Condition		Values/Status
TOTAL DISTNC - OCS RST 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
DETERIORTN VL - OCS RST 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS RST 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS RST 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
TOTAL DISTNC - OCS WRN 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS WRN 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS WRN 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
DETERIORTN VL - OCS WRN 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS WRN 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS WRN 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
CURRENT DETERIORATN VAL	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	On
		Rear window defogger switch and lighting switch: OFF	Off
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates.)	On
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	Off
		Steering wheel: Being turned	On
P/N POSI SW	Ignition switch: ON	Selector lever: P or N	On
		Selector lever: Except above	Off
START SIGNAL	Ignition switch: ON → START → ON		Off → On → Off
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	On
		Accelerator pedal: Slightly depressed	Off
HO2S2 MNTR(B1)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		LEAN ↔ RICH
HO2S2 MNTR(B2)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		LEAN ↔ RICH
IGNITION SW	Ignition switch: ON → OFF → ON		On → Off → On
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	On
		Heater fan switch: OFF	Off

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[VR30DDTT FOR USA AND CANADA]

Monitor Item	Condition	Values/Status	
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been performed yet.	Yet
		Idle air volume learning has already been performed successfully.	CMPLT
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
COMBUSTION	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	Mode1
		2,000 rpm	Mode1
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates)	On
FUEL PUMP RLY	<ul style="list-style-type: none"> • For 1 second after turning ignition switch: ON • Engine running or cranking 		On
	Except above		Off
FPCM	Ignition switch: OFF		Off
	<ul style="list-style-type: none"> • For 1 seconds after turning ignition switch: ON • Engine: Idle speed 		Low
	<ul style="list-style-type: none"> • Engine: Cranking • Engine coolant temperature: More than 10°C (50°) • Engine: Above 4000 rpm 		Mid
	Engine: Cranking		Hi
VENT CONT/V	Ignition switch: ON		Off
THRTL RELAY	Ignition switch: ON		On
HO2S2 HTR (B1)	Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> • 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
	Engine speed: Above 3,600 rpm		Off
HO2S2 HTR (B2)	Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> • 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
	Engine speed: Above 3,600 rpm		Off
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	On
		Brake pedal: Slightly depressed	Off
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	On
		SET/COAST switch: Released	Off
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	On
		RESUME/ACCELERATE switch: Released	Off
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	On
		CANCEL switch: Released	Off
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	On
		MAIN switch: Released	Off

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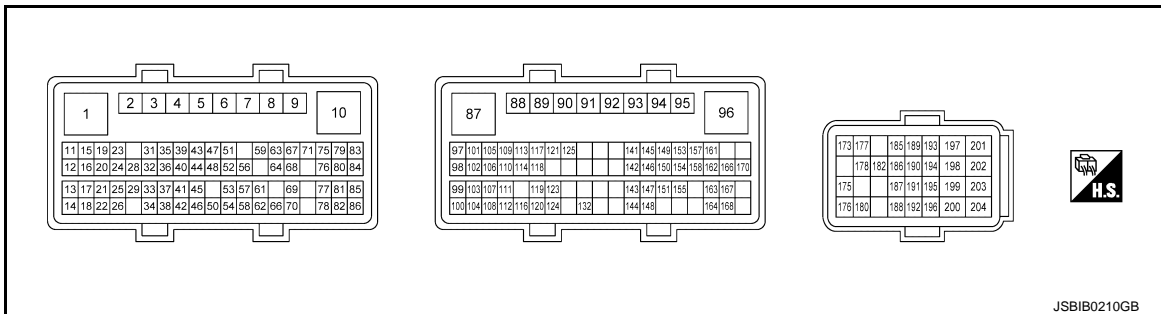
Monitor Item	Condition	Values/Status
SET LAMP	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Off
		2,000 rpm Off
AT OD CANCEL	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Off
		2,000 rpm Off
AT OD MONITOR	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Off
		2,000 rpm Off
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time On → Off
LO SPEED CUT	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Non
		2,000 rpm Non
VHCL SPD CUT	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Non
		2,000 rpm Non
ALT DUTY SIG	Power generation voltage variable control: Operating	On
	Power generation voltage variable control: Not operating	Off
HO2 S2 DIAG1(B2)	DTC P0159 self-diagnosis (delayed response) is incomplete.	INCMP
	DTC P0159 self-diagnosis (delayed response) is complete.	CMPLT
HO2 S2 DIAG1(B1)	DTC P0139 self-diagnosis (delayed response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (delayed response) is complete.	CMPLT
HO2 S2 DIAG2(B2)	DTC P0159 self-diagnosis (slow response) is incomplete.	INCMP
	DTC P0159 self-diagnosis (slow response) is complete.	CMPLT
HO2 S2 DIAG2(B1)	DTC P0139 self-diagnosis (slow response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (slow response) is complete.	CMPLT
EVAP LEAK DIAG	Ignition switch: ON	Depending on condition of EVAP leak diagnosis
EVAP DIAG READY	Ignition switch: ON	Depending on ready condi- tion of EVAP leak diagnosis
SYSTEM 1 DIAGNO- SIS A B2	DTC P219B self-diagnosis is incomplete.	INCMP
	DTC P219B self-diagnosis is complete.	CMPLT
SYSTEM 1 DIAGNO- SIS A B1	DTC P219A self-diagnosis is incomplete.	INCMP
	DTC P219A self-diagnosis is complete.	CMPLT
A/F SEN1 DIAG1(B2)	DTC P015C and P015D self-diagnosis incomplete.	INCMP
	DTC P015C and P015D self-diagnosis is complete.	CMPLT
A/F SEN1 DIAG1(B1)	DTC P015A and P015B self-diagnosis incomplete.	INCMP
	DTC P015A and P015B self-diagnosis is complete.	CMPLT
A/F SEN1 DIAG2(B2)	DTC P014E and P014F self-diagnosis incomplete.	INCMP
	DTC P014E and P014F self-diagnosis is complete.	CMPLT
A/F SEN1 DIAG2(B1)	DTC P014C and P014D self-diagnosis incomplete.	INCMP
	DTC P014C and P014D self-diagnosis is complete.	CMPLT
SYSTEM 1 DIAGNO- SIS B B2	DTC P219B self-diagnosis is on standby.	ABSENT
	DTC P219B self-diagnosis is under diagnosis.	PRSENT

Monitor Item	Condition		Values/Status
SYSTEM 1 DIAGNOSIS B B1	DTC P219A self-diagnosis is on standby.		ABSENT
	DTC P219A self-diagnosis is under diagnosis.		PRESENT
A/F SEN1 DIAG3(B2)	The vehicle condition is not within the diagnosis range of DTC P014E, P014F, P015C or P015D.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014E, P014F, P015C or P015D.		PRSNT
A/F SEN1 DIAG3(B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT
VALVE TIMING ADJUSTMENT	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	YET
V/T DEFAULT POSITION LEARN	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	YET

*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-245. "VR30DDTT : How to Handle Battery"](#).

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

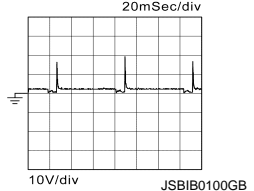
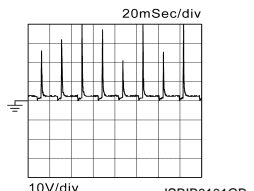
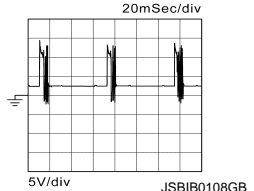
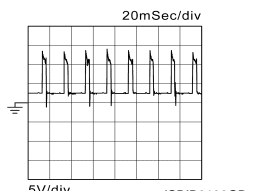
- ECM is located behind the instrument assist lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description	Input/Output	Condition	Value (Approx.)
+	-				
1 (R)	204 (B)	High pressure fuel pump power supply	Input	[Ignition switch: ON]	11.0 - 14.0V
				[Engine is running] Idle speed	13.0 - 14.5 V
2 (GR)	—	ECM ground	—	—	—
3 (G)	204 (B)	Fuel injector driver power supply A1	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V

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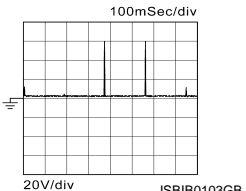
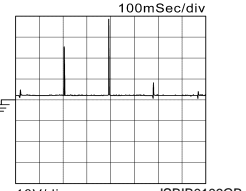
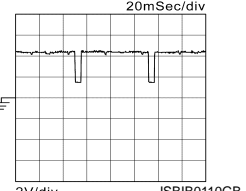
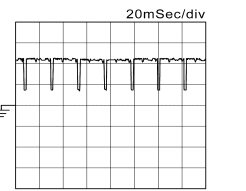
[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
4 (L)	204 (B)	Fuel injector driver power supply A2	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
5 (LG)	204 (B)	Fuel injector driver power supply B1	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
6 (V)	204 (B)	Fuel injector driver power supply B2	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
7 (BG)	—	ECM ground	—	—	—
8 (W)	204 (B)	Knock sensor (bank 1)	Input	[Ignition switch: ON]	1.8 V
				[Engine is running] Idle speed	2.0 V*1
9 (R)	204 (B)	High pressure fuel pump (LO)	Output	[Ignition switch: ON]	1.8 V
				[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.1 V★ 
10 (B)	204 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.1 V★ 
				[Ignition switch: ON]	1.8 V
10 (B)	204 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.7 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.7 V★ 

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[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
11 (BR)	204 (B)	Fuel injector No.1 (HI)	Output	[Ignition switch: ON]	1.8 V
12 (W)		Fuel injector No.3 (HI)		[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.2 V★ 
13 (LG)		Fuel injector No.5 (HI)			
15 (GR)		Fuel injector No.2 (HI)			
16 (V)		Fuel injector No.4 (HI)			
19 (L)		Fuel injector No.6 (HI)			
14 (R)	204 (B)	Fuel injector No.3 (LO)	Output	[Ignition switch: ON]	1.8 V
17 (Y)		Fuel injector No.1 (LO)		[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.1 V★ 
18 (L)		Fuel injector No.5 (LO)			
20 (SB)		Fuel injector No.2 (LO)			
21 (P)		Fuel injector No.4 (LO)			
22 (W)		Fuel injector No.6 (LO)			
23 (GR)	--	Sensor ground [Turbocharger boost sensor (bank1)]	--	--	--
24 (W)	--	Sensor ground (Engine oil pressure sensor)	--	--	--
25 (Y)	204 (B)	Intake camshaft position sensor (bank 1) [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.8 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.8 V★ 

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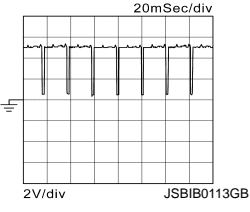
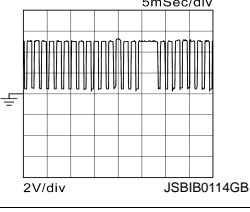
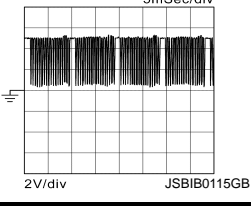
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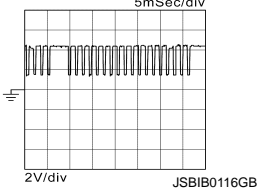
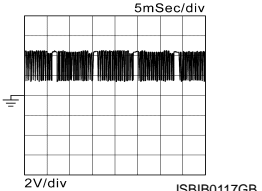
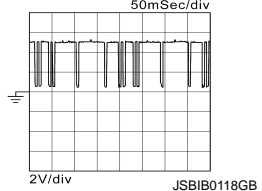
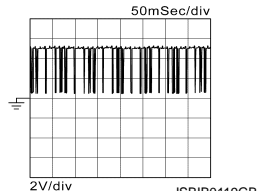
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[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
26 (SB)	204 (B)	Intake camshaft position sensor (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.3 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.3 V★ 
28 (Y)	—	Sensor ground (Crankshaft position sensor)	—	—	—
29 (BR)	—	Sensor ground [Intake camshaft posi- tion sensor (bank 1), Ex- haust camshaft position sensor (bank 1)]	—	—	—
31 (W)	204 (B)	Crankshaft position sen- sor	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.2 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.2 V★ 

Terminal No. (Wire color)		Description	Input/ Output	Condition	Value (Approx.)
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32 (G)	204 (B)	Crankshaft position sensor [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.1 V★ 
33 (G)	204 (B)	Exhaust camshaft position sensor (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.7 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.7 V★ 
34 (R)	204 (B)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5 V
35 (G)	44 (R)	Sensor power supply [Throttle position sensor (bank 1)]	—	[Ignition switch: ON]	5 V
36 (GR)	204 (B)	Sensor power supply [Intake camshaft position sensor (bank 1), Exhaust camshaft position sensor (bank 1)]	—	[Ignition switch: ON]	5 V
37 (Y)	204 (B)	Sensor power supply (Mass air flow sensor, Intake air temperature sensor 1)	—	[Ignition switch: ON]	5 V
38 (L)	204 (B)	Sensor power supply [Multi-way control valve motor, Turbocharger boost sensor (bank 1, 2)]	—	[Ignition switch: ON]	5 V
39 (BG)	204 (B)	Sensor power supply [Electric wastegate control actuator (bank 1, 2)]	—	[Ignition switch: ON]	5 V

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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
40 (P)	204 (B)	Intake air temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
41 (R)	204 (B)	Mass air flow sensor (bank 1)	Input	[Ignition switch: ON]	Approx. 3,300 Hz
				[Engine is running] • Warm-up condition • Idle speed	2,800 - 3,100 Hz
42 (LG)	—	Sensor ground [Mass air flow sensor (bank 1), Intake air temperature sensor 1]	—	—	—
43 (W)	44 (R)	Throttle position sensor 1 (bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75 V
44 (R)	—	Sensor ground [Throttle position sensor (bank 1)]	—	—	—
45 (L)	—	Sensor ground [Electric wastegate control actuator (bank 1)]	—	—	—
46 (G)	204 (B)	Mass air flow sensor (bank 2)	Input	[Ignition switch: ON]	Approx. 3,300 Hz
				[Engine is running] • Warm-up condition • Idle speed	2,800 - 3,100 Hz
47 (SB)	204 (B)	Exhaust gas temperature sensor (bank 2)	Input	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	1.8 V
48 (B)	44 (R)	Throttle position sensor 2 (bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36 V
50 (BR)	100 (P)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
51 (P)	204 (B)	Engine oil pressure sensor	Input	[Engine is running] • Selector lever: N or P • Air conditioner switch: OFF • Engine oil temperature: 80°C (176°F) • Engine speed: 2,000 rpm	1.75 - 2.15 V
52 (R)	204 (B)	Battery current sensor	Input	[Ignition switch: ON]	1.7 V
				[Engine is running] • Battery: Fully charged*2 • Idle speed	2.3 V

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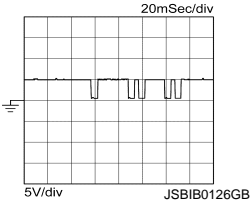
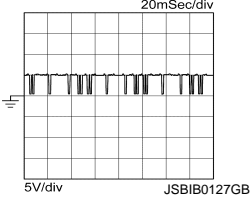
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
53 (V)	204 (B)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.6 - 1.0 V
54 (SB)	204 (B)	Battery temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.4 V
56 (Y)	204 (B)	Engine coolant temperature sensor 2	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
57 (W)	204 (B)	Electric wastegate position sensor (bank 1)	Input	[Ignition switch: ON]	3.1 V
				[Engine is running] • Warm-up condition • Idle speed	3.4 V
58 (W)	204 (B)	Turbocharger boost sensor (bank 1)	Input	[Ignition switch: ON]	1.8 - 2.4 V
59 (V)	204 (B)	Charge air cooler coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
61 (W)	204 (B)	Electric wastegate position sensor (bank 2)	Input	[Ignition switch: ON]	3.2 V
				[Engine is running] • Warm-up condition • Idle speed	3.6 V
62 (R)	204 (B)	Intake air temperature sensor 2	Input	[Ignition switch: ON]	2.6 V
				[Engine is running] • Warm-up condition • Idle speed	2.1 V
63 (L)	204 (B)	Turbocharger boost sensor (bank 2)	Input	[Ignition switch: ON]	1.4 V
				[Engine is running] • Warm-up condition • Idle speed	1.7 V
64 (W)	204 (B)	—	—	—	—
66 (P)	—	Sensor ground [Electric wastegate control actuator (bank 2)]	—	—	—
67 (LG)	204 (B)	Exhaust gas temperature sensor (bank 1)	Input	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	2.0 V
68 (R)	—	Sensor ground [Turbocharger boost sensor (bank 2)]	—	—	—

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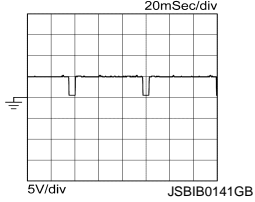
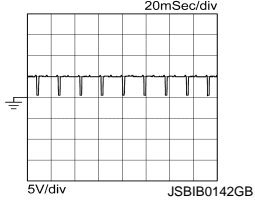
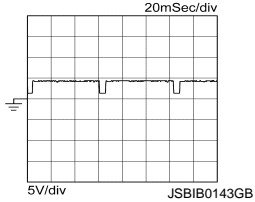
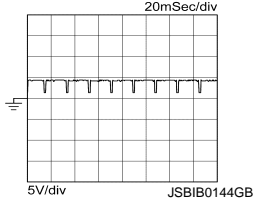
[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
69 (LG)	204 (B)	Multi-way control valve position sensor	Input	[Ignition switch: ON] Cold condition	4.5 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 60°C (140°F)	1.4 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 67°C (153°F)	2.2 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 86°C (187°F)	2.9 V
70 (V)	204 (B)	Refrigerant pressure sensor	Input	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.7 - 2.0 V
71 (W)	204 (B)	Engine coolant temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
75 (V)	204 (B)	Exhaust camshaft position sensor (bank 2)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.3 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.3 V★ 
76 (GR)	204 (B)	Sensor power supply [Mass air flow sensor (bank 2)]	—	[Ignition switch: ON]	5 V

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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
77 (BG)	204 (B)	Intake camshaft position sensor (bank 2)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.6 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.6 V★ 
78 (SB)	204 (B)	Intake camshaft position sensor (bank 2) [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.1 V★ 
79 (BR)	--	Sensor ground [Mass air flow sensor (bank 2)]	--	--	--
80 (P)	204 (B)	Sensor power supply (Fuel rail pressure sensor)	--	[Ignition switch: ON]	5 V
81 (Y)	204 (B)	Sensor power supply (Battery current sensor)	--	[Ignition switch: ON]	5 V
82 (G)	--	Sensor ground [Intake camshaft position sensor (bank 2), Exhaust camshaft position sensor (bank 2)]	--	--	--
83 (Y)	--	Sensor ground (Fuel rail pressure sensor)	--	--	--
84 (B)	--	Sensor ground (Knock sensor)	--	--	--

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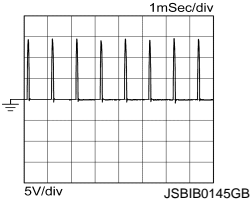
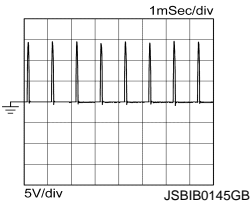
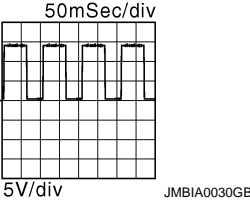
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
85 (W)	204 (B)	Sensor power supply [Intake camshaft position sensor (bank 2), Exhaust camshaft position sensor (bank 2)]	—	[Ignition switch: ON]	5 V
86 (W)	204 (B)	Knock sensor (bank 2)	Input	[Ignition switch: ON]	1.8 V
87 (B)	—			ECM ground	—
88 (B)	—	ECM ground	—	—	—
89 (LG)	90 (G)	Electric wastegate control actuator motor (+) (bank 2)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.1 V★ 
90 (G)	89 (LG)	Electric wastegate control actuator motor (-) (bank 2)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.2 V
91 (BG)	204 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
92 (L)	93 (R)	Electric wastegate control actuator motor (+) (bank 1)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.8 V★ 
93 (R)	92 (L)	Electric wastegate control actuator motor (-) (bank 1)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.2 V
94 (W)	204 (B)	Air fuel ratio (A/F) sensor 1 heater (bank 1)	Output	[Ignition switch: ON]	11.1 V
				[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	10.1 V★ 
95 (GR)	—	ECM ground	—	—	—

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Terminal No. (Wire color)		Description	Input/ Output	Condition	Value (Approx.)
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96 (R)	204 (B)	Throttle control motor power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
97 (GR)	—	Sensor ground (Multi-way control valve, Engine coolant temperature sensor 1, Charge air cooler coolant temperature sensor, Refrigerant pressure sensor)	—	—	—
98 (Y)	204 (B)	Heated oxygen sensor 2 (bank 2)	Input	[Engine is running] Revvng engine from idle to 3,000 rpm quickly after the following conditions are met <ul style="list-style-type: none"> • 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
99 (R)	—	Sensor ground [Heated oxygen sensor 2 (bank 1), Heated oxygen sensor 2 (bank 2)]	—	—	—
100 (P)	—	Sensor ground [Battery current sensor, Engine coolant temperature sensor 2, Engine oil temperature sensor, Exhaust gas temperature sensor (bank 1), Exhaust gas temperature sensor (bank 2)]	—	—	—
101 (L)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 1)	Input	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm 	2.2 V Output voltage varies with air fuel ratio.
102 (P)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 1)	Input	[Ignition switch: ON]	1.8 V
103 (B)	—	Shield	—	—	—
104 (SB)	—	Sensor ground [Throttle position sensor (bank 2)]	—	—	—
105 (BR)	104 (SB)	Sensor power supply [Throttle position sensor (bank 2)]	—	[Ignition switch: ON]	5 V
106 (P)	104 (SB)	Throttle position sensor 1 (bank 2)	Input	[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Selector lever: D • Accelerator pedal: Fully released 	More than 0.36 V
				[Ignition switch: ON] <ul style="list-style-type: none"> • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed 	Less than 4.75 V
107 (LG)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 2)	Input	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm 	2.2 V Output voltage varies with air fuel ratio.

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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
108 (R)	204 (B)	Sensor power supply [Turbocharger speed sensor (bank 2)]	—	[Ignition switch: ON]	5 V
109 (G)	204 (B)	Sensor power supply [Turbocharger speed sensor (bank 1)]	—	[Ignition switch: ON]	5 V
110 (W)	204 (B)	Heated oxygen sensor 2 (bank 1)	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
111 (V)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 2)	Input	[Ignition switch: ON]	1.8 V
112 (LG)	104 (SB)	Throttle position sensor 2 (bank 2)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36 V
113 (Y)	204 (B)	Manifold absolute pres- sure sensor	Input	[Ignition switch: ON]	1.4 V
				[Engine is running] • Warm-up condition • Idle speed	1.0 V
114 (G)	—	Sensor ground (Manifold absolute pres- sure sensor)	—	—	—
116 (L)	—	Sensor ground [Turbocharger speed sensor (bank 1)]	—	—	—
117 (LG)	204 (B)	Charge air cooler cool- ing electric water pump 1	Input	[Ignition switch: ON]	0.7 - 3.6 V
118 (BG)	204 (B)	Charge air cooler cool- ing electric water pump 2	Input	[Ignition switch: ON]	0.7 - 3.6 V
119 (Y)	204 (B)	Turbocharger speed sensor (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed	0.1 - 0.9 V
120 (W)	204 (B)	Turbocharger speed sensor (bank 2)	Input	[Engine is running] • Warm-up condition • Idle speed	0.1 - 0.9 V
121 (V)	204 (B)	PNP signal	Input	[Ignition switch: ON] Selector lever: P or N	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] Selector lever: Except above	0 V

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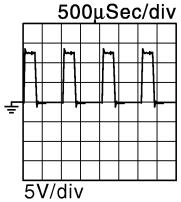
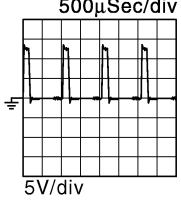
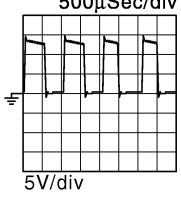
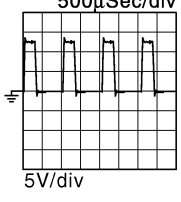
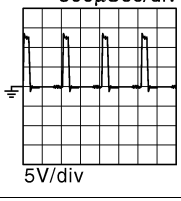
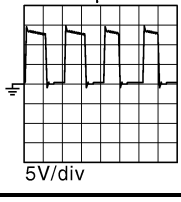
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
123 (BG)	204 (B)	Throttle control motor re- lay	Output	[Ignition switch: ON → OFF]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
				[Ignition switch: ON]	0 - 1.0 V
124 (R)	204 (B)	Fuel pump relay	Output	[Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5 V
				[Ignition switch: ON] More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
125 (P)	204 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] A few seconds after turning ignition switch OFF	0 - 1.5 V
				[Ignition switch: OFF] More than a few seconds after turning ig- nition switch OFF	BATTERY VOLTAGE (11 - 14 V)
132 (B)	—	Sensor ground [Turbocharger speed sensor (bank 2)]	—	—	—
141 (R)	146 (G)	Multi-way control valve motor (+)	Output	[Ignition switch: ON] • Cold condition	0 V
142 (L)	204 (B)	Engine oil pressure con- trol solenoid valve	Output	[Engine is running]	12.5 V
143 (G)	204 (B)	Charge air cooler cool- ing electric water pump 1	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0 - 3.3 V
144 (BG)	204 (B)	Charge air cooler cool- ing electric water pump 2	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0 - 3.3 V
145 (BG)	204 (B)	Multi-way control valve power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
146 (G)	141 (R)	Multi-way control valve motor (-)	Output	[Ignition switch: ON] • Cold condition	0 V

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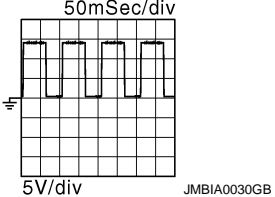
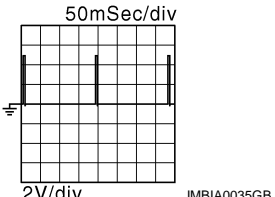
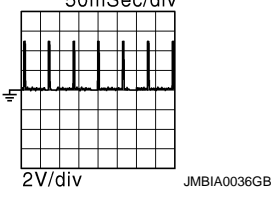
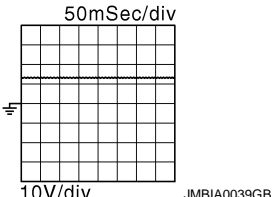
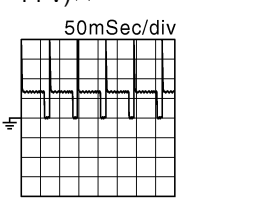
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
147 (W)	148 (GR)	Throttle control motor (Open) (bank 2)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★ 
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★ 
148 (GR)	147 (W)	Throttle control motor (Close) (bank 2)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: In the middle of re- leasing operation	0 - 14 V★ 
149 (G)	150 (GR)	Throttle control motor (Open) (bank 1)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★ 
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★ 
150 (GR)	149 (G)	Throttle control motor (Close) (bank 1)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: In the middle of re- leasing operation	0 - 14 V★ 

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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
151 (BR)	204 (B)	Air fuel ratio (A/F) sensor 1 heater (bank 2)	Output	[Ignition switch: ON]	12.5 V
				[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	10.1 V ★ 
153 (L) 154 (SB) 161 (Y) 162 (GR) 164 (G) 168 (V)	204 (B)	Ignition signal No. 3	Output	[Ignition switch: ON]	0 V
		Ignition signal No. 6		[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2 V★ 
		Ignition signal No. 1		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.1 - 0.4 V★ 
		Ignition signal No. 4			
		Ignition signal No. 2			
		Ignition signal No. 5			
155 (GR)	204 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★ 
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14 V)★ 
157 (W)	204 (B)	Exhaust valve timing control solenoid valve (bank 1)		[Ignition switch: ON]	12.4 V
				[Ignition switch: ON] • Warm-up condition • Idle speed	14 V
158 (G)	204 (B)	Exhaust valve timing control solenoid valve (bank 2)		[Ignition switch: ON]	12.4 V
				[Ignition switch: ON] • Warm-up condition • Idle speed	14 V

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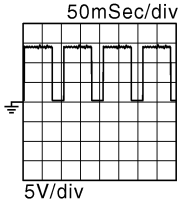
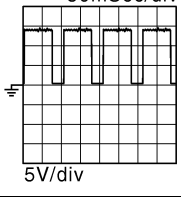
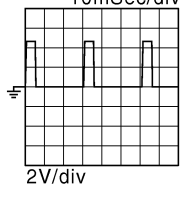
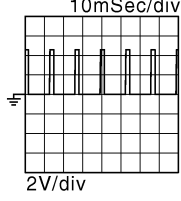
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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
163 (SB)	204 (B)	Heated oxygen sensor 2 heater (bank 2)	Output	[Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met <ul style="list-style-type: none"> • Engine: after warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 
				[Ignition switch: ON] Engine stopped [Engine is running] Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
166 (L)	204 (B)	Heated oxygen sensor 2 heater (bank 1)	Output	[Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met <ul style="list-style-type: none"> • Engine: after warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 
				[Ignition switch: ON] Engine stopped [Engine is running] Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
170 (P)	204 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
173 (SB)	204 (B)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	4.3 V
				[Ignition switch: ON] • Warm-up condition • Idle speed	4.3 V
175 (P)	—	CAN-L	Input/ output	—	—
176 (L)	—	CAN-H	Input/ output	—	—
177 (G)	204 (B)	Sensor power supply (EVAP control system pressure sensor)	—	[Ignition switch: ON]	5 V
178 (V)	204 (B)	Engine speed output sig- nal	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 V★ 
				[Engine is running] Engine speed is 2,000 rpm	1.0 V★ 

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[VR30DDTT FOR USA AND CANADA]

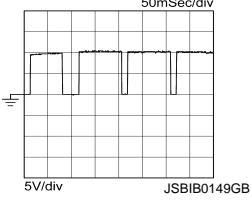
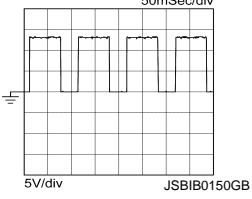
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
180 (P)	204 (B)	Fuel tank temperature sensor	Input	[Ignition switch: ON]	3.2 V
				[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
182 (W)	204 (B)	Fuel pump control module (FPCM) check	Input	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	11.5 V
185 (SB)	204 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
186 (SB)	187 (BG)	ICC steering switch (models with ICC system)	Input	[Ignition switch: ON] MAIN switch: Pressed	0 V
				[Ignition switch: ON] DYNAMIC DRIVER ASSISTANCE switch: Pressed	1.0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1.9 V
				[Ignition switch: ON] DISTANCE switch: Pressed	2.6 V
				[Ignition switch: ON] SET/COAST switch: Pressed	3.2 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3.7 V
		[Ignition switch: ON] ICC steering switch: OFF	4.2 V		
		ASCD steering switch (models without ICC system)	Input	[Ignition switch: ON] MAIN switch: Pressed	0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1 V
				[Ignition switch: ON] SET/COAST switch: Pressed	2 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] ASCD steering switch: OFF	4 V
187 (BG)	—	Sensor ground (ASCD/ICC steering switch)	—	—	—

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
188 (Y)	204 (B)	Fuel pump control module (FPCM)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	8.3 V
				[When cranking engine] Not cold state condition	4.0 V★ 
				[Engine is running] • Warm-up condition • Idle speed [Ignition switch: ON] For 1 second after turning ignition switch ON	4.0 V★ 
189 (Y)	—	Engine communication line-L	Input/ Output	—	—
190 (L)	—	Engine communication line-H	Input/ Output	—	—
191 (P)	204 (B)	Stop lamp switch	Input	[Ignition switch: OFF] Brake pedal: Fully released	0 V
				[Ignition switch: OFF] Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
192 (BG)	204 (B)	Brake pedal position switch	Input	[Ignition switch: ON] Brake pedal: Slightly depressed	0 V
				[Ignition switch: ON] Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
193 (LG)	204 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	12.3 V
				[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
194 (W)	204 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
195 (BR)	204 (B)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.22 - 0.50 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.1 - 2.5 V
196 (R)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
197 (R)	204 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
198 (L)	204 (G)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
199 (B)	—	ECM ground	—	—	—
200 (V)	—	Sensor ground (EVAP control system pressure sensor, Fuel tank temperature sensor)	—	—	—
201 (B)	—	ECM ground	—	—	—
202 (Y)	204 (G)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.45 - 1.00 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.4 - 4.8 V
203 (G)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
204 (B)	—	ECM ground	—	—	—

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

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

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245, "VR30DDTT : How to Handle Battery"](#).

TURBO HIGH PRESSURE MODEL : Fail safe (Turbo High Pressure Model)

INFOID:0000000013591458

Description

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

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. • Engine output control 1: Driving at 70 km/h or more is possible. • Engine output control 2: Driving at 40 km/h or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode		• Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

Fail safe mode		Vehicle behavior
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control 1
C		Engine output control 2
D	Device fix mode	
E	Combustion control mode	Stratified charge combustion control at starting
F		<ul style="list-style-type: none"> Idle speed control Recovery speed control at decelerating Idle neutral control*
G		<ul style="list-style-type: none"> Ignition timing correction control Retardation control

*: Not applicable

Fail Safe List

x:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior								
		Pattern								Others
		A	B	C	D	E	F	G		
U012E U042F	Engine communication	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
		—	—	—	×	—	×	—		
P0010 P0020	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
		—	—	—	×	—	×	—		
P0011 P0021	Intake valve timing control	—	—	—	×	—	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: When VTC mechanism sticks, camshaft position does not change from position of stuck angle.	
P0014 P0024	Exhaust valve timing control	—	—	—	×	—	—	—	—	
P0046 P004B	Electric wastegate actuator motor	—	×	—	×	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)	
P0078 P0084	Exhaust valve timing control solenoid valve	—	—	—	×	—	—	—	—	
P0087 P0088	Fuel rail pressure control	×	—	—	×	×	—	—	—	
		×	—	—	—	×	—	—		

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							Others	
		Pattern								
		A	B	C	D	E	F	G		
P0090	High pressure fuel pump	×	—	—	×	×	—	—	—	A
P0101	Mass air flow sensor	×	—	—	—	×	—	—	—	EC6
P010B		—	×	—	×	—	—	×	—	
P0102		—	×	—	×	—	—	×	—	C
P0103 P010C P010D		—	×	—	×	—	—	×	—	D
P0117 P0118	Engine coolant temperature sensor	—	—	—	—	—	×	—	—	E
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 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.	F
P0171 P0172 P0174 P0175	Fuel injection system	×	—	—	—	—	×	—	—	G
P0190	Fuel rail pressure sensor	×	—	—	×	—	×	—	—	H
P0191		×	—	—	—	×	—	—	—	I
P0192 P0193		×	—	—	—	×	—	—	—	J
P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	—	Exhaust valve timing control does not function.	K
P0201 P0202 P0203 P0204 P0205 P0206	Fuel injector	×	—	—	—	×	—	—	—	L
P0234 P1334	Turbocharger system	—	×	—	×	—	—	—	—	M
P0235 P0237 P0238 P0241 P0242	Turbocharger boost sensor	—	×	—	×	—	—	—	—	N
P0300 P0301 P0302 P0303 P0304 P0305 P0306	Misfire	×	—	—	—	—	×	—	—	O
P0335	Crankshaft position sensor	—	—	—	×	×	—	—	—	P
		—	—	—	×	—	×	—	—	

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0340 P0345	Intake camshaft position sensor	—	—	—	×	×	—	—	—
		—	—	—	×	—	×	—	
P1140 P1145		×	—	—	×	—	—	×	—
P0365 P0390	Exhaust camshaft position sensor	—	—	—	×	—	—	—	—
P0500	Vehicle speed sensor	×	—	—	—	—	×	—	—
P0524	Engine oil pressure	—	—	—	—	—	—	—	<ul style="list-style-type: none"> • ECM illuminates engine oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON.
P0603 P0607	ECM	—	—	—	—	—	—	—	—
		—	×	—	—	—	—	—	ASCD operation may be deactivated.
P0604		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0605		—	—	—	—	—	—	—	—
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0606		—	—	—	—	—	—	—	—
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P060A		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
		—	×	—	×	—	—	—	<ul style="list-style-type: none"> • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • ASCD operation may be deactivated.
P060B		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P062B	—	—	—	—	—	—	—	—	
	×	—	—	—	×	—	—	—	
P0641	Sensor power supply	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	
P0643		—	—	—	×	—	—	—	—

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							Others	
		Pattern								
		A	B	C	D	E	F	G		
P14A4 P14A5 P14AD P14AE	Charge air cooler cooling electric water pump	—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at the command speed.	EC6
P14A7 P14B0		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at full speed.	C
P14A9 P14AA P14AC P14B2 P14B3 P14B5		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump stops.	D
P1197	Out of gas	—	—	—	×	—	—	—	—	F
P119A P119B P119C	Fuel pressure sensor	×	—	—	—	×	—	—	—	G
P1233 P2101	Electric throttle control	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	H
P1236 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.	I
P1238 P2119	Electric throttle control actuator	—	×	—	—	—	—	—	—	J
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	K
P1290 P2100 P2103	Throttle control motor relay	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	L
P1805	Brake switch	—	—	—	—	—	—	—	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	M
		Vehicle condition		Driving condition						
		When engine is idling		Normal						
		When accelerating		Poor acceleration						
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	—	—	—	×	—	—	—	—	N
P23E9 P23EA P2614 P2615	Intake camshaft position sensor	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	O
		—	—	—	×	—	×	—		
P23EB P2616 P2617 P2618		—	—	—	×	×	—	—		P
P2619		—	—	—	×	—	×	—		

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P2562 P2566 P2586 P2590	Electric wastegate control valve position sensor								ECM stops the electric wastegate actuator control. (Wastegate valve opens)
P2563 P2564 P2565 P2587 P2588 P2589		—	×	—	×	—	—	—	—
P2578 P2593	Turbocharger speed sensor	—	—	—	—	—	—	—	Torque have to be limited to the operating range that does not generate the over speed of the turbocharger.
P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1	Electric intake valve timing control actuator								ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.
		—	—	—	×	×	—	—	
P34C4 P34C5	Electric intake valve timing control actuator	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
P34C8	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	

TURBO HIGH PRESSURE MODEL : DTC Inspection Priority Chart

INFOID:000000013591459

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

Priority	Detected items (DTC)	A
1	<ul style="list-style-type: none"> • U0101 U1000 U1001 CAN communication line • U012E U042F Engine communication line • P0096 P0097 P0098 Intake air temperature sensor 2 • P00B3 P00B4 Engine coolant temperature sensor 2 • P00E0 P00E1 Charge air cooler coolant temperature sensor • P0101 P0102 P0103 P010B P010C P010D Mass air flow sensor • P0106 Turbocharger boost sensor • P010A Manifold absolute pressure sensor • P0111 P0112 P0113 P0127 Intake air temperature sensor • P0116 P0117 P0118 P0125 Engine coolant temperature sensor • P011C Intake air temperature sensor • P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor • P0181 P0182 P0183 Fuel tank temperature sensor • P0190 P0191 P0192 P0193 P119A P119B P119C FRP sensor • P0196 P0197 P0198 Engine oil temperature sensor • P0235 P0236 P0237 P0238 P0239 P0240 P0241 P0242 Turbocharger boost sensor • P0327 P0328 P0332 P0333 Knock sensor • P0335 Crankshaft position sensor • P0340 P0345 P1140 P1145 Intake camshaft position sensor • P0365 P0390 Exhaust camshaft position sensor • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 Vehicle speed sensor • P0520 Engine oil pressure sensor • P0544 P0545 P0546 P0547 P0548 P0549 P2080 P2081 P2082 P2083 Exhaust gas temperature sensor • P0603 P0604 P0605 P0606 P0607 P060A P060B P0611 P062B P2610 ECM • P062F Control module • P0641 P23E9 P23EA P23EB P2614 P2615 P2616 P2617 P2618 P2619 P34C8 Electric intake valve timing control module • P0643 Sensor power supply • P0850 Park/neutral position (PNP) switch • P1197 Out of gas* • P1220 Fuel pump control module (FPCM) • P1550 P1551 P1552 P1553 P1554 Battery current sensor • P1556 P1557 Battery temperature sensor • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor • P2562 P2563 P2564 P2565 P2566 P2586 P2587 P2588 P2589 P2590 Electric wastegate control valve position sensor • P2578 P2593 Turbocharger speed sensor • P26A5 P26A6 P26A7 P26AB Multi-way control valve position sensor 	<p style="text-align: center;">EC6</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>G</p> <p>H</p> <p>I</p> <p>J</p> <p>K</p>
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		P

Priority	Detected items (DTC)
2	<ul style="list-style-type: none"> • P0010 P0020 Electric intake valve timing control actuator • P0030 P0031 P0032 P0050 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 P0053 P0057 P0058 P0059 Heated oxygen sensor 2 heater • P0046 P004B Electric wastegate control actuator • P0078 P0084 Exhaust valve timing control solenoid valve • P0090 FRP control system • P0130 P0131 P0132 P014C P014D P014E P014F P0150 P0151 P0152 P015A P015B P015C P015D P2096 P2097 P2098 P2099 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2 • P023B P023C P14A2 P14A3 P14A4 P14A5 P14A6 P14A7 P14A8 P14A9 P14AA P14AC P14AD P14AE P14AF P14B0 P14B1 P14B2 P14B3 P14B5 Charge air cooler cooling electric water pump • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P06DA P06DB Engine oil pressure control solenoid valve • P1217 Engine over temperature (OVERHEAT) • P1233 P2101 Electric throttle control function • P1236 P2118 Throttle control motor • P1290 P2100 P2103 Throttle control motor relay • P1805 Brake switch • P26A3 Multi-way control valve • P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1 P34C4 P34C5 Electric intake valve timing control actuator
3	<ul style="list-style-type: none"> • P0011 P0021 Intake valve timing control • P0014 P0024 Exhaust valve timing control • P0087 P0088 FRP control system • P0171 P0172 P0174 P0175 Fuel injection system function • P0201 P0202 P0203 P0204 P0205 P0206 Injector • P0234 P1334 Turbocharger system • P0300 - P0306 Misfire • P0420 P0430 Three way catalyst function • P0456 EVAP control system (VERY SMALL LEAK) • P0506 P0507 Idle speed control system • P050A P050B P050E P1423 P1424 Cold start control • P0524 Engine oil pressure • P1148 P1168 Closed loop control • P1212 TCS communication line • P1238 P2119 Electric throttle control actuator • P1564 ICC steering switch / ASCD steering switch • P1568 ICC command value • P1572 Brake pedal position switch • P1574 ICC vehicle speed sensor / ASCD vehicle speed sensor • P219A P219B Air fuel ratio

NOTE:

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

TURBO HIGH PRESSURE MODEL : DTC Index

INFOID:0000000013591460

×:Applicable —: Not applicable

DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group*3	Reference page
CONSULT GST*2						
U0101	LOST COMM (TCM)	—	1	×	B	EC6-309
U012E	Communication error (lost)	—	2	×	B	EC6-310
U042F	Communication error (invalid)	—	2	×	B	EC6-312
U1000	CAN COMM CIRCUIT	—	2	—	—	EC6-314
U1001	CAN COMM CIRCUIT	—	1	—	—	EC6-316

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[VR30DDTT FOR USA AND CANADA]

DTC* ¹	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group* ³	Reference page
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE RE- QUIRED.	—	—	Flashing*⁴	—	—
P0010	A camshaft position actuator B1	—	2	×	A	EC6-317
P0011	INT/V TIM CONT-B1	×	2	×	A & B	EC6-317
P0014	EXH/V TIM CONT-B1	×	2	×	A & B	EC6-322
P0020	A camshaft position actuator B2	—	2	×	A	EC6-326
P0021	INT/V TIM CONT-B2	×	2	×	A & B	EC6-328
P0024	EXH/V TIM CONT-B2	×	2	×	A & B	EC6-322
P0030	HO2S1 HTR B1	—	2	×	B	EC6-331
P0031	A/F SEN1 HTR (B1)	—	2	×	B	EC6-334
P0032	A/F SEN1 HTR (B1)	—	2	×	B	EC6-334
P0037	HO2S2 HTR (B1)	—	2	×	B	EC6-337
P0038	HO2S2 HTR (B1)	—	2	×	B	EC6-337
P0046	TC/SC BOOST CONTROL A	—	2	×	B	EC6-340
P004B	TC/SC BOOST CONTROL B	—	2	×	B	EC6-340
P0050	Heated O2 sensor heater B2 sensor 1	—	2	×	B	EC6-331
P0051	A/F SEN1 HTR (B2)	—	2	×	B	EC6-334
P0052	A/F SEN1 HTR (B2)	—	2	×	B	EC6-334
P0053	HO2S1 HTR B1	× ⁵	2	×	A	EC6-343
P0057	HO2S2 HTR (B2)	—	2	×	B	EC6-337
P0058	HO2S2 HTR (B2)	—	2	×	B	EC6-337
P0059	Heated O2 sensor heater B2 sensor 1	× ⁵	2	×	A	EC6-347
P0078	EX V/T ACT/CIRC-B1	—	2	×	B	EC6-351
P0084	EX V/T ACT/CIRC-B2	—	2	×	B	EC6-351
P0087	LOW FUEL PRES	—	2	×	A & B or B	EC6-354
P0088	HIGH FUEL PRES	—	2	×	A & B or B	EC6-358
P0090	FUEL PUMP	—	2	×	B	EC6-361
P0096	IAT SENSOR 2 B1	—	2	×	A	EC6-364
P0097	IAT SENSOR 2 B1	—	2	×	B	EC6-366
P0098	IAT SENSOR 2 B1	—	2	×	B	EC6-366
P00B3	RADIATOR COOLANT TEMP SEN	—	2	—	—	EC6-370
P00B4	RADIATOR COOLANT TEMP SEN	—	2	—	—	EC6-370
P00E0	Charge air cooler coolant temp sensor	—	2	—	—	EC6-373
P00E1	Charge air cooler coolant temp sensor	—	2	—	—	EC6-376
P0101	MAF SEN/CIRCUIT-B1	—	2	×	A or B	EC6-379
P0102	MAF SEN/CIRCUIT-B1	—	1	×	B	EC6-386
P0103	MAF SEN/CIRCUIT-B1	—	1	×	B	EC6-386
P0106	ABSL PRES SEN/CIRC	—	2	×	B	EC6-393
P010A	ABSL PRES SEN/CIRC	—	2	×	B	EC6-397
P010B	MAF SEN/CIRCUIT-B2	—	2	×	A or B	EC6-379

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[VR30DDTT FOR USA AND CANADA]

DTC* ¹	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group* ³	Reference page
CONSULT GST* ²						
P010C	MAF SEN/CIRCUIT-B2	—	1	×	B	EC6-386
P010D	MAF SEN/CIRCUIT-B2	—	1	×	B	EC6-386
P0111	IAT SENSOR 1 B1	—	2	×	A	EC6-401
P0112	IAT SEN/CIRCUIT-B1	—	2	×	B	EC6-403
P0113	IAT SEN/CIRCUIT-B1	—	2	×	B	EC6-403
P0116	ECT SENSOR	—	2	×	A or B	EC6-406
P0117	ECT SEN/CIRC	—	1	×	B	EC6-409
P0118	ECT SEN/CIRC	—	1	×	B	EC6-409
P011C	CAT/IAT CRRLTN B1	—	2	×	B	EC6-412
P0122	TP SEN 2/CIRC-B1	—	1	×	B	EC6-414
P0123	TP SEN 2/CIRC-B1	—	1	×	B	EC6-414
P0125	ECT SENSOR	—	2	×	B	EC6-418
P0127	IAT SENSOR-B1	—	2	×	B	EC6-421
P0130	A/F SENSOR1 (B1)	×	2	×	A or B	EC6-423
P0131	A/F SENSOR1 (B1)	—	2	×	B	EC6-427
P0132	A/F SENSOR1 (B1)	—	2	×	B	EC6-430
P0137	HO2S2 (B1)	×	2	×	A	EC6-433
P0138	HO2S2 (B1)	×	2	×	A or B	EC6-439
P0139	HO2S2 (B1)	×	2	×	A	EC6-447
P014C	A/F SENSOR1 (B1)	×	2	×	A	EC6-454
P014D	A/F SENSOR1 (B1)	×	2	×	A	EC6-454
P014E	A/F SENSOR1 (B2)	×	2	×	A	EC6-454
P014F	A/F SENSOR1 (B2)	×	2	×	A	EC6-454
P0150	A/F SENSOR1 (B2)	×	2	×	A or B	EC6-423
P0151	A/F SENSOR1 (B2)	—	2	×	B	EC6-427
P0152	A/F SENSOR1 (B2)	—	2	×	B	EC6-430
P0157	HO2S2 (B2)	×	2	×	A	EC6-433
P0158	HO2S2 (B2)	×	2	×	A or B	EC6-439
P0159	HO2S2 (B2)	×	2	×	A	EC6-447
P015A	A/F SENSOR1 (B1)	×	2	×	A	EC6-454
P015B	A/F SENSOR1 (B1)	×	2	×	A	EC6-454
P015C	A/F SENSOR1 (B2)	×	2	×	A	EC6-454
P015D	A/F SENSOR1 (B2)	×	2	×	A	EC6-454
P0171	FUEL SYS-LEAN-B1	—	2	×	B	EC6-461
P0172	FUEL SYS-RICH-B1	—	2	×	B	EC6-466
P0174	FUEL SYS-LEAN-B2	—	2	×	B	EC6-461
P0175	FUEL SYS-RICH-B2	—	2	×	B	EC6-466
P0181	FTT SENSOR	—	2	×	A or B	EC6-470
P0182	FTT SEN/CIRCUIT	—	2	×	B	EC6-474
P0183	FTT SEN/CIRCUIT	—	2	×	B	EC6-474
P0190	FUEL PRES SEN/CIRC	—	1	×	B	EC6-477
P0191	FRP SENSOR A	—	2	×	A	EC6-481

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DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group*3	Reference page
CONSULT GST*2						
P0192	FRP SEN/CIRC	—	2	×	B	EC6-477
P0193	FRP SEN/CIRC	—	2	×	B	EC6-477
P0196	EOT SENSOR	—	2	×	A or B	EC6-485
P0197	EOT SEN/CIRC	—	2	×	B	EC6-489
P0198	EOT SEN/CIRC	—	2	×	B	EC6-489
P0201	INJECTOR CIRC-CYL1	—	2	×	B	EC6-491
P0202	INJECTOR CIRC-CYL2	—	2	×	B	EC6-491
P0203	INJECTOR CIRC-CYL3	—	2	×	B	EC6-491
P0204	INJECTOR CIRC-CYL4	—	2	×	B	EC6-491
P0205	INJECTOR CIRC-CYL5	—	2	×	B	EC6-491
P0206	INJECTOR CIRC-CYL6	—	2	×	B	EC6-491
P0222	TP SEN 1/CIRC-B1	—	1	×	B	EC6-492
P0223	TP SEN 1/CIRC-B1	—	1	×	B	EC6-492
P0227	TP SEN 2/CIRC-B2	—	1	×	B	EC6-414
P0228	TP SEN 2/CIRC-B2	—	1	×	B	EC6-414
P0234	TC SYSTEM-B1	—	1	×	B	EC6-496
P0235	TURBO BOOST SENSOR	—	2	×	B	EC6-498
P0236	TC BOOST SEN/CIRC-B1	—	2	×	B	EC6-496
P0237	TC BOOST SEN/CIRC-B1	—	2	×	B	EC6-504
P0238	TC BOOST SEN/CIRC-B1	—	2	×	B	EC6-504
P0239	TC/SC boost sensor B	—	2	×	B	EC6-498
P023B	Charge air cooler coolant pump	—	2	—	—	EC6-508
P023C	Charge air cooler coolant pump	—	2	—	—	EC6-512
P0240	TC BOOST SEN/CIRC-B2	—	2	×	B	EC6-501
P0241	TC BOOST SEN/CIRC-B2	—	2	×	B	EC6-504
P0242	TC BOOST SEN/CIRC-B2	—	2	×	B	EC6-504
P0300	MULTI CYL MISFIRE	—	1 or 2	×	B	EC6-516
P0301	CYL 1 MISFIRE	—	1 or 2	×	B	EC6-516
P0302	CYL 2 MISFIRE	—	1 or 2	×	B	EC6-516
P0303	CYL 3 MISFIRE	—	1 or 2	×	B	EC6-516
P0304	CYL 4 MISFIRE	—	1 or 2	×	B	EC6-516
P0305	CYL 5 MISFIRE	—	1 or 2	×	B	EC6-516
P0306	CYL 6 MISFIRE	—	1 or 2	×	B	EC6-516
P0327	KNOCK SEN/CIRC-B1	—	2	—	—	EC6-523
P0328	KNOCK SEN/CIRC-B1	—	2	—	—	EC6-523
P0332	KNOCK SEN/CIRC-B2	—	2	—	—	EC6-523
P0333	KNOCK SEN/CIRC-B2	—	2	—	—	EC6-523
P0335	CKP SEN/CIRCUIT	—	2	×	B	EC6-526
P0340	CMP SEN/CIRC-B1	—	2	×	B	EC6-530
P0345	CMP SEN/CIRC-B2	—	2	×	B	EC6-530
P0365	CAMSHAFT POSITION SENSOR B B1	—	2	×	B	EC6-535
P0390	Camshaft position sensor B bank2	—	2	×	B	EC6-538

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DTC* ¹	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group* ³	Reference page
CONSULT GST* ²						
P0420	TW CATALYST SYS-B1	×	2	×	A	EC6-541
P0430	TW CATALYST SYS-B2	×	2	×	A	EC6-541
P0441	EVAP PURG FLOW/MON	×	2	×	A	EC6-546
P0443	PURG VOLUME CONT/V	—	2	×	A	EC6-552
P0444	PURG VOLUME CONT/V	—	2	×	B	EC6-557
P0445	PURG VOLUME CONT/V	—	2	×	B	EC6-557
P0447	VENT CONTROL VALVE	—	2	×	B	EC6-561
P0448	VENT CONTROL VALVE	—	2	×	A	EC6-565
P0451	EVAP SYS PRES SEN	—	2	×	A	EC6-569
P0452	EVAP SYS PRES SEN	—	2	×	B	EC6-573
P0453	EVAP SYS PRES SEN	—	2	×	B	EC6-576
P0456	EVAP VERY SML LEAK	×* ⁶	2	×	A	EC6-580
P0460	FUEL LEV SEN SLOSH	—	2	×	B	EC6-586
P0461	FUEL LEVEL SENSOR	—	2	×	A	EC6-588
P0462	FUEL LEVL SEN/CIRC	—	2	×	B	EC6-590
P0463	FUEL LEVL SEN/CIRC	—	2	×	B	EC6-590
P0500	VEHICLE SPEED SEN A* ⁷	—	2	×	B	EC6-592
P0506	ISC SYSTEM	—	2	×	B	EC6-594
P0507	ISC SYSTEM	—	2	×	B	EC6-596
P050A	COLD START CONTROL	—	2	×	A	EC6-598
P050B	COLD START CONTROL	—	2	×	A	EC6-598
P050E	COLD START CONTROL	—	2	×	A	EC6-598
P0520	EOP SENSOR/SWITCH	—	2	—	—	EC6-601
P0524	ENGINE OIL PRESSURE	—	1	—	—	EC6-604
P0544	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	B	EC6-607
P0545	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	B	EC6-610
P0546	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	B	EC6-610
P0547	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	B	EC6-613
P0548	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	B	EC6-616
P0549	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	B	EC6-616
P0603	ECM BACK UP/CIRCUIT	—	2	× or —	A or B or —	EC6-619
P0604	ECM	—	1	×	B	EC6-621
P0605	ECM	—	1 or 2	×	B	EC6-622
P0606	CONTROL MODULE	—	1	× or —	B or —	EC6-623
P0607	ECM	—	1 or 2	× or —	B or —	EC6-625
P060A	CONTROL MODULE	—	1	×	B	EC6-626
P060B	CONTROL MODULE	—	1	×	B	EC6-628
P0611	FIC MODULE	—	2	×	B	EC6-629

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DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group*3	Reference page
CONSULT GST*2						
P062B	ECM	—	2	×	B	EC6-630
P062F	CONTROL MODULE	—	1	×	B	EC6-632
P0641	Sensor reference voltage A	—	2	×	A	EC6-633
P0643	SENSOR POWER/CIRC	—	1	×	B	EC6-636
P06DA	ENGINE OIL PRESSURE CONTROL	—	2	—	—	EC6-639
P06DB	ENGINE OIL PRESSURE CONTROL	—	2	—	—	EC6-639
P0850	P-N POS SW/CIRCUIT	—	2	×	B	EC6-642
P1140	INTK TIM S/CIRC-B1	—	2	×	B	EC6-645
P1145	INTK TIM S/CIRC-B2	—	2	×	B	EC6-648
P1148	CLOSED LOOP-B1	—	1	×	B	EC6-651
P1168	CLOSED LOOP-B2	—	1	×	B	EC6-651
P1197	FUEL RUN OUT	—	2	—	—	EC6-652
P119A	FUEL PRESSURE SENSOR	—	2	×	A	EC6-654
P119B	FUEL PRESSURE SENSOR	—	2	×	A	EC6-654
P119C	FUEL PRESSURE SENSOR	—	2	×	B	EC6-659
P1212	TCS/CIRC	—	2	—	—	EC6-663
P1217	ENG OVER TEMP	—	1	×	B	EC6-665
P1220	FPCM/CIRCUIT	—	1	—	—	EC6-668
P1225	CTP LEARNING-B1	—	2	—	—	EC6-671
P1226	CTP LEARNING-B1	—	2	—	—	EC6-673
P1233	ETC FNCTN/CIRC-B2	—	1	×	B	EC6-675
P1234	CTP LEARNING-B2	—	2	—	—	EC6-671
P1235	CTP LEARNING-B2	—	2	—	—	EC6-673
P1236	ETC MOT-B2	—	1	×	B	EC6-678
P1238	ETC ACTR-B2	—	1	×	B	EC6-680
P1239	TP SENSOR-B2	—	1	×	B	EC6-682
P1290	ETC MOT PWR-B2	—	1	×	B	EC6-686
P1334	TC SYSTEM-B2	—	1	×	B	EC6-688
P1423	COLD START CONTROL	—	2	×	A & B	EC6-690
P1424	COLD START CONTROL	—	2	×	A & B	EC6-690
P14A2	Charge air cooler cooling electric W/P	—	2	—	—	EC6-692
P14A3	Charge air cooler cooling electric W/P	—	2	—	—	EC6-696
P14A4	Charge air cooler cooling electric W/P	—	2	—	—	EC6-700
P14A5	Charge air cooler cooling electric W/P	—	2	—	—	EC6-704
P14A6	Charge air cooler cooling electric W/P	—	2	—	—	EC6-708
P14A7	Charge air cooler cooling electric W/P	—	2	—	—	EC6-712
P14A8	Charge air cooler cooling electric W/P	—	2	—	—	EC6-716
P14A9	Charge air cooler cooling electric W/P	—	2	—	—	EC6-720
P14AA	Charge air cooler cooling electric W/P	—	2	—	—	EC6-722
P14AC	Charge air cooler cooling electric W/P	—	2	—	—	EC6-724
P14AD	Charge air cooler cooling electric W/P	—	2	—	—	EC6-726
P14AE	Charge air cooler cooling electric W/P	—	2	—	—	EC6-730

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DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group*3	Reference page
CONSULT GST*2						
P14AF	Charge air cooler cooling electric W/P	—	2	—	—	EC6-734
P14B0	Charge air cooler cooling electric W/P	—	2	—	—	EC6-738
P14B1	Charge air cooler cooling electric W/P	—	2	—	—	EC6-742
P14B2	Charge air cooler cooling electric W/P	—	2	—	—	EC6-746
P14B3	Charge air cooler cooling electric W/P	—	2	—	—	EC6-748
P14B5	Charge air cooler cooling electric W/P	—	2	—	—	EC6-750
P1550	BAT CURRENT SENSOR	—	2	—	—	EC6-752
P1551	BAT CURRENT SENSOR	—	2	—	—	EC6-755
P1552	BAT CURRENT SENSOR	—	2	—	—	EC6-755
P1553	BAT CURRENT SENSOR	—	2	—	—	EC6-759
P1554	BAT CURRENT SENSOR	—	2	—	—	EC6-762
P1556	BAT TMP SEN/CIRC	—	2	—	—	EC6-765
P1557	BAT TMP SEN/CIRC	—	2	—	—	EC6-765
P1564	ASCD SW	—	1	—	—	EC6-768 (without ICC) EC6-771 (with ICC)
P1568	ICC COMMAND VALUE	—	1	—	—	EC6-775
P1572	ASCD BRAKE SW	—	1	—	—	EC6-777 (without ICC) EC6-782 (with ICC)
P1574	ASCD VHL SPD SEN	—	1	—	—	EC6-790 (without ICC) EC6-792 (with ICC)
P1610	LOCK MODE	—	2	—	—	SEC-96
P1611	ID DISCORD,IMMU-ECM	—	2	—	—	SEC-98
P1612	CHAIN OF ECM-IMMU	—	2	—	—	SEC-99
P1805	BRAKE SW/CIRCUIT	—	2	—	—	EC6-794
P2080	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	A	EC6-797
P2081	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	B	EC6-800
P2082	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	A	EC6-803
P2083	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	B	EC6-806
P2096	POST CATALYST FUEL TRIM SYS B1	—	2	×	B	EC6-809
P2097	POST CATALYST FUEL TRIM SYS B1	—	2	×	B	EC6-809
P2098	POST CATALYST FUEL TRIM SYS B2	—	2	×	B	EC6-809
P2099	POST CATALYST FUEL TRIM SYS B2	—	2	×	B	EC6-809
P2100	ETC MOT PWR-B1	—	1	×	B	EC6-814
P2101	ETC FNCTN/CIRC-B1	—	1	×	B	EC6-816

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DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group*3	Reference page	
CONSULT GST*2							
P2103	ETC MOT PWR	—	1	×	B	EC6-814	A
P2118	ETC MOT-B1	—	1	×	B	EC6-820	EC6
P2119	ETC ACTR-B1	—	1	×	B	EC6-822	
P2122	APP SEN 1/CIRC	—	1	×	B	EC6-824	C
P2123	APP SEN 1/CIRC	—	1	×	B	EC6-824	
P2127	APP SEN 2/CIRC	—	1	×	B	EC6-827	D
P2128	APP SEN 2/CIRC	—	1	×	B	EC6-827	
P2132	TP SEN 1/CIRC-B2	—	1	×	B	EC6-492	
P2133	TP SEN 1/CIRC-B2	—	1	×	B	EC6-492	E
P2135	TP SENSOR-B1	—	1	×	B	EC6-682	
P2138	APP SENSOR	—	1	×	B	EC6-830	F
P219A	AIR FUEL RATIO IMBALANCE B1	×	2	×	A	EC6-832	
P219B	AIR FUEL RATIO IMBALANCE B2	×	2	×	A	EC6-832	
P23E9	A camshaft posi signal B2	—	2	×	A	EC6-837	G
P23EA	A camshaft posi signal B2	—	2	×	A	EC6-840	
P23EB	A camshaft posi signal B2	—	2	×	A	EC6-843	
P2562	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC6-847	H
P2563	TC BOOST CONTROL POSITN SEN A	—	2	×	A	EC6-850	I
P2564	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC6-854	
P2565	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC6-854	J
P2566	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC6-847	K
P2578	Turbocharger/Supercharger speed sensor A	—	2	—	—	EC6-857	
P2586	TC BOOST CONTROL POSITN SEN B	—	2	×	B	EC6-861	L
P2587	TC BOOST CONTROL POSITN SEN B	—	2	×	A	EC6-864	M
P2588	TC BOOST CONTROL POSITN SEN B	—	2	×	B	EC6-868	
P2589	TC BOOST CONTROL POSITN SEN B	—	2	×	B	EC6-868	N
P2590	TC BOOST CONTROL POSITN SEN B	—	2	×	B	EC6-861	O
P2593	Turbocharger/Supercharger speed sensor B	—	2	—	—	EC6-871	
P2610	ECM/PCM INTERNAL ENG OFF TIMER	—	2	×	B	EC6-875	P
P2614	A camshaft posi signal B1	—	2	×	A	EC6-877	
P2615	A camshaft posi signal B1	—	2	×	A	EC6-880	
P2616	A camshaft posi signal B1	—	2	×	A	EC6-883	
P2617	Crankshaft position signal	—	2	×	A	EC6-887	
P2618	Crankshaft position signal	—	2	×	A	EC6-890	

DTC* ¹	Items (CONSULT screen terms)	SRT code	Trip	MIL	PermanentDTC group* ³	Reference page
CONSULT GST* ²						
P2619	Crankshaft position signal	—	2	×	A	EC6-894
P26A3	ENGINE COOLANT BYPASS VALVE	—	1 or 2	×	B	EC6-899
P26A5	ENGINE COOLANT B/V A POSI SEN	—	2	×	A	EC6-902
P26A6	ENGINE COOLANT B/V A POSI SEN	—	2	×	B	EC6-905
P26A7	ENGINE COOLANT B/V A POSI SEN	—	2	×	B	EC6-905
P26AB	ENGINE COOLANT B/V A POSI SEN	—	2	×	A	EC6-908
P34A4	A camshaft posi actuator temp sens B1	—	2	×	A	EC6-912
P34A5	A camshaft posi actuator temp sens B1	—	2	×	A	EC6-915
P34A6	A camshaft posi actuator temp sens B1	—	2	×	A	EC6-918
P34A7	A camshaft posi actuator temp sens B1	—	2	×	A	EC6-921
P34A8	A camshaft posi actuator temp sens B2	—	2	×	A	EC6-924
P34A9	A camshaft posi actuator temp sens B2	—	2	×	A	EC6-927
P34AA	A camshaft posi actuator temp sens B2	—	2	×	A	EC6-930
P34AB	A camshaft posi actuator temp sens B2	—	2	×	A	EC6-933
P34AC	A camshaft posi actuator posi sens B1	—	2	×	A	EC6-936
P34AD	A camshaft posi actuator posi sens B1	—	2	×	A	EC6-940
P34B0	A camshaft posi actuator posi sens B2	—	2	×	A	EC6-943
P34B1	A camshaft posi actuator posi sens B2	—	2	×	A	EC6-947
P34C4	A camshaft posi actuator control B1	—	2	×	A	EC6-950
P34C5	A camshaft posi actuator control B2	—	2	×	A	EC6-951
P34C8	Camshaft position control module	—	2	×	A	EC6-952

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

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

*3: Refer to [EC6-288](#), "Description", "PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)".

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

*5: This DTC is not displayed in "SRT STATUS" function on 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.

TURBO LOW PRESSURE MODEL

TURBO LOW PRESSURE MODEL : Reference Value

INFOID:0000000013924181

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations.
Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor.

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This occurs because the timing light shows a value calculated by ECM according to signals received from the camshaft position sensor and other sensors related to ignition timing.

- For outlines of following items, refer to [EC6-115. "CONSULT Function"](#).

CONSULT MONITOR ITEM

Monitor Item	Condition		Values/Status
COOLANT TEMP/S	Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature
TURBO BST SEN	Ignition switch: ON		Indicates intake boost
PURG VOL C/V	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
		2,000 rpm	—
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank temperature
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
CAL/LD VALUE	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	5% - 35%
		2,500 rpm	5% - 35%
HO2S2 (B1)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> • Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 (B2)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> • Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F ALPHA-B1	See EC6-294. "Description" .		
A/F ALPHA-B2	See EC6-294. "Description" .		
A/F S1 HTR(B1)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%
A/F S1 HTR(B2)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%
TC/SC SPEED B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	3,200 rpm	15,000 - 30,000 rpm
TC/SC SPEED B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	3,200 rpm	15,000 - 30,000 rpm
EXH/V TIM B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	0.0°C
		2,000 rpm	3.0°C

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Monitor Item	Condition		Values/Status
EXH/V TIM B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	-0.5°C
		2,000 rpm	2.0°C
W/GATE V CLSD LEARN B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	CMPLT
		2,000 rpm	CMPLT
W/GATE V CLSD LEARN B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	CMPLT
		2,000 rpm	CMPLT
W/G ACTUATOR POSITION B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	0.0061- 0.0098 m
		2,000 rpm	0.0061- 0.0098 m
W/G ACTUATOR POSITION B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	0.0061- 0.0098 m
		2,000 rpm	0.0061- 0.0098 m
RADIATOR COOLANT TEMP	Engine: Running		More than 70°C (158°F)
Ignition timing	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	10 deg
		2,000 rpm	44 deg
Fuel injection timing	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	-38 deg
		2,000 rpm	-34 deg
FAN DUTY	Engine: Running		0 - 100%
Charge air cooler coolant temp	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	Indicates charge air cooler temperature
AC EVA TEMP	Engine: Running		Indicates A/C evaporator temperature sent from "unified meter and A/C amp."
AC EVA TARGET	Engine: Running		Indicates target A/C evaporator temperature sent from "unified meter and A/C amp."
ALT DUTY	Engine: Idle		0 - 80%
FUEL PUMP DUTY	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N position • Air conditioner switch: OFF • No load 	Idle	60 – 70
BAT TEMP SEN	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load 	Idle	Indicates the temperature around the battery.
THRTL STK CNT B1	This item is displayed but is not applicable to this model.		
THRTL STK CNT B2	This item is displayed but is not applicable to this model.		
ENG SPEED	Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 655,350 km (0 - 407,234 miles)

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Monitor Item	Condition	Values/Status
B/FUEL SCHDL	See EC6-294, "Description" .	
MASS AIRFLOW	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 2,500 rpm
		1.2 - 2.0 g/s 4.6 - 7.6 g/s
FUEL PRES SEN	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 2,000 rpm
		2.0 - 4.0 MPa 2.0 - 4.0 MPa
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released
		Accelerator pedal: Fully depressed
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released
		Accelerator pedal: Fully depressed
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Selector lever: D	Accelerator pedal: Fully released
		Accelerator pedal: Fully depressed
TP SEN 2-B1*1	• Ignition switch: ON (Engine stopped) • Selector lever: D	Accelerator pedal: Fully released
		Accelerator pedal: Fully depressed
FUEL INJ B1	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle
		2,000 rpm
FUEL INJ B2	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle
		2,000 rpm
IDLE FUEL PRES MIN	Engine: After warming up	2.0 MPa
IDLE FUEL PRES MAX	Engine: After warming up	4.0 MPa
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.	Almost the same speed as the speedometer indication
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0 V
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm
A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm
SET VHCL SPD	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle
		2,000 rpm
VTC DTY EX B1	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle
		2,000 rpm
VTC DTY EX B2	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle
		2,000 rpm

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Monitor Item	Condition		Values/Status
BAT CUR SEN	<ul style="list-style-type: none"> • Engine speed: Idle • Battery: Fully charged*2 • Selector lever: P or N • Air conditioner switch: OFF • No load 		Approx. 2.600 - 3.500 V
MILEAGE FOR EONV	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load 	Idle	Varies depending on vehicle environment.
A/F ADJ-B1	Engine: Running		-0.330 - 0.330
A/F ADJ-B2	Engine: Running		-0.330 - 0.330
TP SEN 1-B2	<ul style="list-style-type: none"> • Ignition switch: ON (Engine stopped) • Selector lever: D 	Accelerator pedal: Fully released	More than 0.360 V
		Accelerator pedal: Fully depressed	Less than 4.750 V
TP SEN 2-B2*1	<ul style="list-style-type: none"> • Ignition switch: ON (Engine stopped) • Selector lever: D 	Accelerator pedal: Fully released	More than 0.360 V
		Accelerator pedal: Fully depressed	Less than 4.750 V
INT/V TIM (B1)	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	- 5 - 5°C
		2,000 rpm	Approx. 0 - 30°C
INT/V TIM (B2)	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	- 5 - 5°C
		2,000 rpm	Approx. 0 - 30°C
BOOST S/V DUTY	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	0.00000000%
		2,000 rpm	0.00000000%
H/P FUEL PUMP DEG	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	286 - 308 deg
		2,000 rpm	294 - 316 deg
FUEL PRES SEN V	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	0.7 - 1.0 V
		2,000 rpm	0.6 - 1.0 V
EOP SENSOR	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	1.385 V
		2,000 rpm	1.945 V
ECM TEMP 1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	56.375°C
		2,000 rpm	48.750°C
ECM TEMP 2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	54.875°C
		2,000 rpm	47.125°C
MASS AIR FLOW SENSOR (Hz)	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2800 - 3100 Hz
		2,000 rpm	2200 - 2600 Hz
A/F-S ATMSPHRC CRCT B2	Engine: After warming up, idle the engine		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the engine		Varies depending on vehicle environment.

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Monitor Item	Condition		Values/Status
A/F-S ATMSPHRC CRCT UP B2	Engine: Running		Varies depending on the number of updates.
A/F-S ATMSPHRC CRCT UP B1	Engine: Running		Varies depending on the number of updates.
EXHAUST GAS TEMP SEN 1 B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2.53250 V
		2,000 rpm	1.29500 V
EXHAUST GAS TEMP SEN 1 B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2.45625 V
		2,000 rpm	1.33125 V
Electric water pump 1 duty	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	40 %
Electric water pump 2 duty	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	40 %
AFM output	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2800 - 3100 Hz
		2,000 rpm	2200 - 2600 Hz
W/G ACTUATOR POSI SEN B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	3.240 - 4.480 V
		2,000 rpm	3.240 - 4.480 V
W/G ACTUATOR POSI SEN B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	3.240 - 4.480 V
		2,000 rpm	3.240 - 4.480 V
ENGINE COOLANT B/V POSI	Ignition switch: ON		Approx. 207 deg
	Engine: Idle	Engine coolant temperature: 60°C (140°F)	Approx. 47 deg
		Engine coolant temperature: 67°C (153°F)	Approx. 87 deg
		Engine coolant temperature: 86°C (187°F)	Approx. 125 deg
TOTAL DISTNC - OCS RST 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS RST 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS RST 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
DETERIORTN VL - OCS RST 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS RST 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS RST 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
TOTAL DISTNC - OCS WRN 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS WRN 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)

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Monitor Item	Condition		Values/Status
TOTAL DISTNC - OCS WRN 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
DETERIORTN VL - OCS WRN 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS WRN 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS WRN 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
CURRENT DETERIORATN VAL	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	On
		Rear window defogger switch and lighting switch: OFF	Off
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates.)	On
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	Off
		Steering wheel: Being turned	On
P/N POSI SW	Ignition switch: ON	Selector lever: P or N	On
		Selector lever: Except above	Off
START SIGNAL	Ignition switch: ON → START → ON		Off → On → Off
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	On
		Accelerator pedal: Slightly depressed	Off
HO2S2 MNTR(B1)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		LEAN ↔ RICH
HO2S2 MNTR(B2)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		LEAN ↔ RICH
IGNITION SW	Ignition switch: ON → OFF → ON		On → Off → On
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	On
		Heater fan switch: OFF	Off
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been performed yet.	Yet
		Idle air volume learning has already been performed successfully.	CMPLT
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
COMBUSTION	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	Mode1
		2,000 rpm	Mode1
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates)	On

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Monitor Item	Condition		Values/Status
FUEL PUMP RLY	<ul style="list-style-type: none"> For 1 second after turning ignition switch: ON Engine running or cranking 		On
	Except above		Off
FPCM	Ignition switch: OFF		Off
	<ul style="list-style-type: none"> For 1 seconds after turning ignition switch: ON Engine: Idle speed 		Low
	<ul style="list-style-type: none"> Engine: Cranking Engine coolant temperature: More than 10°C (50°) Engine: Above 4000 rpm 		Mid
	Engine: Cranking		Hi
VENT CONT/V	Ignition switch: ON		Off
THRTL RELAY	Ignition switch: ON		On
HO2S2 HTR (B1)	Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> 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
	Engine speed: Above 3,600 rpm		Off
HO2S2 HTR (B2)	Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> 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
	Engine speed: Above 3,600 rpm		Off
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	On
		Brake pedal: Slightly depressed	Off
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	On
		SET/COAST switch: Released	Off
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	On
		RESUME/ACCELERATE switch: Released	Off
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	On
		CANCEL switch: Released	Off
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	On
		MAIN switch: Released	Off
SET LAMP	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	Off
		2,000 rpm	Off
AT OD CANCEL	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	Off
		2,000 rpm	Off
AT OD MONITOR	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	Off
		2,000 rpm	Off
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	On → Off

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Monitor Item	Condition	Values/Status
LO SPEED CUT	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Non
		2,000 rpm Non
VHCL SPD CUT	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Non
		2,000 rpm Non
ALT DUTY SIG	Power generation voltage variable control: Operating	
	Power generation voltage variable control: Not operating	
HO2 S2 DIAG1(B2)	DTC P0159 self-diagnosis (delayed response) is incomplete.	
	DTC P0159 self-diagnosis (delayed response) is complete.	
HO2 S2 DIAG1(B1)	DTC P0139 self-diagnosis (delayed response) is incomplete.	
	DTC P0139 self-diagnosis (delayed response) is complete.	
HO2 S2 DIAG2(B2)	DTC P0159 self-diagnosis (slow response) is incomplete.	
	DTC P0159 self-diagnosis (slow response) is complete.	
HO2 S2 DIAG2(B1)	DTC P0139 self-diagnosis (slow response) is incomplete.	
	DTC P0139 self-diagnosis (slow response) is complete.	
EVAP LEAK DIAG	Ignition switch: ON	
	Depending on condition of EVAP leak diagnosis	
EVAP DIAG READY	Ignition switch: ON	
	Depending on ready condition of EVAP leak diagnosis	
SYSTEM 1 DIAGNOSIS A B2	DTC P219B self-diagnosis is incomplete.	
	DTC P219B self-diagnosis is complete.	
SYSTEM 1 DIAGNOSIS A B1	DTC P219A self-diagnosis is incomplete.	
	DTC P219A self-diagnosis is complete.	
A/F SEN1 DIAG1(B2)	DTC P015C and P015D self-diagnosis incomplete.	
	DTC P015C and P015D self-diagnosis is complete.	
A/F SEN1 DIAG1(B1)	DTC P015A and P015B self-diagnosis incomplete.	
	DTC P015A and P015B self-diagnosis is complete.	
A/F SEN1 DIAG2(B2)	DTC P014E and P014F self-diagnosis incomplete.	
	DTC P014E and P014F self-diagnosis is complete.	
A/F SEN1 DIAG2(B1)	DTC P014C and P014D self-diagnosis incomplete.	
	DTC P014C and P014D self-diagnosis is complete.	
SYSTEM 1 DIAGNOSIS B B2	DTC P219B self-diagnosis is on standby.	
	DTC P219B self-diagnosis is under diagnosis.	
SYSTEM 1 DIAGNOSIS B B1	DTC P219A self-diagnosis is on standby.	
	DTC P219A self-diagnosis is under diagnosis.	
A/F SEN1 DIAG3(B2)	The vehicle condition is not within the diagnosis range of DTC P014E, P014F, P015C or P015D.	
	The vehicle condition is within the diagnosis range of DTC P014E, P014F, P015C or P015D.	
A/F SEN1 DIAG3(B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.	
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.	

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< ECU DIAGNOSIS INFORMATION >

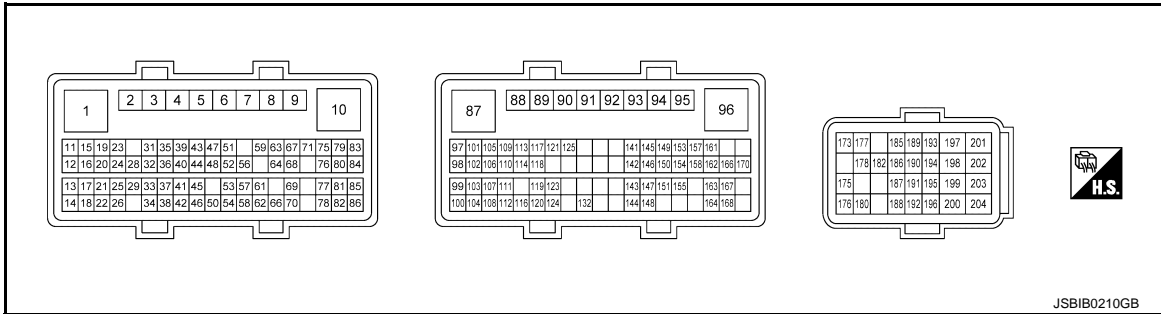
[VR30DDTT FOR USA AND CANADA]

Monitor Item	Condition	Values/Status
VALVE TIMING ADJUSTMENT	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load <p style="text-align: center;">Idle</p>	YET
V/T DEFAULT POSITION LEARN	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load <p style="text-align: center;">Idle</p>	YET

*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-245, "VR30DDTT : How to Handle Battery"](#).

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

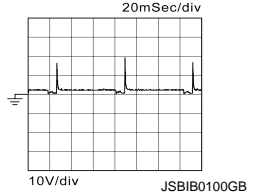
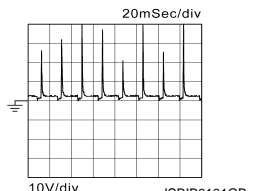
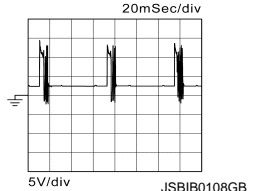
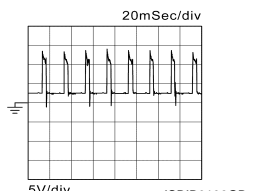
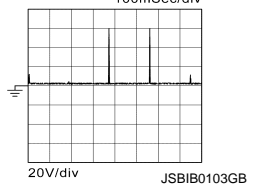
- ECM is located behind the instrument assist lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
1 (R)	204 (B)	High pressure fuel pump power supply	Input	[Ignition switch: ON]	11.0 - 14.0V
				[Engine is running] Idle speed	13.0 - 14.5 V
2 (GR)	—	ECM ground	—	—	—
3 (G)	204 (B)	Fuel injector driver power supply A1	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
4 (L)	204 (B)	Fuel injector driver power supply A2	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
5 (LG)	204 (B)	Fuel injector driver power supply B1	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
6 (V)	204 (B)	Fuel injector driver power supply B2	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
7 (BG)	—	ECM ground	—	—	—

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< ECU DIAGNOSIS INFORMATION >

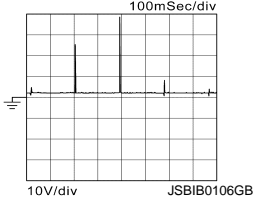

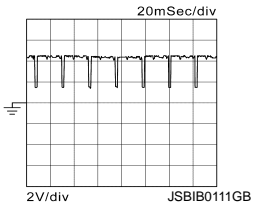
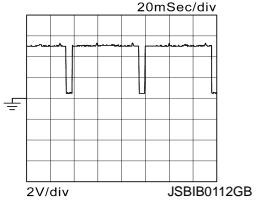
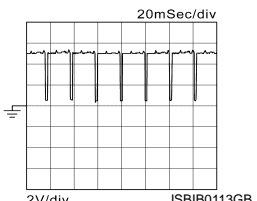
[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
8 (W)	204 (B)	Knock sensor (bank 1)	Input	[Ignition switch: ON]	1.8 V
				[Engine is running] Idle speed	2.0 V*1
9 (R)	204 (B)	High pressure fuel pump (LO)	Output	[Ignition switch: ON]	1.8 V
				[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.1 V★ 
10 (B)	204 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.1 V★ 
				[Ignition switch: ON]	1.8 V
10 (B)	204 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.7 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.7 V★ 
11 (BR)	204 (B)	Fuel injector No.1 (HI)	Output	[Ignition switch: ON]	1.8 V
12 (W)		Fuel injector No.3 (HI)		[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.2 V★ 
13 (LG)		Fuel injector No.5 (HI)			
15 (GR)		Fuel injector No.2 (HI)			
16 (V)		Fuel injector No.4 (HI)			
19 (L)		Fuel injector No.6 (HI)			

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
14 (R)	204 (B)	Fuel injector No.3 (LO)	Output	[Ignition switch: ON]	1.8 V
17 (Y)		Fuel injector No.1 (LO)		[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	
18 (L)		Fuel injector No.5 (LO)			
20 (SB)		Fuel injector No.2 (LO)			
21 (P)		Fuel injector No.4 (LO)			
22 (W)		Fuel injector No.6 (LO)			
23 (GR)		—			
24 (W)	—	Sensor ground (Engine oil pressure sensor)	—	—	—
25 (Y)	204 (B)	Intake camshaft position sensor (bank 1) [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.8 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.8 V★ 
26 (SB)	204 (B)	Intake camshaft position sensor (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.3 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.3 V★ 

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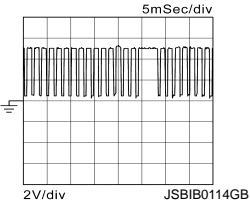
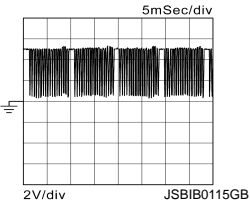
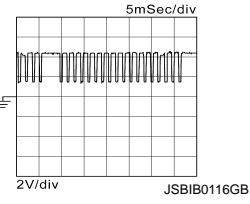
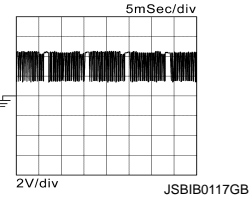
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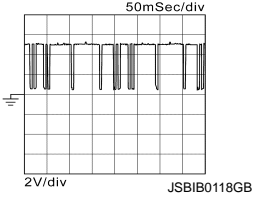
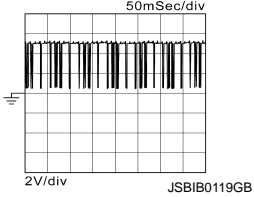
[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
28 (Y)	—	Sensor ground (Crankshaft position sensor)	—	—	—
29 (BR)	—	Sensor ground [Intake camshaft posi- tion sensor (bank 1), Ex- haust camshaft position sensor (bank 1)]	—	—	—
31 (W)	204 (B)	Crankshaft position sen- sor	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.2 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.2 V★ 
32 (G)	204 (B)	Crankshaft position sen- sor [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.1 V★ 

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
33 (G)	204 (B)	Exhaust camshaft position sensor (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.7 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.7 V★ 
34 (R)	204 (B)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5 V
35 (G)	44 (R)	Sensor power supply [Throttle position sensor (bank 1)]	—	[Ignition switch: ON]	5 V
36 (GR)	204 (B)	Sensor power supply [Intake camshaft position sensor (bank 1), Exhaust camshaft position sensor (bank 1)]	—	[Ignition switch: ON]	5 V
37 (Y)	204 (B)	Sensor power supply (Mass air flow sensor, Intake air temperature sensor 1)	—	[Ignition switch: ON]	5 V
38 (L)	204 (B)	Sensor power supply [Multi-way control valve motor, Turbocharger boost sensor (bank 1, 2)]	—	[Ignition switch: ON]	5 V
39 (BG)	204 (B)	Sensor power supply [Electric wastegate control actuator (bank 1, 2)]	—	[Ignition switch: ON]	5 V
40 (P)	204 (B)	Intake air temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
41 (R)	204 (B)	Mass air flow sensor (bank 1)	Input	[Ignition switch: ON]	Approx. 3,300 Hz
				[Engine is running] • Warm-up condition • Idle speed	2,800 - 3,100 Hz
42 (LG)	—	Sensor ground [Mass air flow sensor (bank 1), Intake air temperature sensor 1]	—	—	—

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[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
43 (W)	44 (R)	Throttle position sensor 1 (bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75 V
44 (R)	—	Sensor ground [Throttle position sensor (bank 1)]	—	—	—
45 (L)	—	Sensor ground [Electric wastegate control actuator (bank 1)]	—	—	—
46 (G)	204 (B)	Mass air flow sensor (bank 2)	Input	[Ignition switch: ON]	Approx. 3,300 Hz
				[Engine is running] • Warm-up condition • Idle speed	2,800 - 3,100 Hz
47 (SB)	204 (B)	Exhaust gas temperature sensor (bank 2)	Input	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	1.8 V
48 (B)	44 (R)	Throttle position sensor 2 (bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36 V
50 (BR)	100 (P)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
51 (P)	204 (B)	Engine oil pressure sensor	Input	[Engine is running] • Selector lever: N or P • Air conditioner switch: OFF • Engine oil temperature: 80°C (176°F) • Engine speed: 2,000 rpm	1.75 - 2.15 V
52 (R)	204 (B)	Battery current sensor	Input	[Ignition switch: ON]	1.7 V
				[Engine is running] • Battery: Fully charged*2 • Idle speed	2.3 V
53 (V)	204 (B)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.6 - 1.0 V
54 (SB)	204 (B)	Battery temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.4 V
56 (Y)	204 (B)	Engine coolant temperature sensor 2	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
57 (W)	204 (B)	Electric wastegate position sensor (bank 1)	Input	[Ignition switch: ON]	3.1 V
				[Engine is running] • Warm-up condition • Idle speed	3.4 V
58 (W)	204 (B)	Turbocharger boost sensor (bank 1)	Input	[Ignition switch: ON]	1.8 - 2.4 V
59 (V)	204 (B)	Charge air cooler coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
61 (W)	204 (B)	Electric wastegate position sensor (bank 2)	Input	[Ignition switch: ON]	3.2 V
				[Engine is running] • Warm-up condition • Idle speed	3.6 V
62 (R)	204 (B)	Intake air temperature sensor 2	Input	[Ignition switch: ON]	2.6 V
				[Engine is running] • Warm-up condition • Idle speed	2.1 V
63 (L)	204 (B)	Turbocharger boost sensor (bank 2)	Input	[Ignition switch: ON]	1.4 V
				[Engine is running] • Warm-up condition • Idle speed	1.7 V
64 (W)	204 (B)	—	—	—	—
66 (P)	—	Sensor ground [Electric wastegate control actuator (bank 2)]	—	—	—
67 (LG)	204 (B)	Exhaust gas temperature sensor (bank 1)	Input	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	2.0 V
68 (R)	—	Sensor ground [Turbocharger boost sensor (bank 2)]	—	—	—
69 (LG)	204 (B)	Multi-way control valve position sensor	Input	[Ignition switch: ON] Cold condition	4.5 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 60°C (140°F)	1.4 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 67°C (153°F)	2.2 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 86°C (187°F)	2.9 V

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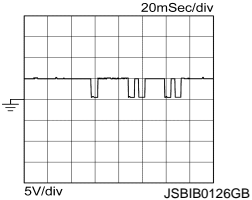
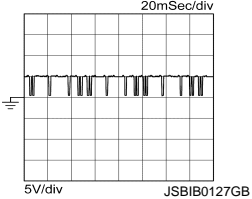
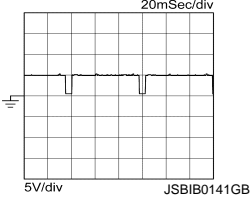
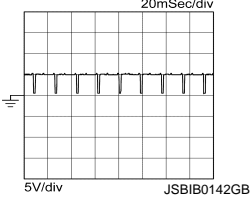
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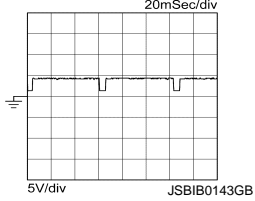
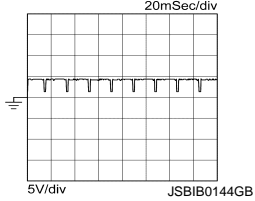
[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
70 (V)	204 (B)	Refrigerant pressure sensor	Input	[Ignition switch: ON]	0 V
				<ul style="list-style-type: none"> • [Engine is running] • Warm-up condition • Idle speed • Both A/C switch and blower fan motor switch: ON (Compressor operates) 	1.7 - 2.0 V
71 (W)	204 (B)	Engine coolant temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
75 (V)	204 (B)	Exhaust camshaft position sensor (bank 2)	Input	<ul style="list-style-type: none"> • [Engine is running] • Warm-up condition • Idle speed <p>NOTE: The pulse cycle changes depending on rpm at idle</p>	4.3 V★ 
				<ul style="list-style-type: none"> • [Engine is running] • Warm-up condition • Engine speed: 2,000 rpm 	4.3 V★ 
76 (GR)	204 (B)	Sensor power supply [Mass air flow sensor (bank 2)]	—	[Ignition switch: ON]	5 V
77 (BG)	204 (B)	Intake camshaft position sensor (bank 2)	Input	<ul style="list-style-type: none"> • [Engine is running] • Warm-up condition • Idle speed <p>NOTE: The pulse cycle changes depending on rpm at idle</p>	4.6 V★ 
				<ul style="list-style-type: none"> • [Engine is running] • Warm-up condition • Engine speed: 2,000 rpm 	4.6 V★ 

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[VR30DDTT FOR USA AND CANADA]

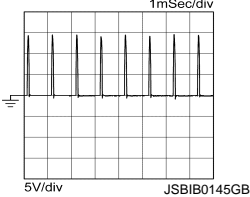
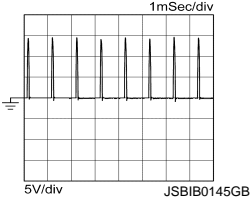
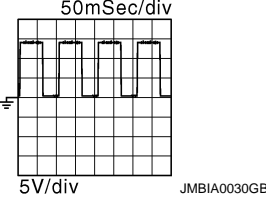
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
78 (SB)	204 (B)	Intake camshaft position sensor (bank 2) [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.1 V★ 
79 (BR)	—	Sensor ground [Mass air flow sensor (bank 2)]	—	—	—
80 (P)	204 (B)	Sensor power supply (Fuel rail pressure sensor)	—	[Ignition switch: ON]	5 V
81 (Y)	204 (B)	Sensor power supply (Battery current sensor)	—	[Ignition switch: ON]	5 V
82 (G)	—	Sensor ground [Intake camshaft position sensor (bank 2), Exhaust camshaft position sensor (bank 2)]	—	—	—
83 (Y)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
84 (B)	—	Sensor ground (Knock sensor)	—	—	—
85 (W)	204 (B)	Sensor power supply [Intake camshaft position sensor (bank 2), Exhaust camshaft position sensor (bank 2)]	—	[Ignition switch: ON]	5 V
86 (W)	204 (B)	Knock sensor (bank 2)	Input	[Ignition switch: ON]	1.8 V
				[Engine is running] • Warm-up condition • Idle speed	2.4 V*1
87 (B)	—	ECM ground	—	—	—
88 (B)	—	ECM ground	—	—	—

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[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
89 (LG)	90 (G)	Electric wastegate control actuator motor (+) (bank 2)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.1 V★ 
90 (G)	89 (LG)	Electric wastegate control actuator motor (-) (bank 2)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.2 V
91 (BG)	204 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
92 (L)	93 (R)	Electric wastegate control actuator motor (+) (bank 1)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.8 V★ 
93 (R)	92 (L)	Electric wastegate control actuator motor (-) (bank 1)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.2 V
94 (W)	204 (B)	Air fuel ratio (A/F) sensor 1 heater (bank 1)	Output	[Ignition switch: ON]	11.1 V
				[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	10.1 V★ 
95 (GR)	—	ECM ground	—	—	—
96 (R)	204 (B)	Throttle control motor power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
97 (GR)	—	Sensor ground (Multi-way control valve, Engine coolant temperature sensor 1, Charge air cooler coolant temperature sensor, Refrigerant pressure sensor)	—	—	—

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[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
98 (Y)	204 (B)	Heated oxygen sensor 2 (bank 2)	Input	[Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met • Engine: after warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
99 (R)	—	Sensor ground [Heated oxygen sensor 2 (bank 1), Heated oxygen sensor 2 (bank 2)]	—	—	—
100 (P)	—	Sensor ground [Battery current sensor, Engine coolant temperature sensor 1, Engine oil temperature sensor, Exhaust gas temperature sensor (bank 1), Exhaust gas temperature sensor (bank 2)]	—	—	—
101 (L)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 1)	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.2 V Output voltage varies with air fuel ratio.
102 (P)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 1)	Input	[Ignition switch: ON]	1.8 V
103 (B)	—	Shield	—	—	—
104 (SB)	—	Sensor ground [Throttle position sensor (bank 2)]	—	—	—
105 (BR)	104 (SB)	Sensor power supply [Throttle position sensor (bank 2)]	—	[Ignition switch: ON]	5 V
106 (P)	104 (SB)	Throttle position sensor 1 (bank 2)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75 V
107 (LG)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 2)	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.2 V Output voltage varies with air fuel ratio.
110 (W)	204 (B)	Heated oxygen sensor 2 (bank 1)	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
111 (V)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 2)	Input	[Ignition switch: ON]	1.8 V

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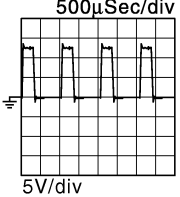
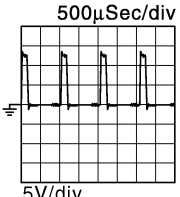
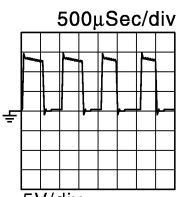
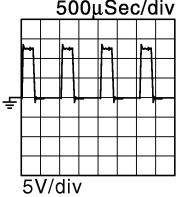
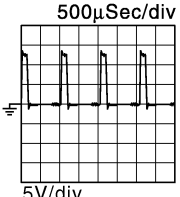
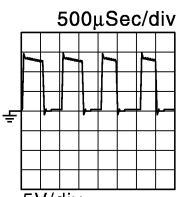
[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
112 (LG)	104 (SB)	Throttle position sensor 2 (bank 2)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36 V
113 (Y)	204 (B)	Manifold absolute pres- sure sensor	Input	[Ignition switch: ON]	1.4 V
				[Engine is running] • Warm-up condition • Idle speed	1.0 V
114 (G)	—	Sensor ground (Manifold absolute pres- sure sensor)	—	—	—
117 (LG)	204 (B)	Charge air cooler cool- ing electric water pump 1	Input	[Ignition switch: ON]	0.7 - 3.6 V
121 (V)	204 (B)	PNP signal	Input	[Ignition switch: ON] Selector lever: P or N	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] Selector lever: Except above	0 V
123 (BG)	204 (B)	Throttle control motor re- lay	Output	[Ignition switch: ON → OFF]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
				[Ignition switch: ON]	0 - 1.0 V
124 (R)	204 (B)	Fuel pump relay	Output	[Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5 V
				[Ignition switch: ON] More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
125 (P)	204 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] A few seconds after turning ignition switch OFF	0 - 1.5 V
				[Ignition switch: OFF] More than a few seconds after turning ig- nition switch OFF	BATTERY VOLTAGE (11 - 14 V)
141 (R)	146 (G)	Multi-way control valve motor (+)	Output	[Ignition switch: ON] • Cold condition	0 V
142 (L)	204 (B)	Engine oil pressure con- trol solenoid valve	Output	[Engine is running]	12.5 V
143 (G)	204 (B)	Charge air cooler cool- ing electric water pump 1	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0 - 3.3 V
145 (BG)	204 (B)	Multi-way control valve power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

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[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
146 (G)	141 (R)	Multi-way control valve motor (-)	Output	[Ignition switch: ON] • Cold condition	0 V
147 (W)	148 (GR)	Throttle control motor (Open) (bank 2)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★  JMBIA0031GB
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★  JMBIA0032GB
148 (GR)	147 (W)	Throttle control motor (Close) (bank 2)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: In the middle of re-leasing operation	0 - 14 V★  JMBIA0033GB
149 (G)	150 (GR)	Throttle control motor (Open) (bank 1)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★  JMBIA0031GB
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★  JMBIA0032GB
150 (GR)	149 (G)	Throttle control motor (Close) (bank 1)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: In the middle of re-leasing operation	0 - 14 V★  JMBIA0033GB

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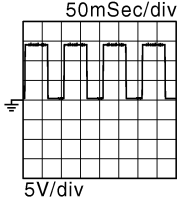
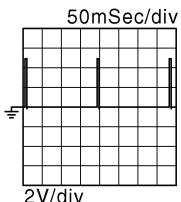
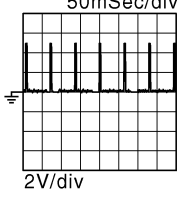
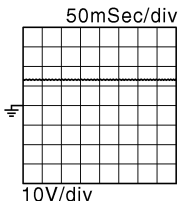
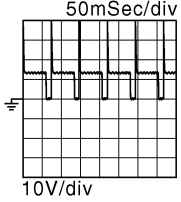
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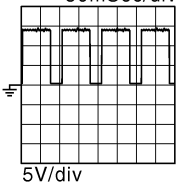
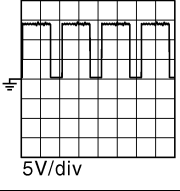
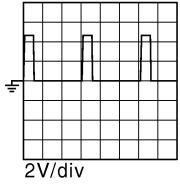
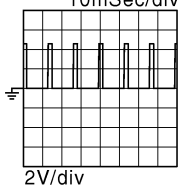
[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
151 (BR)	204 (B)	Air fuel ratio (A/F) sensor 1 heater (bank 2)	Output	[Ignition switch: ON]	12.5 V
				[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed (More than 140 seconds after starting engine) 	10.1 V ★ 
153 (L)	204 (B)	Ignition signal No. 3	Output	[Ignition switch: ON]	0 V
154 (SB)		Ignition signal No. 6		[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2 V ★ 
161 (Y)		Ignition signal No. 1		[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Engine speed: 2,000 rpm 	0.1 - 0.4 V ★ 
162 (GR)		Ignition signal No. 4			
164 (G)		Ignition signal No. 2		[Engine is running] <ul style="list-style-type: none"> • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting 	BATTERY VOLTAGE (11 - 14 V) ★ 
168 (V)		Ignition signal No. 5			
155 (GR)	204 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] <ul style="list-style-type: none"> • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14 V) ★ 
				[Ignition switch: ON]	12.4 V
157 (W)	204 (B)	Exhaust valve timing control solenoid valve (bank 1)		[Ignition switch: ON]	12.4 V
				[Ignition switch: ON] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	14 V
158 (G)	204 (B)	Exhaust valve timing control solenoid valve (bank 2)		[Ignition switch: ON]	12.4 V
				[Ignition switch: ON] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	14 V

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[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
163 (SB)	204 (B)	Heated oxygen sensor 2 heater (bank 2)	Output	[Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met <ul style="list-style-type: none"> • Engine: after warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 
				[Ignition switch: ON] Engine stopped [Engine is running] Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
166 (L)	204 (B)	Heated oxygen sensor 2 heater (bank 1)	Output	[Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met <ul style="list-style-type: none"> • Engine: after warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 
				[Ignition switch: ON] Engine stopped [Engine is running] Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
170 (P)	204 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
173 (SB)	204 (B)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	4.3 V
				[Ignition switch: ON] • Warm-up condition • Idle speed	4.3 V
175 (P)	—	CAN-L	Input/ output	—	—
176 (L)	—	CAN-H	Input/ output	—	—
177 (G)	204 (B)	Sensor power supply (EVAP control system pressure sensor)	—	[Ignition switch: ON]	5 V
178 (V)	204 (B)	Engine speed output sig- nal	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 V★ 
				[Engine is running] Engine speed is 2,000 rpm	1.0 V★ 

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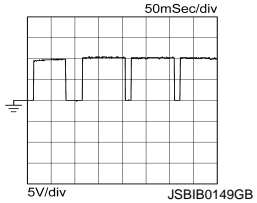
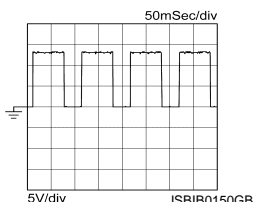
[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
180 (P)	204 (B)	Fuel tank temperature sensor	Input	[Ignition switch: ON]	3.2 V
				[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
182 (W)	204 (B)	Fuel pump control module (FPCM) check	Input	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	11.5 V
185 (SB)	204 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
186 (SB)	187 (BG)	ICC steering switch (models with ICC system)	Input	[Ignition switch: ON] MAIN switch: Pressed	0 V
				[Ignition switch: ON] DYNAMIC DRIVER ASSISTANCE switch: Pressed	1.0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1.9 V
				[Ignition switch: ON] DISTANCE switch: Pressed	2.6 V
				[Ignition switch: ON] SET/COAST switch: Pressed	3.2 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3.7 V
		[Ignition switch: ON] ICC steering switch: OFF	4.2 V		
		ASCD steering switch (models without ICC system)	Input	[Ignition switch: ON] MAIN switch: Pressed	0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1 V
				[Ignition switch: ON] SET/COAST switch: Pressed	2 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] ASCD steering switch: OFF	4 V
187 (BG)	—	Sensor ground (ASCD/ICC steering switch)	—	—	—

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[VR30DDTT FOR USA AND CANADA]

Terminal No. (Wire color)		Description	Input/ Output	Condition	Value (Approx.)
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188 (Y)	204 (B)	Fuel pump control module (FPCM)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	8.3 V
				[When cranking engine] Not cold state condition	4.0 V★ 
				[Engine is running] • Warm-up condition • Idle speed [Ignition switch: ON] For 1 second after turning ignition switch ON	4.0 V★ 
189 (Y)	—	ENGINE COMMUNICATION LINE-L	Input/ Output	—	—
190 (L)	—	ENGINE COMMUNICATION LINE-H	Input/ Output	—	—
191 (P)	204 (B)	Stop lamp switch	Input	[Ignition switch: OFF] Brake pedal: Fully released	0 V
				[Ignition switch: OFF] Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
192 (BG)	204 (B)	Brake pedal position switch	Input	[Ignition switch: ON] Brake pedal: Slightly depressed	0 V
				[Ignition switch: ON] Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
193 (LG)	204 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	12.3 V
				[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
194 (W)	204 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
195 (BR)	204 (B)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.22 - 0.50 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.1 - 2.5 V
196 (R)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
197 (R)	204 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
198 (L)	204 (G)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
199 (B)	—	ECM ground	—	—	—
200 (V)	—	Sensor ground (EVAP control system pressure sensor, Fuel tank temperature sensor)	—	—	—
201 (B)	—	ECM ground	—	—	—
202 (Y)	204 (G)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.45 - 1.00 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.4 - 4.8 V
203 (G)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
204 (B)	—	ECM ground	—	—	—

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

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

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245](#), "[VR30DDTT : How to Handle Battery](#)".

TURBO LOW PRESSURE MODEL : Fail safe (Turbo Low Pressure Model)

INFOID:0000000013924183

Description

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

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. • Engine output control 1: Driving at 70 km/h or more is possible. • Engine output control 2: Driving at 40 km/h or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode		• Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

Fail safe mode		Vehicle behavior
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control 1
C		Engine output control 2
D	Device fix mode	
E	Combustion control mode	Stratified charge combustion control at starting
F		<ul style="list-style-type: none"> Idle speed control Recovery speed control at decelerating Idle neutral control*
G		<ul style="list-style-type: none"> Ignition timing correction control Retardation control

*: Not applicable

Fail Safe List

x:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior								
		Pattern								Others
		A	B	C	D	E	F	G		
U012E U042F	Engine communication	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
P0010 P0020	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
P0011 P0021	Intake valve timing control	—	—	—	×	—	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: When VTC mechanism sticks, camshaft position does not change from position of stuck angle.	
P0014 P0024	Exhaust valve timing control	—	—	—	×	—	—	—	—	
P0046 P004B	Electric wastegate actuator motor	—	×	—	×	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)	
P0078 P0084	Exhaust valve timing control solenoid valve	—	—	—	×	—	—	—	—	
P0087 P0088	Fuel rail pressure control	×	—	—	×	×	—	—	—	
		×	—	—	—	×	—	—	—	

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DTC No.	Detected items	Vehicle behavior							Others
		Pattern							
		A	B	C	D	E	F	G	
P0090	High pressure fuel pump	×	—	—	×	×	—	—	—
P0101 P010B	Mass air flow sensor	×	—	—	—	×	—	—	—
		—	×	—	×	—	—	×	—
P0102 P0103 P010C P010D		—	×	—	×	—	—	×	—
P0117 P0118	Engine coolant temperature sensor	—	—	—	—	—	×	—	—
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 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.
P0171 P0172 P0174 P0175	Fuel injection system	×	—	—	—	—	×	—	—
P0190	Fuel rail pressure sensor	×	—	—	×	—	×	—	—
P0191 P0192 P0193		×	—	—	—	×	—	—	—
P0197 P0198		Engine oil temperature sensor	—	—	—	—	—	—	—
P0201 P0202 P0203 P0204 P0205 P0206	Fuel injector	×	—	—	—	×	—	—	—
P0234 P1334	Turbocharger system	—	×	—	×	—	—	—	—
P0235 P0237 P0238 P0241 P0242	Turbocharger boost sensor	—	×	—	×	—	—	—	—
P0300 P0301 P0302 P0303 P0304 P0305 P0306	Misfire	×	—	—	—	—	×	—	—
P0335	Crankshaft position sensor	—	—	—	×	×	—	—	—
		—	—	—	×	—	×	—	

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							Others		
		Pattern									
		A	B	C	D	E	F	G			
P0340 P0345	Intake camshaft position sensor	—	—	—	×	×	—	—	—	EC6	
		—	—	—	×	—	×	—			
P1140 P1145		×	—	—	×	—	—	×	—	C	
P0365 P0390	Exhaust camshaft position sensor	—	—	—	×	—	—	—	—		
P0500	Vehicle speed sensor	×	—	—	—	—	×	—	—	D	
P0524	Engine oil pressure	—	—	—	—	—	—	—	<ul style="list-style-type: none"> ECM illuminates engine oil pressure warning lamp on the combination meter. Engine speed will not rise more than 4,000rpm due to the fuel cut. Fail-safe is canceled when ignition switch OFF → ON. 	E	
P0603 P0607	ECM	—	—	—	—	—	—	—	—	F	
		—	×	—	—	—	—	—	—	ASCD operation may be deactivated.	
P0604		—	—	—	×	—	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	G
P0605		—	—	—	—	—	—	—	—	—	H
		—	—	—	×	—	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	I
P0606		—	—	—	—	—	—	—	—	—	J
		—	—	—	×	—	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	K
P060A		—	—	—	×	—	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	L
		—	×	—	×	—	—	—	—	<ul style="list-style-type: none"> ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ASCD operation may be deactivated. 	M
P060B		—	—	—	×	—	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	N
P062B	—	—	—	—	—	—	—	—	—	O	
	×	—	—	—	×	—	—	—	—		
P0641	Sensor power supply	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	P	
		—	—	—	×	—	×	—			
P0643		—	—	—	×	—	—	—	—		

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior								
		Pattern							Others	
		A	B	C	D	E	F	G		
P14A4 P14A5	Charge air cooler cooling electric water pump	—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at the command speed.	
P14A7		—	—	—	—	—	—	—		Charge air cooler cooling electric water pump runs at full speed.
P14A9 P14AA P14AC		—	—	—	—	—	—	—		Charge air cooler cooling electric water pump stops.
P1197	Out of gas	—	—	—	×	—	—	—	—	
P119A P119B P119C	Fuel pressure sensor	×	—	—	—	×	—	—	—	
P1233 P2101	Electric throttle control	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1236 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.	
P1238 P2119	Electric throttle control actuator	—	×	—	—	—	—	—	—	
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1290 P2100 P2103	Throttle control motor relay	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
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	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	—	—	—	×	—	—	—	—	
P23E9 P23EA P2614 P2615	Intake camshaft position sensor	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
		—	—	—	×	—	×	—		
P23EB P2616 P2617 P2618		—	—	—	×	×	—	—		
P2619		—	—	—	×	—	×	—		

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

DTC No.	Detected items	Vehicle behavior							Others
		Pattern							
		A	B	C	D	E	F	G	
P2562 P2566 P2586 P2590	Electric wastegate control valve position sensor								ECM stops the electric wastegate actuator control. (Wastegate valve opens)
P2563 P2564 P2565 P2587 P2588 P2589		—	×	—	×	—	—	—	—
P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1	Electric intake valve timing control actuator								ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.
P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1		—	—	—	×	×	—	—	
P34C4 P34C5	Electric intake valve timing control actuator	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
P34C8	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	

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TURBO LOW PRESSURE MODEL : DTC Inspection Priority Chart

INFOID:000000013924184

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

Priority	Detected items (DTC)
1	<ul style="list-style-type: none"> • U0101 U1000 U1001 CAN communication line • U012E U042F Engine communication line • P0096 P0097 P0098 Intake air temperature sensor 2 • P00B3 P00B4 Engine coolant temperature sensor 2 • P00E0 P00E1 Charge air cooler coolant temperature sensor • P0101 P0102 P0103 P010B P010C P010D Mass air flow sensor • P0106 Turbocharger boost sensor • P010A Manifold absolute pressure sensor • P0111 P0112 P0113 P0127 Intake air temperature sensor • P0116 P0117 P0118 P0125 Engine coolant temperature sensor • P011C Intake air temperature sensor • P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor • P0181 P0182 P0183 Fuel tank temperature sensor • P0190 P0191 P0192 P0193 P119A P119B P119C FRP sensor • P0196 P0197 P0198 Engine oil temperature sensor • P0235 P0236 P0237 P0238 P0239 P0240 P0241 P0242 Turbocharger boost sensor • P0327 P0328 P0332 P0333 Knock sensor • P0335 Crankshaft position sensor • P0340 P0345 P1140 P1145 Intake camshaft position sensor • P0365 P0390 Exhaust camshaft position sensor • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 Vehicle speed sensor • P0520 Engine oil pressure sensor • P0544 P0545 P0546 P0547 P0548 P0549 P2080 P2081 P2082 P2083 Exhaust gas temperature sensor • P0603 P0604 P0605 P0606 P0607 P060A P060B P0611 P062B P2610 ECM • P062F Control module • P0641 P23E9 P23EA P23EB P2614 P2615 P2616 P2617 P2618 P2619 P34C8 Electric intake valve timing control module • P0643 Sensor power supply • P0850 Park/neutral position (PNP) switch • P1197 Out of gas* • P1220 Fuel pump control module (FPCM) • P1550 P1551 P1552 P1553 P1554 Battery current sensor • P1556 P1557 Battery temperature sensor • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor • P2562 P2563 P2564 P2565 P2566 P2586 P2587 P2588 P2589 P2590 Electric wastegate control valve position sensor • P26A5 P26A6 P26A7 P26AB Multi-way control valve position sensor

Priority	Detected items (DTC)
2	<ul style="list-style-type: none"> • P0010 P0020 Electric intake valve timing control actuator • P0030 P0031 P0032 P0050 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 P0053 P0057 P0058 P0059 Heated oxygen sensor 2 heater • P0046 P004B Electric wastegate control actuator • P0078 P0084 Exhaust valve timing control solenoid valve • P0090 FRP control system • P0130 P0131 P0132 P014C P014D P014E P014F P0150 P0151 P0152 P015A P015B P015C P015D P2096 P2097 P2098 P2099 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2 • P023B P023C P14A4 P14A5 P14A6 P14A7 P14A8 P14A9 P14AA P14AC Charge air cooler cooling electric water pump • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P06DA P06DB Engine oil pressure control solenoid valve • P1217 Engine over temperature (OVERHEAT) • P1233 P2101 Electric throttle control function • P1236 P2118 Throttle control motor • P1290 P2100 P2103 Throttle control motor relay • P1805 Brake switch • P26A3 Multi-way control valve • P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1 P34C4 P34C5 Electric intake valve timing control actuator
3	<ul style="list-style-type: none"> • P0011 P0021 Intake valve timing control • P0014 P0024 Exhaust valve timing control • P0087 P0088 FRP control system • P0171 P0172 P0174 P0175 Fuel injection system function • P0201 P0202 P0203 P0204 P0205 P0206 Injector • P0234 P1334 Turbocharger system • P0300 - P0306 Misfire • P0420 P0430 Three way catalyst function • P0456 EVAP control system (VERY SMALL LEAK) • P0506 P0507 Idle speed control system • P050A P050B P050E P1423 P1424 Cold start control • P0524 Engine oil pressure • P1148 P1168 Closed loop control • P1212 TCS communication line • P1238 P2119 Electric throttle control actuator • P1564 ICC steering switch / ASCD steering switch • P1568 ICC command value • P1572 Brake pedal position switch • P1574 ICC vehicle speed sensor / ASCD vehicle speed sensor • P219A P219B Air fuel ratio

NOTE:

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

TURBO LOW PRESSURE MODEL : DTC Index

INFOID:0000000013924185

×:Applicable —: Not applicable

DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*3	Reference page
U0101	LOST COMM (TCM)	—	1	×	B	EC6-309
U012E	Communication error (lost)	—	2	×	B	EC6-310
U042F	Communication error (invalid)	—	2	×	B	EC6-312
U1000	CAN COMM CIRCUIT	—	2	—	—	EC6-314
U1001	CAN COMM CIRCUIT	—	1	—	—	EC6-316
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	Flashing*4	—	—

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[VR30DDTT FOR USA AND CANADA]

DTC* ¹	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ³	Reference page
CONSULT GST* ²						
P0010	A camshaft position actuator B1	—	2	×	A	EC6-317
P0011	INT/V TIM CONT-B1	×	2	×	A & B	EC6-317
P0014	EXH/V TIM CONT-B1	×	2	×	A & B	EC6-322
P0020	A camshaft position actuator B2	—	2	×	A	EC6-326
P0021	INT/V TIM CONT-B2	×	2	×	A & B	EC6-328
P0024	EXH/V TIM CONT-B2	×	2	×	A & B	EC6-322
P0030	HO2S1 HTR B1	—	2	×	B	EC6-331
P0031	A/F SEN1 HTR (B1)	—	2	×	B	EC6-334
P0032	A/F SEN1 HTR (B1)	—	2	×	B	EC6-334
P0037	HO2S2 HTR (B1)	—	2	×	B	EC6-337
P0038	HO2S2 HTR (B1)	—	2	×	B	EC6-337
P0046	TC/SC BOOST CONTROL A	—	2	×	B	EC6-340
P004B	TC/SC BOOST CONTROL B	—	2	×	B	EC6-340
P0050	Heated O2 sensor heater B2 sensor 1	—	2	×	B	EC6-331
P0051	A/F SEN1 HTR (B2)	—	2	×	B	EC6-334
P0052	A/F SEN1 HTR (B2)	—	2	×	B	EC6-334
P0053	HO2S1 HTR B1	×* ⁵	2	×	A	EC6-343
P0057	HO2S2 HTR (B2)	—	2	×	B	EC6-337
P0058	HO2S2 HTR (B2)	—	2	×	B	EC6-337
P0059	Heated O2 sensor heater B2 sensor 1	×* ⁵	2	×	A	EC6-347
P0078	EX V/T ACT/CIRC-B1	—	2	×	B	EC6-351
P0084	EX V/T ACT/CIRC-B2	—	2	×	B	EC6-351
P0087	LOW FUEL PRES	—	2	×	A & B or B	EC6-354
P0088	HIGH FUEL PRES	—	2	×	A & B or B	EC6-358
P0090	FUEL PUMP	—	2	×	B	EC6-361
P0096	IAT SENSOR 2 B1	—	2	×	A	EC6-364
P0097	IAT SENSOR 2 B1	—	2	×	B	EC6-366
P0098	IAT SENSOR 2 B1	—	2	×	B	EC6-366
P00B3	RADIATOR COOLANT TEMP SEN	—	2	—	—	EC6-370
P00B4	RADIATOR COOLANT TEMP SEN	—	2	—	—	EC6-370
P00E0	Charge air cooler coolant temp sensor	—	2	—	—	EC6-373
P00E1	Charge air cooler coolant temp sensor	—	2	—	—	EC6-376
P0101	MAF SEN/CIRCUIT-B1	—	2	×	A or B	EC6-379
P0102	MAF SEN/CIRCUIT-B1	—	1	×	B	EC6-386
P0103	MAF SEN/CIRCUIT-B1	—	1	×	B	EC6-386
P0106	ABSL PRES SEN/CIRC	—	2	×	B	EC6-393
P010A	ABSL PRES SEN/CIRC	—	2	×	B	EC6-397
P010B	MAF SEN/CIRCUIT-B2	—	2	×	A or B	EC6-379
P010C	MAF SEN/CIRCUIT-B2	—	1	×	B	EC6-386
P010D	MAF SEN/CIRCUIT-B2	—	1	×	B	EC6-386
P0111	IAT SENSOR 1 B1	—	2	×	A	EC6-401
P0112	IAT SEN/CIRCUIT-B1	—	2	×	B	EC6-403

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[VR30DDTT FOR USA AND CANADA]

DTC* ¹	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ³	Reference page
CONSULT GST* ²						
P0113	IAT SEN/CIRCUIT-B1	—	2	×	B	EC6-403
P0116	ECT SENSOR	—	2	×	A or B	EC6-406
P0117	ECT SEN/CIRC	—	1	×	B	EC6-409
P0118	ECT SEN/CIRC	—	1	×	B	EC6-409
P011C	CAT/IAT CRRLTN B1	—	2	×	B	EC6-412
P0122	TP SEN 2/CIRC-B1	—	1	×	B	EC6-414
P0123	TP SEN 2/CIRC-B1	—	1	×	B	EC6-414
P0125	ECT SENSOR	—	2	×	B	EC6-418
P0127	IAT SENSOR-B1	—	2	×	B	EC6-421
P0130	A/F SENSOR1 (B1)	×	2	×	A or B	EC6-423
P0131	A/F SENSOR1 (B1)	—	2	×	B	EC6-427
P0132	A/F SENSOR1 (B1)	—	2	×	B	EC6-430
P0137	HO2S2 (B1)	×	2	×	A	EC6-433
P0138	HO2S2 (B1)	×	2	×	A or B	EC6-439
P0139	HO2S2 (B1)	×	2	×	A	EC6-447
P014C	A/F SENSOR1 (B1)	×	2	×	A	EC6-454
P014D	A/F SENSOR1 (B1)	×	2	×	A	EC6-454
P014E	A/F SENSOR1 (B2)	×	2	×	A	EC6-454
P014F	A/F SENSOR1 (B2)	×	2	×	A	EC6-454
P0150	A/F SENSOR1 (B2)	×	2	×	A or B	EC6-423
P0151	A/F SENSOR1 (B2)	—	2	×	B	EC6-427
P0152	A/F SENSOR1 (B2)	—	2	×	B	EC6-430
P0157	HO2S2 (B2)	×	2	×	A	EC6-433
P0158	HO2S2 (B2)	×	2	×	A or B	EC6-439
P0159	HO2S2 (B2)	×	2	×	A	EC6-447
P015A	A/F SENSOR1 (B1)	×	2	×	A	EC6-454
P015B	A/F SENSOR1 (B1)	×	2	×	A	EC6-454
P015C	A/F SENSOR1 (B2)	×	2	×	A	EC6-454
P015D	A/F SENSOR1 (B2)	×	2	×	A	EC6-454
P0171	FUEL SYS-LEAN-B1	—	2	×	B	EC6-461
P0172	FUEL SYS-RICH-B1	—	2	×	B	EC6-466
P0174	FUEL SYS-LEAN-B2	—	2	×	B	EC6-461
P0175	FUEL SYS-RICH-B2	—	2	×	B	EC6-466
P0181	FTT SENSOR	—	2	×	A or B	EC6-470
P0182	FTT SEN/CIRCUIT	—	2	×	B	EC6-474
P0183	FTT SEN/CIRCUIT	—	2	×	B	EC6-474
P0190	FUEL PRES SEN/CIRC	—	1	×	B	EC6-477
P0191	FRP SENSOR A	—	2	×	A	EC6-481
P0192	FRP SEN/CIRC	—	2	×	B	EC6-477
P0193	FRP SEN/CIRC	—	2	×	B	EC6-477
P0196	EOT SENSOR	—	2	×	A or B	EC6-485
P0197	EOT SEN/CIRC	—	2	×	B	EC6-489

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[VR30DDTT FOR USA AND CANADA]

DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*3	Reference page
CONSULT GST*2						
P0198	EOT SEN/CIRC	—	2	×	B	EC6-489
P0201	INJECTOR CIRC-CYL1	—	2	×	B	EC6-491
P0202	INJECTOR CIRC-CYL2	—	2	×	B	EC6-491
P0203	INJECTOR CIRC-CYL3	—	2	×	B	EC6-491
P0204	INJECTOR CIRC-CYL4	—	2	×	B	EC6-491
P0205	INJECTOR CIRC-CYL5	—	2	×	B	EC6-491
P0206	INJECTOR CIRC-CYL6	—	2	×	B	EC6-491
P0222	TP SEN 1/CIRC-B1	—	1	×	B	EC6-492
P0223	TP SEN 1/CIRC-B1	—	1	×	B	EC6-492
P0227	TP SEN 2/CIRC-B2	—	1	×	B	EC6-414
P0228	TP SEN 2/CIRC-B2	—	1	×	B	EC6-414
P0234	TC SYSTEM-B1	—	1	×	B	EC6-496
P0235	TURBO BOOST SENSOR	—	2	×	B	EC6-498
P0236	TC BOOST SEN/CIRC-B1	—	2	×	B	EC6-496
P0237	TC BOOST SEN/CIRC-B1	—	2	×	B	EC6-504
P0238	TC BOOST SEN/CIRC-B1	—	2	×	B	EC6-504
P0239	TC/SC boost sensor B	—	2	×	B	EC6-498
P023B	Charge air cooler coolant pump	—	2	—	—	EC6-508
P023C	Charge air cooler coolant pump	—	2	—	—	EC6-512
P0240	TC BOOST SEN/CIRC-B2	—	2	×	B	EC6-501
P0241	TC BOOST SEN/CIRC-B2	—	2	×	B	EC6-504
P0242	TC BOOST SEN/CIRC-B2	—	2	×	B	EC6-504
P0300	MULTI CYL MISFIRE	—	1 or 2	×	B	EC6-516
P0301	CYL 1 MISFIRE	—	1 or 2	×	B	EC6-516
P0302	CYL 2 MISFIRE	—	1 or 2	×	B	EC6-516
P0303	CYL 3 MISFIRE	—	1 or 2	×	B	EC6-516
P0304	CYL 4 MISFIRE	—	1 or 2	×	B	EC6-516
P0305	CYL 5 MISFIRE	—	1 or 2	×	B	EC6-516
P0306	CYL 6 MISFIRE	—	1 or 2	×	B	EC6-516
P0327	KNOCK SEN/CIRC-B1	—	2	—	—	EC6-523
P0328	KNOCK SEN/CIRC-B1	—	2	—	—	EC6-523
P0332	KNOCK SEN/CIRC-B2	—	2	—	—	EC6-523
P0333	KNOCK SEN/CIRC-B2	—	2	—	—	EC6-523
P0335	CKP SEN/CIRCUIT	—	2	×	B	EC6-526
P0340	CMP SEN/CIRC-B1	—	2	×	B	EC6-530
P0345	CMP SEN/CIRC-B2	—	2	×	B	EC6-530
P0365	CAMSHAFT POSITION SENSOR B B1	—	2	×	B	EC6-535
P0390	Camshaft position sensor B bank2	—	2	×	B	EC6-538
P0420	TW CATALYST SYS-B1	×	2	×	A	EC6-541
P0430	TW CATALYST SYS-B2	×	2	×	A	EC6-541
P0441	EVAP PURG FLOW/MON	×	2	×	A	EC6-546
P0443	PURG VOLUME CONT/V	—	2	×	A	EC6-552

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DTC* ¹	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ³	Reference page
CONSULT GST* ²						
P0444	PURG VOLUME CONT/V	—	2	×	B	EC6-557
P0445	PURG VOLUME CONT/V	—	2	×	B	EC6-557
P0447	VENT CONTROL VALVE	—	2	×	B	EC6-561
P0448	VENT CONTROL VALVE	—	2	×	A	EC6-565
P0451	EVAP SYS PRES SEN	—	2	×	A	EC6-569
P0452	EVAP SYS PRES SEN	—	2	×	B	EC6-573
P0453	EVAP SYS PRES SEN	—	2	×	B	EC6-576
P0456	EVAP VERY SML LEAK	×* ⁶	2	×	A	EC6-580
P0460	FUEL LEV SEN SLOSH	—	2	×	B	EC6-586
P0461	FUEL LEVEL SENSOR	—	2	×	A	EC6-588
P0462	FUEL LEV SEN/CIRC	—	2	×	B	EC6-590
P0463	FUEL LEV SEN/CIRC	—	2	×	B	EC6-590
P0500	VEHICLE SPEED SEN A* ⁷	—	2	×	B	EC6-592
P0506	ISC SYSTEM	—	2	×	B	EC6-594
P0507	ISC SYSTEM	—	2	×	B	EC6-596
P050A	COLD START CONTROL	—	2	×	A	EC6-598
P050B	COLD START CONTROL	—	2	×	A	EC6-598
P050E	COLD START CONTROL	—	2	×	A	EC6-598
P0520	EOP SENSOR/SWITCH	—	2	—	—	EC6-601
P0524	ENGINE OIL PRESSURE	—	1	—	—	EC6-604
P0544	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	B	EC6-607
P0545	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	B	EC6-610
P0546	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	B	EC6-610
P0547	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	B	EC6-613
P0548	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	B	EC6-616
P0549	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	B	EC6-616
P0603	ECM BACK UP/CIRCUIT	—	2	× or —	A or B or —	EC6-619
P0604	ECM	—	1	×	B	EC6-621
P0605	ECM	—	1 or 2	×	B	EC6-622
P0606	CONTROL MODULE	—	1	× or —	B or —	EC6-623
P0607	ECM	—	1 or 2	× or —	B or —	EC6-625
P060A	CONTROL MODULE	—	1	×	B	EC6-626
P060B	CONTROL MODULE	—	1	×	B	EC6-628
P0611	FIC MODULE	—	2	×	B	EC6-629
P062B	ECM	—	2	×	B	EC6-630
P062F	CONTROL MODULE	—	1	×	B	EC6-632
P0641	Sensor reference voltage A	—	2	×	A	EC6-633
P0643	SENSOR POWER/CIRC	—	1	×	B	EC6-636
P06DA	ENGINE OIL PRESSURE CONTROL	—	2	—	—	EC6-639
P06DB	ENGINE OIL PRESSURE CONTROL	—	2	—	—	EC6-639
P0850	P-N POS SW/CIRCUIT	—	2	×	B	EC6-642
P1140	INTK TIM S/CIRC-B1	—	2	×	B	EC6-645

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DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*3	Reference page
CONSULT GST*2						
P1145	INTK TIM S/CIRC-B2	—	2	×	B	EC6-648
P1148	CLOSED LOOP-B1	—	1	×	B	EC6-651
P1168	CLOSED LOOP-B2	—	1	×	B	EC6-651
P1197	FUEL RUN OUT	—	2	—	—	EC6-652
P119A	FUEL PRESSURE SENSOR	—	2	×	A	EC6-654
P119B	FUEL PRESSURE SENSOR	—	2	×	A	EC6-654
P119C	FUEL PRESSURE SENSOR	—	2	×	B	EC6-659
P1212	TCS/CIRC	—	2	—	—	EC6-663
P1217	ENG OVER TEMP	—	1	×	B	EC6-665
P1220	FPCM/CIRCUIT	—	1	—	—	EC6-668
P1225	CTP LEARNING-B1	—	2	—	—	EC6-671
P1226	CTP LEARNING-B1	—	2	—	—	EC6-673
P1233	ETC FNCTN/CIRC-B2	—	1	×	B	EC6-675
P1234	CTP LEARNING-B2	—	2	—	—	EC6-671
P1235	CTP LEARNING-B2	—	2	—	—	EC6-673
P1236	ETC MOT-B2	—	1	×	B	EC6-678
P1238	ETC ACTR-B2	—	1	×	B	EC6-680
P1239	TP SENSOR-B2	—	1	×	B	EC6-682
P1290	ETC MOT PWR-B2	—	1	×	B	EC6-686
P1334	TC SYSTEM-B2	—	1	×	B	EC6-688
P1423	COLD START CONTROL	—	2	×	A & B	EC6-690
P1424	COLD START CONTROL	—	2	×	A & B	EC6-690
P14A4	Charge air cooler cooling electric W/P	—	2	—	—	EC6-700
P14A5	Charge air cooler cooling electric W/P	—	2	—	—	EC6-704
P14A6	Charge air cooler cooling electric W/P	—	2	—	—	EC6-708
P14A7	Charge air cooler cooling electric W/P	—	2	—	—	EC6-712
P14A8	Charge air cooler cooling electric W/P	—	2	—	—	EC6-716
P14A9	Charge air cooler cooling electric W/P	—	2	—	—	EC6-720
P14AA	Charge air cooler cooling electric W/P	—	2	—	—	EC6-722
P14AC	Charge air cooler cooling electric W/P	—	2	—	—	EC6-724
P1550	BAT CURRENT SENSOR	—	2	—	—	EC6-752
P1551	BAT CURRENT SENSOR	—	2	—	—	EC6-755
P1552	BAT CURRENT SENSOR	—	2	—	—	EC6-755
P1553	BAT CURRENT SENSOR	—	2	—	—	EC6-759
P1554	BAT CURRENT SENSOR	—	2	—	—	EC6-762
P1556	BAT TMP SEN/CIRC	—	2	—	—	EC6-765
P1557	BAT TMP SEN/CIRC	—	2	—	—	EC6-765
P1564	ASCD SW	—	1	—	—	EC6-768 (without ICC) EC6-771 (with ICC)
P1568	ICC COMMAND VALUE	—	1	—	—	EC6-775

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DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*3	Reference page
P1572	ASCD BRAKE SW	—	1	—	—	EC6-777 (without ICC) EC6-782 (with ICC)
P1574	ASCD VHL SPD SEN	—	1	—	—	EC6-790 (without ICC) EC6-792 (with ICC)
P1610	LOCK MODE	—	2	—	—	SEC-96
P1611	ID DISCORD,IMMU-ECM	—	2	—	—	SEC-98
P1612	CHAIN OF ECM-IMMU	—	2	—	—	SEC-99
P1805	BRAKE SW/CIRCUIT	—	2	—	—	EC6-794
P2080	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	A	EC6-797
P2081	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	B	EC6-800
P2082	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	A	EC6-803
P2083	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	B	EC6-806
P2096	POST CATALYST FUEL TRIM SYS B1	—	2	×	B	EC6-809
P2097	POST CATALYST FUEL TRIM SYS B1	—	2	×	B	EC6-809
P2098	POST CATALYST FUEL TRIM SYS B2	—	2	×	B	EC6-809
P2099	POST CATALYST FUEL TRIM SYS B2	—	2	×	B	EC6-809
P2100	ETC MOT PWR-B1	—	1	×	B	EC6-814
P2101	ETC FNCTN/CIRC-B1	—	1	×	B	EC6-816
P2103	ETC MOT PWR	—	1	×	B	EC6-814
P2118	ETC MOT-B1	—	1	×	B	EC6-820
P2119	ETC ACTR-B1	—	1	×	B	EC6-822
P2122	APP SEN 1/CIRC	—	1	×	B	EC6-824
P2123	APP SEN 1/CIRC	—	1	×	B	EC6-824
P2127	APP SEN 2/CIRC	—	1	×	B	EC6-827
P2128	APP SEN 2/CIRC	—	1	×	B	EC6-827
P2132	TP SEN 1/CIRC-B2	—	1	×	B	EC6-492
P2133	TP SEN 1/CIRC-B2	—	1	×	B	EC6-492
P2135	TP SENSOR-B1	—	1	×	B	EC6-682
P2138	APP SENSOR	—	1	×	B	EC6-830
P219A	AIR FUEL RATIO IMBALANCE B1	×	2	×	A	EC6-832
P219B	AIR FUEL RATIO IMBALANCE B2	×	2	×	A	EC6-832
P23E9	A camshaft posi signal B2	—	2	×	A	EC6-837
P23EA	A camshaft posi signal B2	—	2	×	A	EC6-840
P23EB	A camshaft posi signal B2	—	2	×	A	EC6-843
P2562	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC6-847
P2563	TC BOOST CONTROL POSITN SEN A	—	2	×	A	EC6-850
P2564	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC6-854
P2565	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC6-854
P2566	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC6-847
P2586	TC BOOST CONTROL POSITN SEN B	—	2	×	B	EC6-861

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DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*3	Reference page
CONSULT GST*2						
P2587	TC BOOST CONTROL POSITN SEN B	—	2	×	A	EC6-864
P2588	TC BOOST CONTROL POSITN SEN B	—	2	×	B	EC6-868
P2589	TC BOOST CONTROL POSITN SEN B	—	2	×	B	EC6-868
P2590	TC BOOST CONTROL POSITN SEN B	—	2	×	B	EC6-861
P2610	ECM/PCM INTERNAL ENG OFF TIMER	—	2	×	B	EC6-875
P2614	A camshaft posi signal B1	—	2	×	A	EC6-877
P2615	A camshaft posi signal B1	—	2	×	A	EC6-880
P2616	A camshaft posi signal B1	—	2	×	A	EC6-883
P2617	Crankshaft position signal	—	2	×	A	EC6-887
P2618	Crankshaft position signal	—	2	×	A	EC6-890
P2619	Crankshaft position signal	—	2	×	A	EC6-894
P26A3	ENGINE COOLANT BYPASS VALVE	—	1 or 2	×	B	EC6-899
P26A5	ENGINE COOLANT B/V A POSI SEN	—	2	×	A	EC6-902
P26A6	ENGINE COOLANT B/V A POSI SEN	—	2	×	B	EC6-905
P26A7	ENGINE COOLANT B/V A POSI SEN	—	2	×	B	EC6-905
P26AB	ENGINE COOLANT B/V A POSI SEN	—	2	×	A	EC6-908
P34A4	A camshaft posi actuator temp sens B1	—	2	×	A	EC6-912
P34A5	A camshaft posi actuator temp sens B1	—	2	×	A	EC6-915
P34A6	A camshaft posi actuator temp sens B1	—	2	×	A	EC6-918
P34A7	A camshaft posi actuator temp sens B1	—	2	×	A	EC6-921
P34A8	A camshaft posi actuator temp sens B2	—	2	×	A	EC6-924
P34A9	A camshaft posi actuator temp sens B2	—	2	×	A	EC6-927
P34AA	A camshaft posi actuator temp sens B2	—	2	×	A	EC6-930
P34AB	A camshaft posi actuator temp sens B2	—	2	×	A	EC6-933
P34AC	A camshaft posi actuator posi sens B1	—	2	×	A	EC6-936
P34AD	A camshaft posi actuator posi sens B1	—	2	×	A	EC6-940
P34B0	A camshaft posi actuator posi sens B2	—	2	×	A	EC6-943
P34B1	A camshaft posi actuator posi sens B2	—	2	×	A	EC6-947
P34C4	A camshaft posi actuator control B1	—	2	×	A	EC6-950
P34C5	A camshaft posi actuator control B2	—	2	×	A	EC6-951
P34C8	Camshaft position control module	—	2	×	A	EC6-952

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

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

*3: Refer to [EC6-288, "Description"](#), "PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)".

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

*5: This DTC is not displayed in "SRT STATUS" function on 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.

Test Value and Test Limit

INFOID:000000013688948

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.

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

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

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

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

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Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description	
				TID	Unit and Scaling ID		
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1	
			P0153	95H	04H	Response rate: Response ratio (lean to rich)	
			P0153	96H	84H	Response rate: Response ratio (rich to lean)	
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle	
			P0157	08H	0CH	Maximum sensor output voltage for test cycle	
			P0158	80H	0CH	Sensor output voltage	
			P0159	81H	0CH	Difference in sensor output voltage	
			P0159	82H	11H	Rear O2 sensor delay response diagnosis	
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle	
			P0164	08H	0CH	Maximum sensor output voltage for test cycle	
			P0166	80H	0CH	Sensor output voltage	
			P0165	81H	0CH	Difference in sensor output voltage	
	CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
				P0420	82H	01H	Switching time lag engine exhaust index value
				P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
P2423				84H	84H	O2 storage index in HC trap catalyst	
22H		Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index	
			P0430	82H	01H	Switching time lag engine exhaust index value	
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage	
			P2424	84H	84H	O2 storage index in HC trap catalyst	
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)	
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)	
			P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition	
			P0400	83H	96H	Low flow faults: Max EGR temp	
			P1402	84H	96H	High Flow Faults: EGR temp increase rate	
			P0402	85H	FCH	EGR differential pressure high flow	
			P0401	86H	37H	EGR differential pressure low flow	
			P2457	87H	96H	EGR temperature	

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

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Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description	
				TID	Unit and Scaling ID		
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage	
			P0030	83H	0BH	A/F sensor heater circuit malfunction	
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage	
			P0141	81H	14H	Rear O2 sensor internal impedance	
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage	
	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage	
			P0036	83H	0BH	A/F sensor heater circuit malfunction	
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage	
			P0161	81H	14CH	Rear O2 sensor internal impedance	
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage	
	SECONDARY AIR	71H	Secondary air system	P0411	80H	01H	Secondary air injection system incorrect flow detected
				Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
P2445				82H	01H	Secondary air injection system pump stuck off	
P2448				83H	01H	Secondary air injection system high airflow	
Bank1: P2440 Bank2: P2442				84H	01H	Secondary air injection system switching valve stuck open	
P2440				85H	01H	Secondary air injection system switching valve stuck open	
P2444				86H	01H	Secondary air injection system pump stuck on	

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
			P117A / P219A	82H	03H	Cylinder A/F imbalance monitoring
			P219C	83H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #1 cylinder parameter
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #2 cylinder parameter
			P219E	85H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #3 cylinder parameter
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #4 cylinder parameter
			P21A0	87H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #5 cylinder parameter
			P21A2	89H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #7 cylinder parameter
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B / P219B	82H	03H	Cylinder A/F imbalance monitoring
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #2 cylinder parameter
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #4 cylinder parameter
			P21A1	88H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #6 cylinder parameter
P21A3	8AH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #8 cylinder parameter			

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

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

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[VR30DDTT FOR USA AND CANADA]

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

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

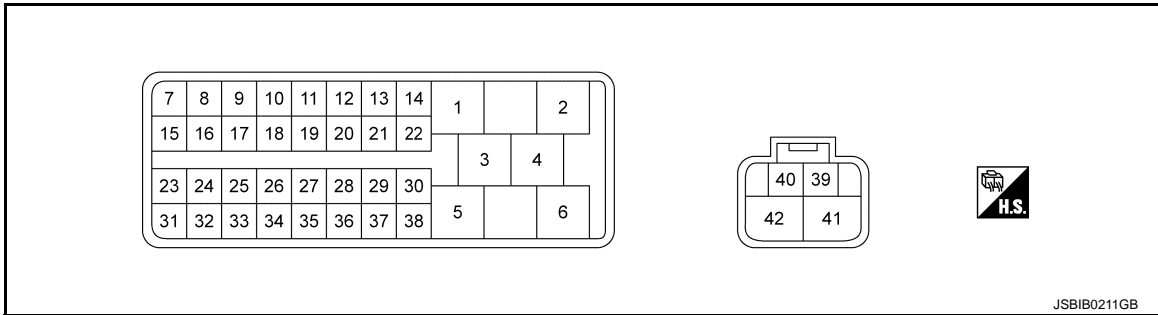
[VR30DDTT FOR USA AND CANADA]

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

Reference Value

INFOID:000000013591462

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

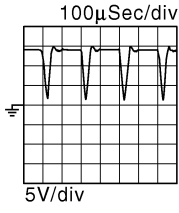
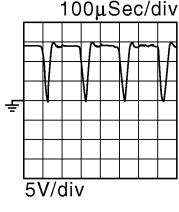
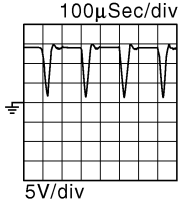
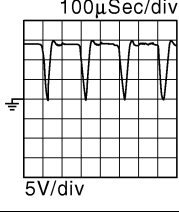
- Electric intake valve timing control module is located behind the IPDM E/R. For this inspection, remove hood/hood cover (RH).
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No.		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
1 (W)	41 (B)	Electric intake valve timing control motor 1 phase 1	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
2 (B)	41 (B)	Electric intake valve timing control motor 2 phase 1	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
3 (R)	41 (B)	Electric intake valve timing control motor 1 phase 2	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
4 (W)	41 (B)	Electric intake valve timing control motor 2 phase 2	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
5 (B)	41 (B)	Electric intake valve timing control motor 1 phase 3	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
6 (R)	41 (B)	Electric intake valve timing control motor 2 phase 3	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
7 (Y)	41 (B)	Sensor power supply	—	[Ignition switch: ON]	5 V
8 (W)	41 (B)	Electric intake valve timing control motor 1 hall sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
9 (BG)	41 (B)	Electric intake valve timing control motor 1 temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.0 - 2.0 V
11 (B)	—	Shield	—	—	—
12 (L)	41 (B)	ENGINE communication line-H	Input/Output	—	—

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

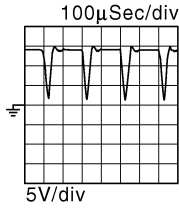
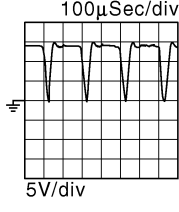
[VR30DDTT FOR USA AND CANADA]

Terminal No.		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
14 (Y)	41 (B)	Intake camshaft position sensor (bank 1) [electric intake valve timing control signal]	Input	[Engine is running] • Warm-up condition • Idle speed	3.8 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.8 V★ 
15 (G)	41 (B)	Electric intake valve timing control motor 1 hall sensor 3	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
16 (R)	41 (B)	Electric intake valve timing control motor 1 hall sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
17 (B)	—	Sensor ground	—	—	—
19 (Y)	—	ENGINE communication line-L	Input/Output	—	—
21 (L)	41 (B)	Intake camshaft position sensor (bank 2) [electric intake valve timing control signal]	Input	[Engine is running] • Warm-up condition • Idle speed	4.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.1 V★ 
23 (LG)	41 (B)	Electric intake valve timing control motor 2 hall sensor 3	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
24 (BR)	41 (B)	Electric intake valve timing control motor 2 hall sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
25 (V)	—	Sensor ground	—	—	—
28 (W)	41 (B)	Ignition switch	—	—	—

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR USA AND CANADA]

Terminal No.		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
30 (G)	41 (B)	Crankshaft position sensor [electric intake valve timing control signal]	Input	[Engine is running] • Warm-up condition • Idle speed	3.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.1 V★ 
31 (GR)	41 (B)	Sensor power supply	—	[Ignition switch: ON]	5 V
32 (L)	—	Electric intake valve timing control motor 2 hall sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
33 (P)	—	Electric intake valve timing control motor 2 temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.0 - 2.0 V
39 (R)	41 (B)	Power supply	—	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
40 (L)	41 (B)	Power supply	—	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
41 (B)	—	Ground	—	—	—

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

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ENGINE CONTROL SYSTEM

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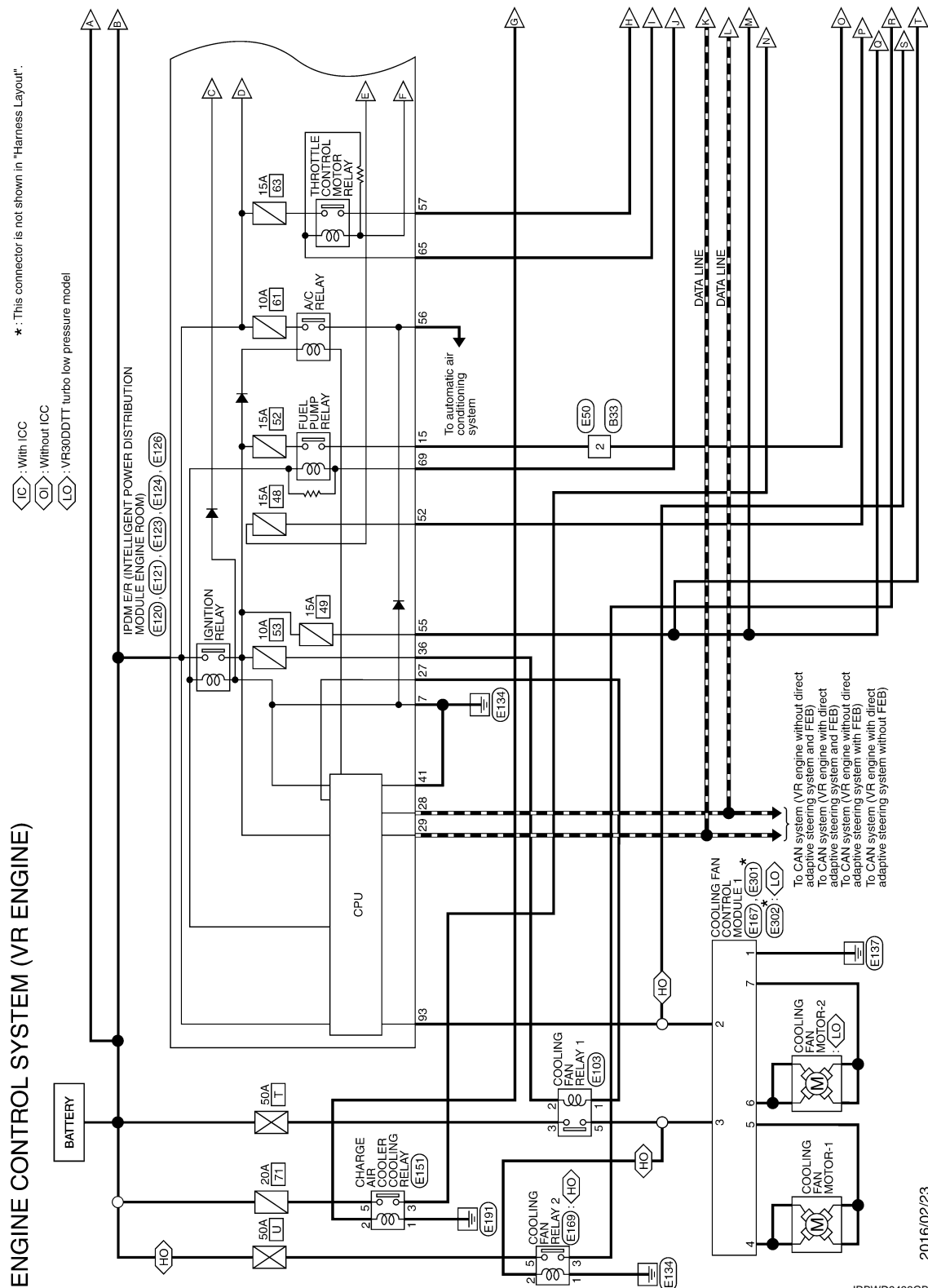
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WIRING DIAGRAM

ENGINE CONTROL SYSTEM

Wiring Diagram

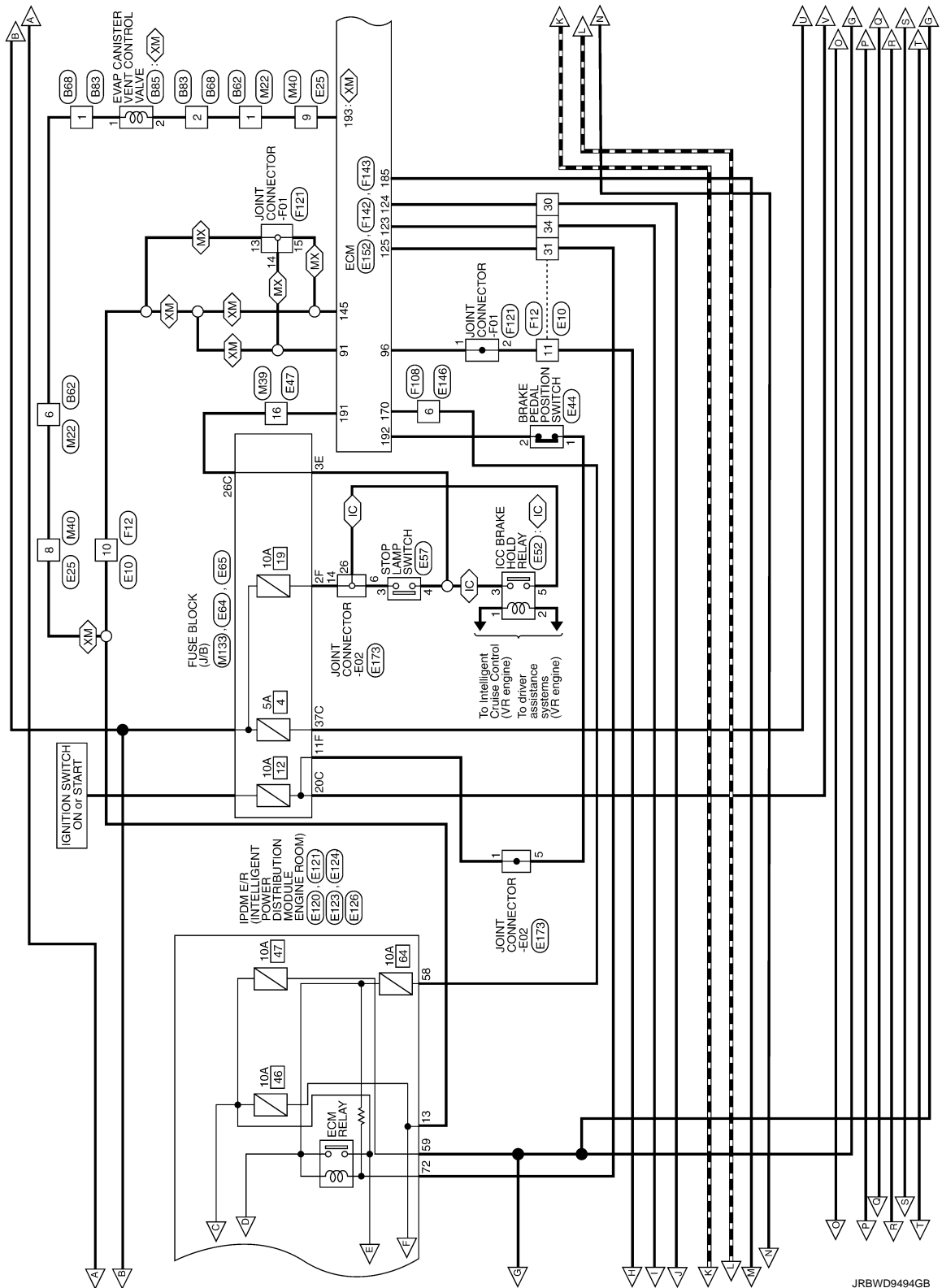
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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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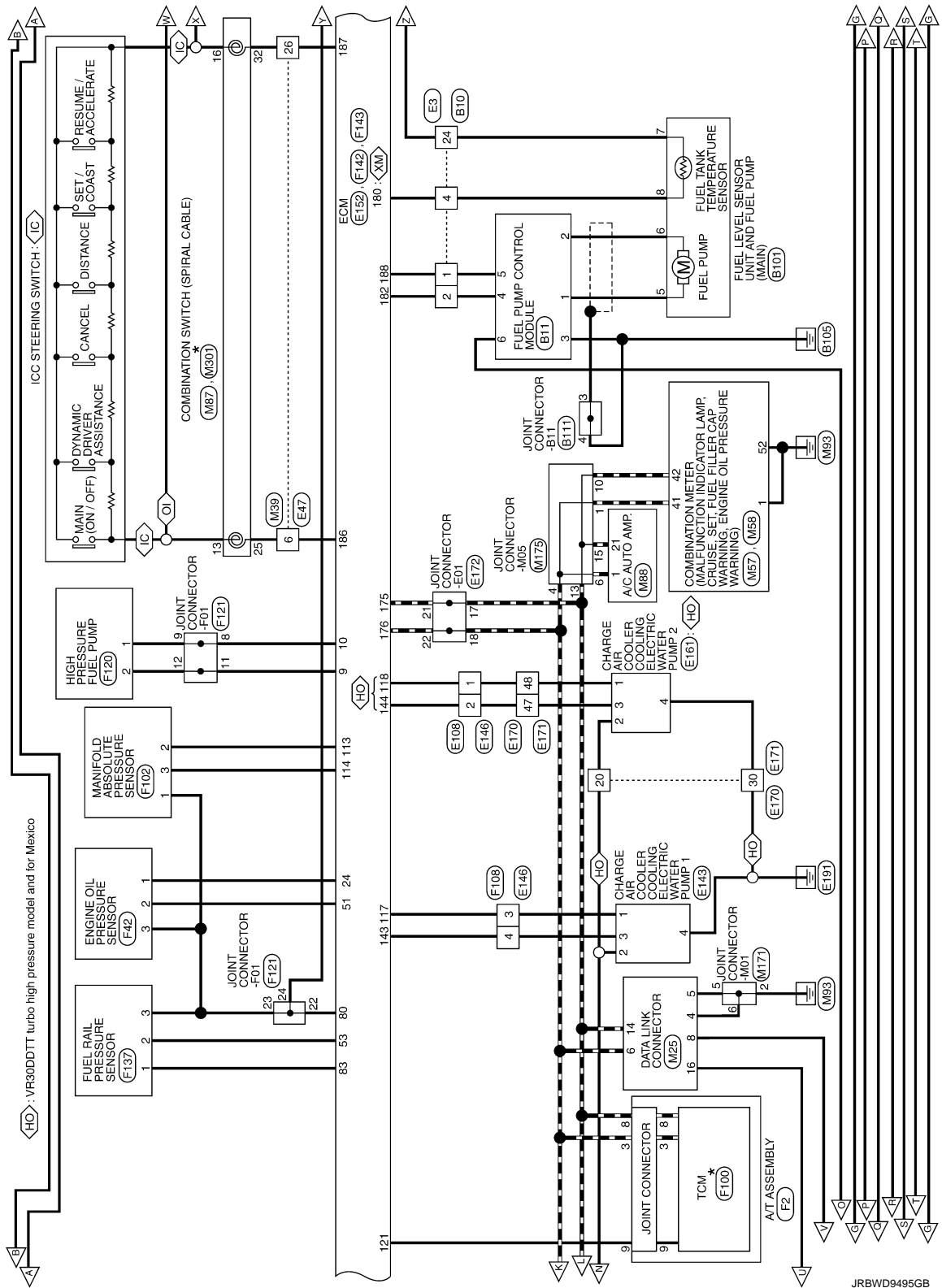
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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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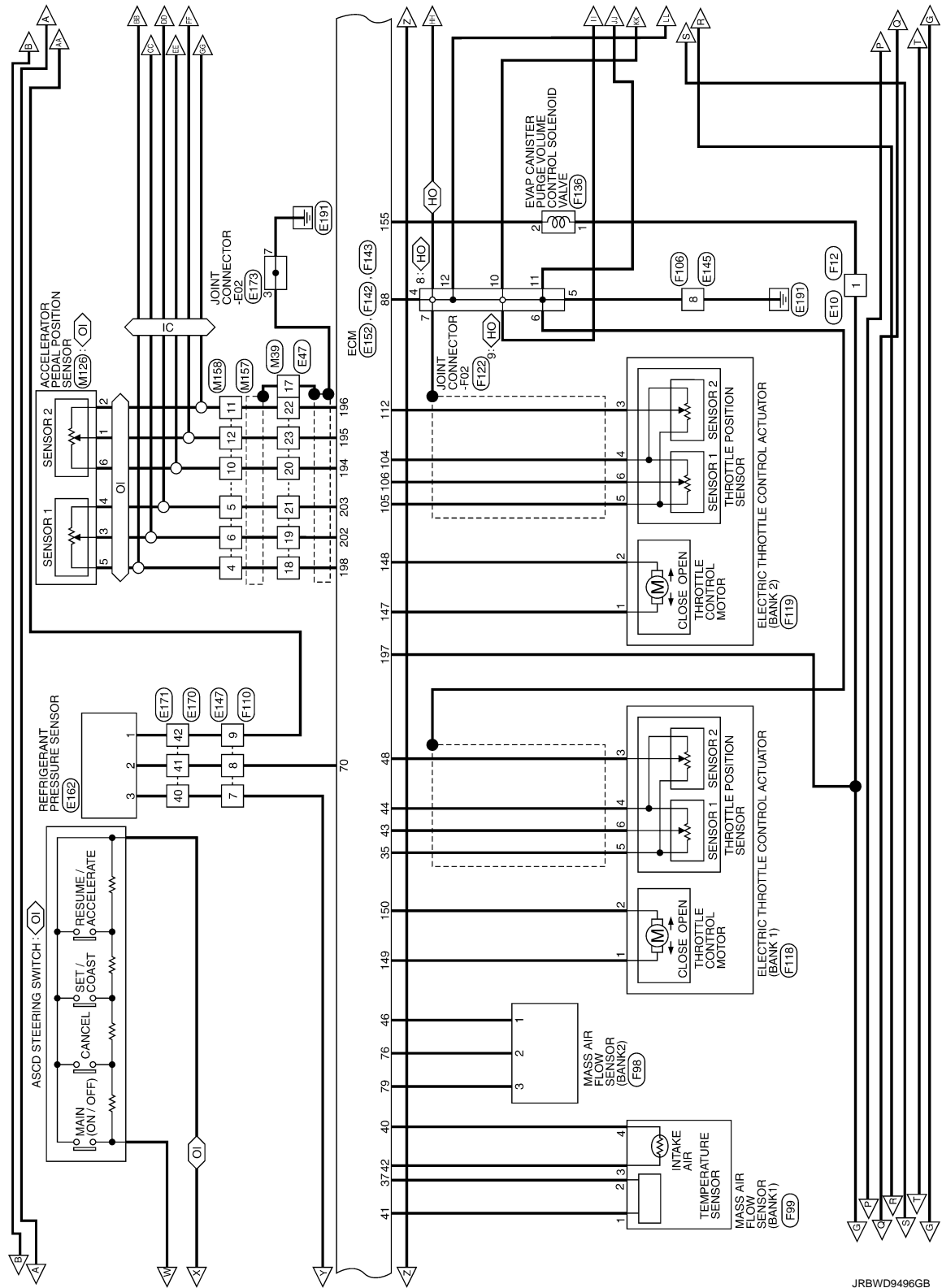


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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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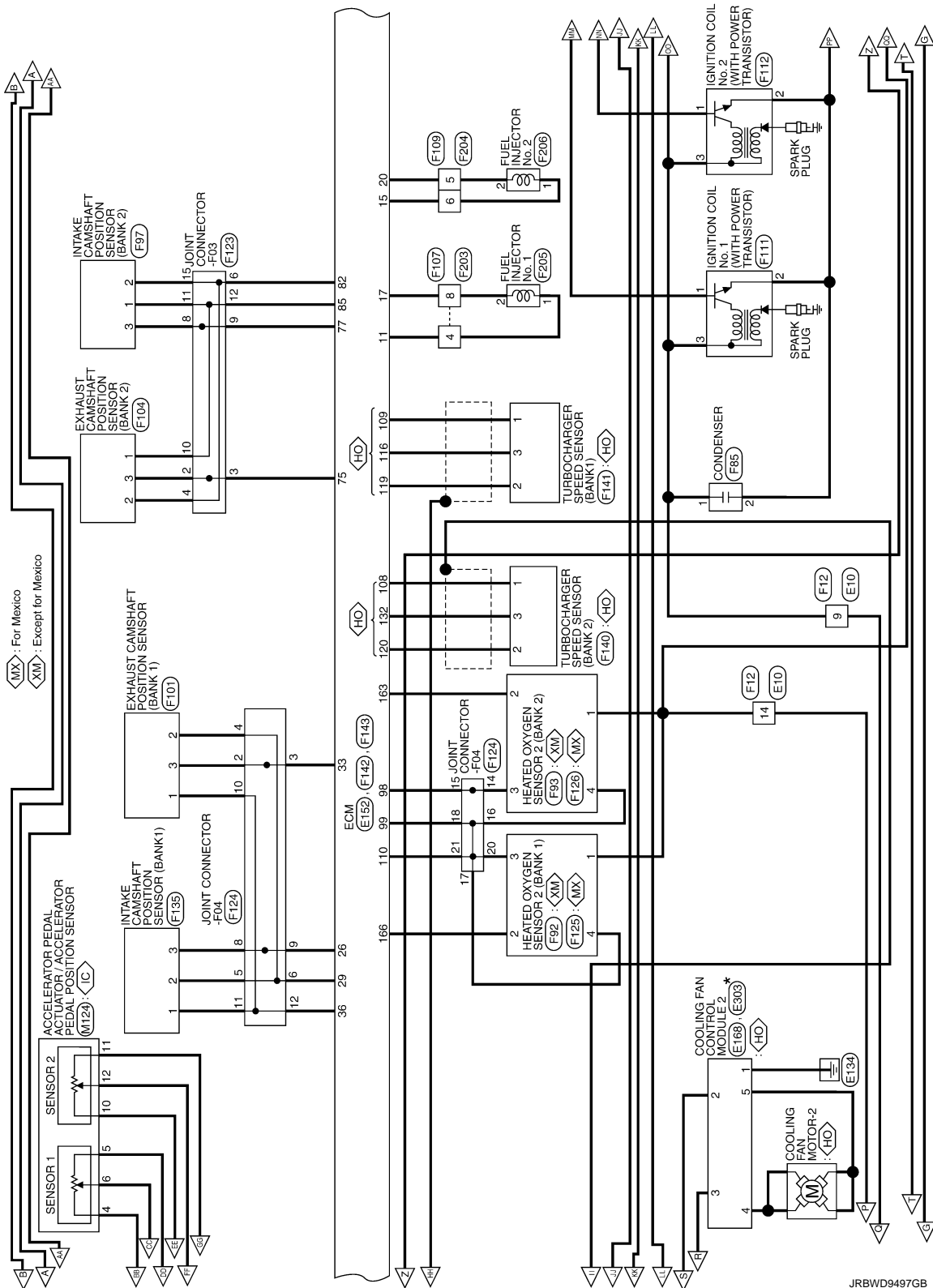
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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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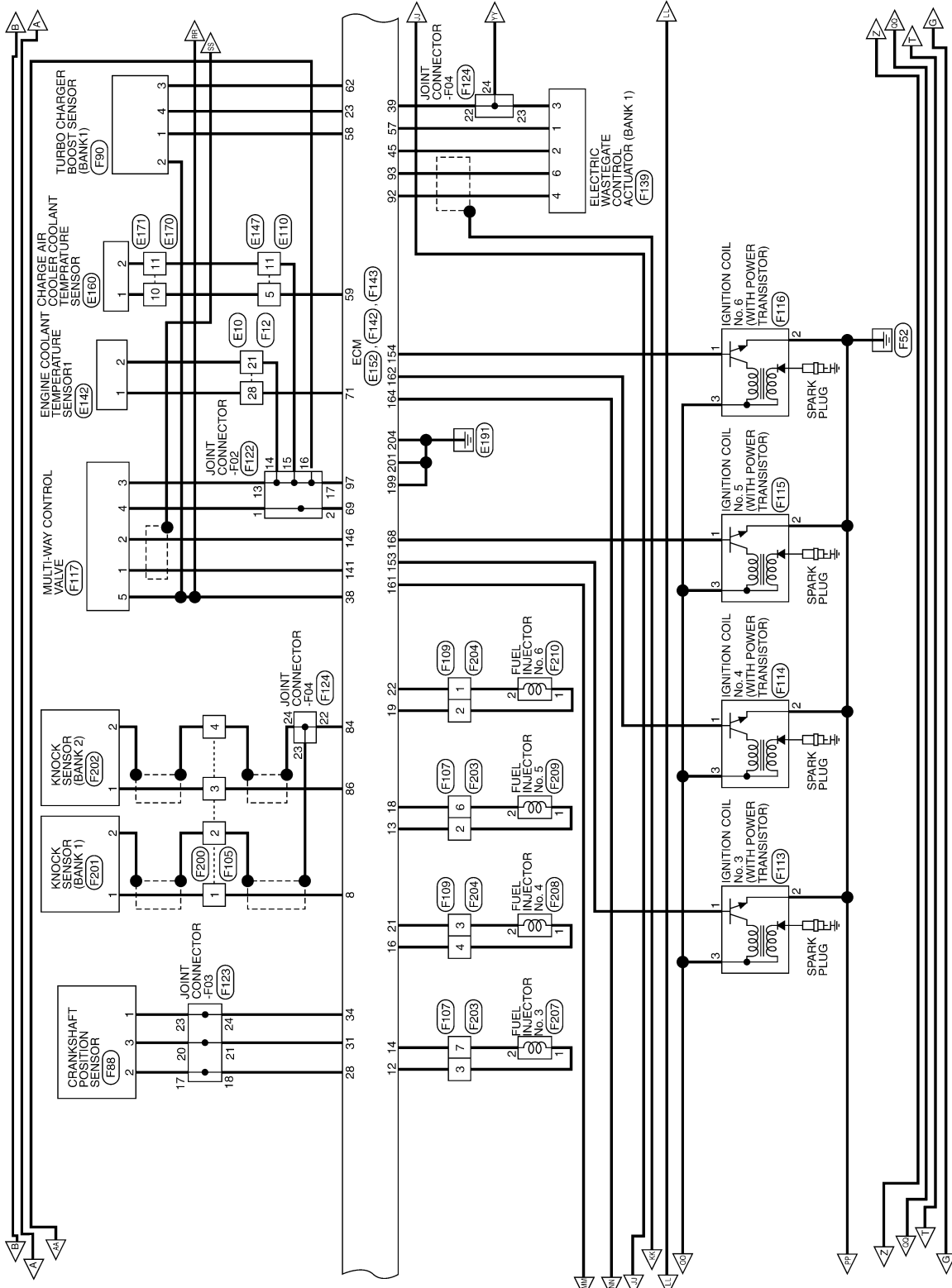


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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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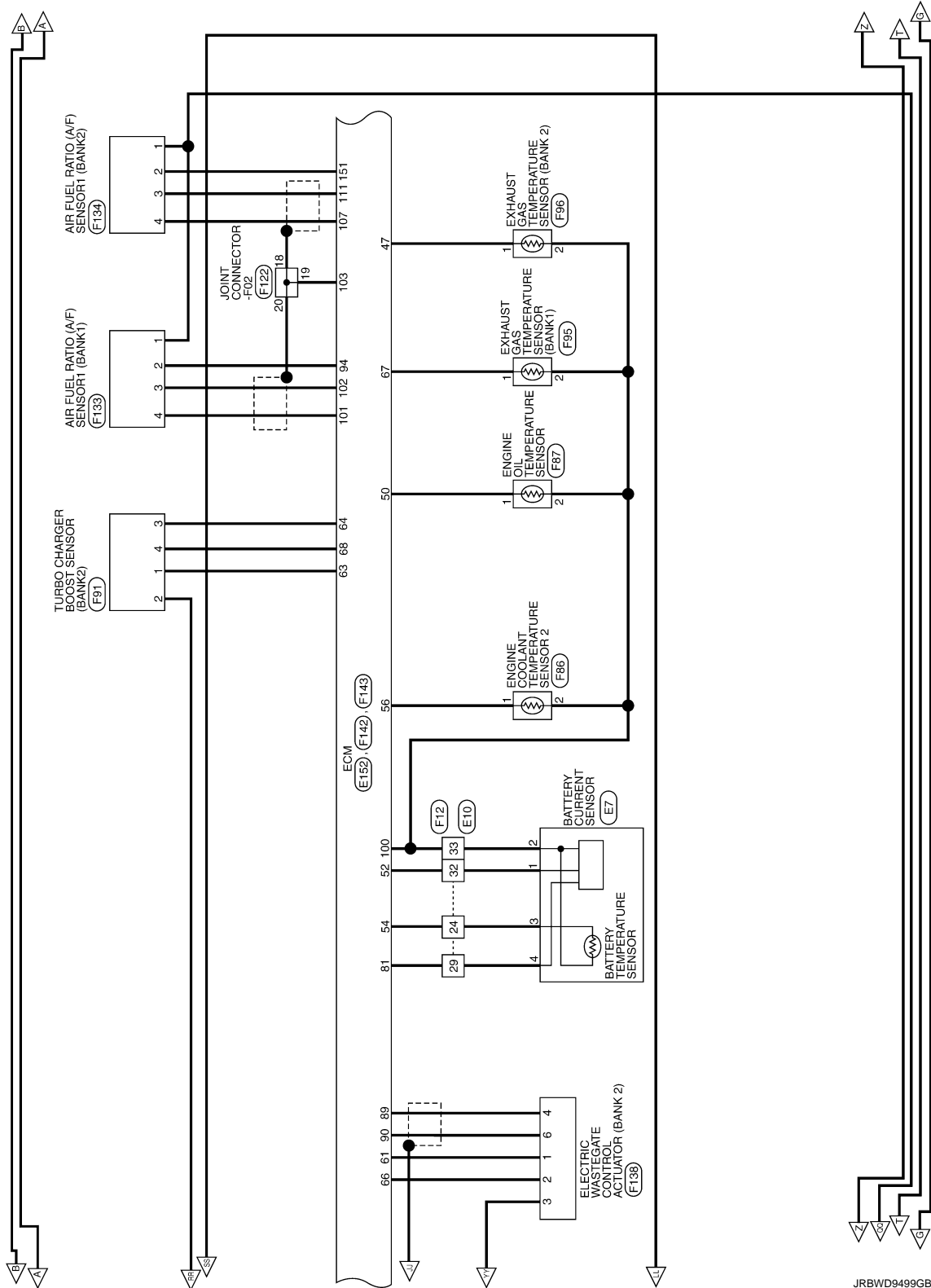
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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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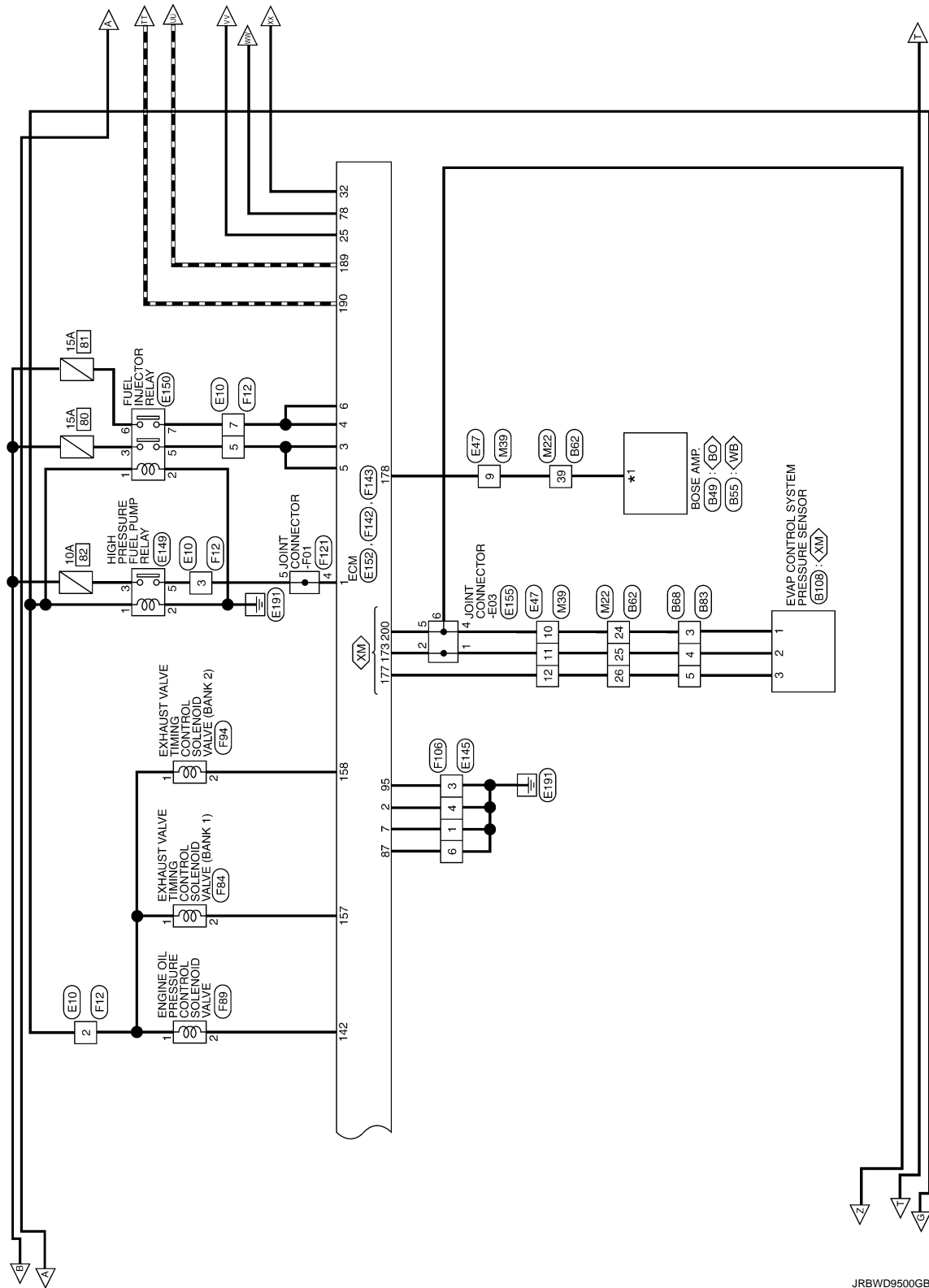


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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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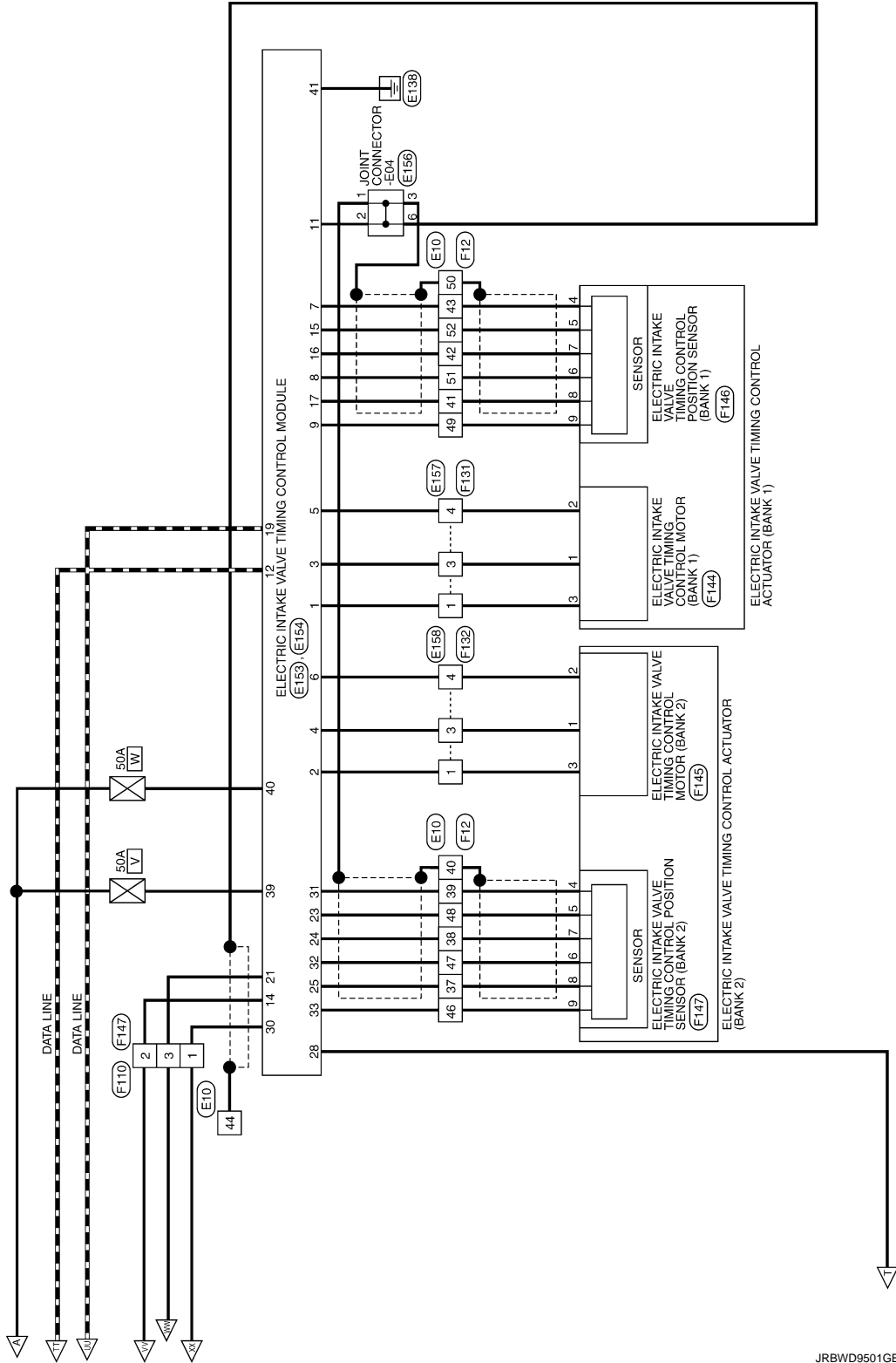
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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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*1 78 : <WB> : Without BOSE system
 19 : <BO> : With BOSE system



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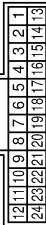
ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	B10
Connector Name	WIRE TO WIRE
Connector Type	TH24FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [With 2.0L turbo gasoline engine]
1	Y	- [With VR30 engine]
2	W	-
3	LG	-
4	P	- [With VR30 engine]
4	SB	- [With 2.0L turbo gasoline engine]
5	L	-
6	V	-
7	LG	-
8	R	-
9	W	-
10	B	-
11	G	-
12	R	-
13	GR	-
14	BG	-
15	BR	-
16	LG	-
17	V	-
18	BR	-
19	LG	- [With 2.0L turbo gasoline engine]
19	Y	- [With VR30 engine]
20	X	-
21	R	- [With 2.0L turbo gasoline engine]
21	V	- [With VR30 engine]
22	L	-
23	V	-
24	B	- [With VR30 engine]
24	R	- [With 2.0L turbo gasoline engine]

Connector No.	B11
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	TB06FB



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

Connector No.	B33
Connector Name	WIRE TO WIRE
Connector Type	M06FW-LC

Terminal No.	Color Of Wire	Signal Name [Specification]
2	BR	-
4	L	-
5	R	-



Connector No.	B49
Connector Name	ACTIVE NOISE CONTROL UNIT
Connector Type	TH32FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SHIELD	GND
2	P	CAN-L [For 2.0L turbo gasoline engine]
2	R	CAN-L [For VR30 engine]
3	B	ENGINE TYPE SIGNAL 1
4	B	ENGINE TYPE SIGNAL 2
4	G	FRONT MICROPHONE SIGNAL (+)
8	G	FRONT MICROPHONE SIGNAL (+)
9	BG	REAR MICROPHONE SIGNAL (+)
12	G	SOUND SIGNAL FRONT LH (+)
13	R	SOUND SIGNAL FRONT RH (+)
14	LG	SOUND SIGNAL REAR LH (+)
15	B	SOUND SIGNAL REAR RH (+)
16	V	ACC
18	L	CAN-H
19	P	ENGINE SPEED SIGNAL
20	W	IGN
23	B	GND
24	R	FRONT MICROPHONE SIGNAL (-)
25	W	REAR MICROPHONE SIGNAL (-)
28	L	SOUND SIGNAL FRONT LH (-)
29	L	SOUND SIGNAL FRONT RH (-)
30	P	SOUND SIGNAL REAR LH (-)
31	W	SOUND SIGNAL REAR RH (-)
32	Y	BAT

Connector No.	B55
Connector Name	BOSE AMP.
Connector Type	TH40FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
43	W	REAR MICROPHONE GND
44	R	VOICE GUIDANCE SIGNAL (-)
45	R	SOUND SIGNAL LH (-)
46	B	SOUND SIGNAL RH (-)
52	R	FRONT MICROPHONE GND
54	LG	AV COMM (L)
55	V	ACC
58	B	ENGINE TYPE SIGNAL 1
63	BG	REAR MICROPHONE SIGNAL
64	G	VOICE GUIDANCE SIGNAL (+)
65	L	SOUND SIGNAL LH (+)
66	W	SOUND SIGNAL RH (+)
72	G	FRONT MICROPHONE SIGNAL
74	P	AV COMM (H)
78	W	ENGINE SPEED SIGNAL
79	SHIELD	SHIELD

Connector No.	B62
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	- [With 2.0L turbo gasoline engine and without BOSE system]
1	LG	- [With VR30 engine]
1	W	- [With 2.0L turbo gasoline engine and with BOSE system]

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

2	L	- [With VR30 engine]
2	SHIELD	- [With 2.0L turbo gasoline engine]
3	BR	- [With 2.0L turbo gasoline engine]
3	R	- [With VR30 engine and with BOSE system]
3	W	- [With VR30 engine and without BOSE system]
4	SHIELD	- [With VR30 engine]
4	Y	- [With 2.0L turbo gasoline engine]
5	G	- [With VR30 engine]
5	V	- [With 2.0L turbo gasoline engine]
6	BG	- [With VR30 engine]
6	BR	- [With 2.0L turbo gasoline engine]
7	B	- [With 2.0L turbo gasoline engine and with BOSE system]
7	BR	- [With VR30 engine and without BOSE system]
7	W	- [With 2.0L turbo gasoline engine and without BOSE system]
8	B	- [With VR30 engine and with BOSE system]
8	Y	- [With 2.0L turbo gasoline engine and without BOSE system]
8	G	- [With VR30 engine and with BOSE system]
8	V	- [With 2.0L turbo gasoline engine and without BOSE system]
9	LG	- [With VR30 engine]
9	SHIELD	- [With VR30 engine]
10	V	-
11	GR	-
12	Y	-
13	R	-
14	BG	-
15	BG	- [With 2.0L turbo gasoline engine]
15	GR	- [With VR30 engine]
16	V	-
17	P	-
18	L	-
19	R	-
20	GR	-
21	R	-
22	V	-
23	W	-
24	BG	- [With 2.0L turbo gasoline engine]
24	V	- [With VR30 engine]
25	L	-
25	SB	- [With VR30 engine]
26	G	- [With 2.0L turbo gasoline engine]
26	W	- [With VR30 engine]
27	R	-
29	LG	- [With 2.0L turbo gasoline engine]
30	LG	-
30	P	- [With 2.0L turbo gasoline engine]
31	SHIELD	-
32	L	-
33	B	-
33	LG	- [With VR30 engine]
34	SHIELD	- [With 2.0L turbo gasoline engine]

35	LG	- [With VR30 engine]
35	W	- [With 2.0L turbo gasoline engine]
36	R	- [With VR30 engine]
36	P	- [With 2.0L turbo gasoline engine]
37	W	- [With 2.0L turbo gasoline engine and without BOSE system]
37	R	- [With VR30 engine]
37	W	- [With 2.0L turbo gasoline engine and with BOSE system]
38	P	-
39	P	- [With VR30 engine and without BOSE system]
39	R	- [With 2.0L turbo gasoline engine]
39	W	- [With VR30 engine and with BOSE system]
40	G	-
41	L	-
42	R	-
43	SHIELD	-
44	P	-
45	B	- [With 2.0L turbo gasoline engine]
45	G	- [With VR30 engine]
46	SHIELD	-
47	G	-
48	BG	-
49	G	-
50	V	-
51	GR	-
52	W	- [With 2.0L turbo gasoline engine]
52	Y	- [With VR30 engine]
53	R	-
54	GR	-
55	L	-
56	V	-
57	R	-
58	LG	-
59	P	-
61	L	-
62	P	- [With VR30 engine]
62	V	- [With 2.0L turbo gasoline engine]
63	L	-
64	W	-
66	LG	-
68	L	-
69	P	-
71	R	- [With VR30 engine]
72	G	- [With 2.0L turbo gasoline engine]
72	Y	- [With VR30 engine]
73	R	- [With 2.0L turbo gasoline engine]
73	SHIELD	- [With VR30 engine]
74	BG	-
74	L	- [With VR30 engine]
75	GR	- [With 2.0L turbo gasoline engine]

75	V	- [With VR30 engine]
76	GR	- [With VR30 engine]
76	V	- [With 2.0L turbo gasoline engine]
77	P	-
78	L	-
79	R	-
80	GR	- [With 2.0L turbo gasoline engine]
81	W	- [With VR30 engine]
81	B	- [With 2.0L turbo gasoline engine]
81	R	- [With VR30 engine]
82	G	- [With 2.0L turbo gasoline engine]
82	SHIELD	- [With VR30 engine]
83	R	- [With 2.0L turbo gasoline engine]
83	W	- [With VR30 engine]
84	BR	- [With 2.0L turbo gasoline engine]
84	SHIELD	- [With 2.0L turbo gasoline engine]
85	BG	- [With VR30 engine]
85	G	- [With 2.0L turbo gasoline engine]
86	R	- [With 2.0L turbo gasoline engine]
86	W	- [With VR30 engine]
87	LG	- [With VR30 engine]
87	SHIELD	- [With 2.0L turbo gasoline engine]
89	LG	-
90	P	- [With 2.0L turbo gasoline engine]
90	V	- [With VR30 engine]
92	L	- [With 2.0L turbo gasoline engine]
92	W	- [With VR30 engine]
93	R	-
93	SHIELD	- [With 2.0L turbo gasoline engine]
94	R	-
95	L	- [With 2.0L turbo gasoline engine]
95	Y	- [With VR30 engine]
96	R	- [With 2.0L turbo gasoline engine]
96	W	- [With VR30 engine]
97	L	- [With VR30 engine]
97	R	- [With 2.0L turbo gasoline engine and without BOSE system]
97	W	- [With 2.0L turbo gasoline engine and with BOSE system]
98	LG	-
99	BR	- [With VR30 engine and with BOSE system]
99	P	- [With 2.0L turbo gasoline engine]
99	V	- [With VR30 engine and without BOSE system]
100	BR	- [With VR30 engine]
100	W	- [With 2.0L turbo gasoline engine]

Connector No.	B68
Connector Name	WIRE TO WIRE
Connector Type	NS06FW-C5



2
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Terminal No.	Color Of Wire	Signal Name (Specification)
1	BG	- [With VR30 engine]
1	BR	- [With 2.0L turbo gasoline engine]
2	LG	- [With VR30 engine]
2	P	- [With 2.0L turbo gasoline engine]
3	BG	- [With 2.0L turbo gasoline engine]
3	V	- [With VR30 engine]
4	L	- [With 2.0L turbo gasoline engine]
4	SB	- [With VR30 engine]
5	G	- [With VR30 engine]
5	R	- [With 2.0L turbo gasoline engine]

Connector No.	B83
Connector Name	WIRE TO WIRE
Connector Type	NS06MMV-C5



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Terminal No.	Color Of Wire	Signal Name (Specification)
1	BG	- [With VR30 engine]
1	BR	- [With 2.0L turbo gasoline engine]
2	LG	- [With VR30 engine]
2	P	- [With 2.0L turbo gasoline engine]
3	V	- [With VR30 engine]
3	W	- [With 2.0L turbo gasoline engine]
4	L	- [With 2.0L turbo gasoline engine]
4	SB	- [With VR30 engine]
5	G	- [With VR30 engine]
5	R	- [With 2.0L turbo gasoline engine]

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

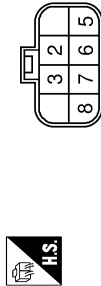
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	B85
Connector Name	EVAP CANISTER VENT CONTROL VALVE
Connector Type	E02FB-R5



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	VCC
2	LG	GND

Connector No.	B101
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP (PUMP)
Connector Type	HS08F5Y



Terminal No.	Color Of Wire	Signal Name [Specification]
2	W	-
3	Y	-
5	G	- [With VR30 engine]
6	BR	- [With 2.0L turbo gasoline engine]
7	G	- [With VR30 engine]
8	P	- [With 2.0L turbo gasoline engine]

Connector No.	B108
Connector Name	EVAP CONTROL SYSTEM PRESSURE SENSOR
Connector Type	E03FG-R5



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

Connector No.	B111
Connector Name	JOINT CONNECTOR-B11
Connector Type	TK04W-J



Terminal No.	Color Of Wire	Signal Name [Specification]
3	SHIELD	-
4	B	-

Connector No.	E3
Connector Name	WIRE TO WIRE
Connector Type	TH24WA-AH



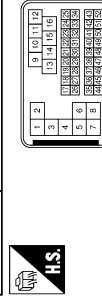
Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [With 2.0L turbo gasoline engine]
1	Y	- [With VR30 engine]
2	W	-
3	LG	-
4	P	- [With VR30 engine]
4	SB	- [With 2.0L turbo gasoline engine]
5	L	-
6	Y	-
7	LG	-
8	BG	-
9	W	-
10	B	-
11	G	-
12	R	-
13	GR	-
14	G	-
15	LG	- [With 2.0L turbo gasoline engine]
16	V	- [With VR30 engine]
17	P	-
18	BR	-
19	LG	- [With 2.0L turbo gasoline engine]
19	V	- [With VR30 engine]
20	GR	-
21	R	- [With 2.0L turbo gasoline engine]
21	V	- [With VR30 engine]
22	L	-
23	P	-
24	B	- [With VR30 engine]
24	BR	- [With 2.0L turbo gasoline engine]

Connector No.	E7
Connector Name	BATTERY CURRENT SENSOR
Connector Type	RH04FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	BG	-
4	LG	-

Connector No.	E10
Connector Name	WIRE TO WIRE
Connector Type	SA336MB-RS8-SH28



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
3	LG	-
4	R	-
5	G	-
7	V	-
8	W	-
9	W	-
10	BG	-
11	LG	-
12	BG	-
13	L	-
14	Y	-
15	LG	-
16	G	-
17	L	-

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

18	P	-	-
19	GR	-	-
20	G	-	-
21	GR	-	-
22	W	-	-
23	G	-	-
24	BG	-	-
25	V	-	-
26	BR	-	-
27	W	-	-
28	BG	-	-
29	LG	-	-
30	G	-	-
31	P	-	-
32	R	-	-
33	B	-	-
34	V	-	-
35	LG	-	-
36	W	-	-
37	V	-	-
38	BR	-	-
39	GR	-	-
40	SHIELD	-	-
41	B	-	-
42	R	-	-
43	Y	-	-
44	SHIELD	-	-
45	Y	-	-
46	P	-	-
47	L	-	-
48	LG	-	-
49	BG	-	-
50	SHIELD	-	-
51	W	-	-
52	G	-	-

Connector No.	E25
Connector Name	WIRE TO WIRE
Connector Type	THROFWM-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
6	V	-
7	L	-
8	BG	- [With VR30 engine]
9	BR	- [With 2.0L turbo gasoline engine]
9	GR	- [With 2.0L turbo gasoline engine]
9	LG	- [With VR30 engine] [Color of wire differs depending on production]
10	BR	-
11	L	-
12	GR	- [With VR30 engine]
12	P	- [With 2.0L turbo gasoline engine]
13	SHIELD	- [With 2.0L turbo gasoline engine]
13	W	- [With VR30 engine]
14	B	-
15	GR	- [With 2.0L turbo gasoline engine]
15	SB	- [With VR30 engine]
16	BR	- [With 2.0L turbo gasoline engine]
16	Y	- [With VR30 engine]
17	BR	- [With VR30 engine]
17	GR	- [With 2.0L turbo gasoline engine]
18	G	- [With 2.0L turbo gasoline engine]
18	P	- [With VR30 engine]
19	Y	-
21	W	- [With 2.0L turbo gasoline engine]
31	Y	- [With VR30 engine]
32	G	- [With 2.0L turbo gasoline engine]
32	GR	- [With VR30 engine]
33	L	- [With VR30 engine]
33	Y	- [With 2.0L turbo gasoline engine]
34	P	-
35	GR	-
36	R	-
37	L	- [With 2.0L turbo gasoline engine]
37	V	- [With VR30 engine]
38	L	- [With VR30 engine]

76	G	-	-
77	Y	-	-
78	LG	- [With 2.0L turbo gasoline engine and with ADAS]	-
78	P	- [With VR30 engine]	-
78	V	- [With 2.0L turbo gasoline engine and without ADAS]	-
79	SB	-	-
80	G	-	-
81	R	-	-
82	V	-	-
83	BR	- [With 2.0L turbo gasoline engine]	-
84	R	- [With VR30 engine]	-
84	LG	-	-
85	BG	-	-
87	G	-	-
89	LG	-	-
90	G	- [With VR30 engine]	-
90	GR	- [With 2.0L turbo gasoline engine]	-
91	G	-	-
93	BG	-	-
94	GR	- [With VR30 engine]	-
94	L	- [With 2.0L turbo gasoline engine]	-
95	BG	- [With VR30 engine]	-
95	P	- [With 2.0L turbo gasoline engine and without gateway]	-
95	R	- [With 2.0L turbo gasoline engine and with gateway]	-
96	W	-	-
97	LG	-	-
98	L	-	-
99	LG	- [With 2.0L turbo gasoline engine]	-
99	P	- [With VR30 engine]	-
100	SHIELD	-	-

Connector No.	E44
Connector Name	BRAKE PEDAL POSITION SWITCH
Connector Type	S02F1



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [Color of wire differs depending on production]
1	V	- [Color of wire differs depending on production]
2	BG	- [With VR30 engine]
2	BR	- [With 2.0L turbo gasoline engine]

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	E47
Connector Name	WIRE TO WIRE
Connector Type	TH32MW-AH



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
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Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [Color of wire differs depending on production]
1	Y	- [Color of wire differs depending on production]
2	V	-
3	L	-
4	P	- [Without Gateway]
4	R	- [With Gateway]
5	W	-
6	SB	-
7	BR	- [Color of wire differs depending on production]
7	L	- [Color of wire differs depending on production]
8	W	-
9	BG	- [Without BOSE system]
9	V	- [With BOSE system]
10	V	-
11	SB	-
12	G	-
13	G	-
15	BR	-
16	P	-
17	SHIELD	-
18	L	-
19	Y	-
20	W	-
21	G	-
22	R	-
23	BR	-
24	R	-
25	L	-
26	BG	-
27	LG	-
28	BR	-
29	W	-
30	Y	-
31	G	-
32	GR	-

Connector No.	E50
Connector Name	WIRE TO WIRE
Connector Type	M08BMW-LC



1	2	3
4	5	6

Terminal No.	Color Of Wire	Signal Name [Specification]
2	BR	-
4	L	-
5	V	-

Connector No.	E52
Connector Name	ICC BRAKE HOLD RELAY
Connector Type	MS02FL-M2-LC



1	2	3
4	5	6

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	G	-
3	V	-
5	BR	- [With 2.0L turbo gasoline engine]
5	L	- [With VR30 engine]

Connector No.	E57
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC



3	4
1	2

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [With ASCD]
1	L	- [With ADAS]
2	GR	- [With ASCD]
2	LG	- [With ADAS]
3	BR	-
4	V	-

Connector No.	E64
Connector Name	FUSE BLOCK (J/B)
Connector Type	MS08FW-CS



3E	7E	9E	1E	4E
6E	8E	5E	2E	1E

Terminal No.	Color Of Wire	Signal Name [Specification]
1E	G	-
2E	P	-
3E	V	-
4E	GR	-
6E	L	-
7E	BG	-

Connector No.	E65
Connector Name	FUSE BLOCK (J/B)
Connector Type	TH12FW-AH



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

Terminal No.	Color Of Wire	Signal Name [Specification]
10P	W	-
11F	G	- [Color of wire differs depending on production]
11F	R	- [Color of wire differs depending on production]
12F	W	- [With VR30 engine]
12F	Y	- [With 2.0L turbo gasoline engine]
1F	R	-
2F	BR	-
3F	P	-
5F	P	-
6F	L	-
7F	R	-
8F	L	-
9F	L	-

Connector No.	E103
Connector Name	COOLING FAN RELAY 1
Connector Type	24384_4GADA



3	2	1
5	4	1

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

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

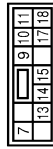
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	E108
Connector Name	WIRE TO WIRE
Connector Type	RS06FB-PR



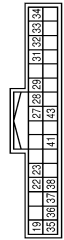
Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	SHIELD	-
3	W	-
5	R	-
6	B	-

Connector No.	E120
Connector Name	IPMA I/R INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	NS12PW-CS



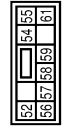
Terminal No.	Color Of Wire	Signal Name [Specification]
7	B/W	-
9	P	-
10	LG	-
11	V	-
13	BG	-
14	SB	-
15	BR	-
17	GR	-
18	L	-

Connector No.	E121
Connector Name	IPMA I/R INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	TH32FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
19	L	- [With 2.0L turbo gasoline engine]
22	P	- [With VR30 engine]
23	GR	- [With VR30 engine]
23	LG	- [With 2.0L turbo gasoline engine and without Aera (left side)]
23	P	- [With 2.0L turbo gasoline engine and with Aera (left side)]
27	GR	-
28	P	-
29	L	-
31	G	-
32	SB	-
33	SB	-
34	Y	-
35	G	-
36	SB	- [With VR30 engine]
36	W	- [With 2.0L turbo gasoline engine]
37	GR	-
38	BR	-
41	GR	-
43	V	-

Connector No.	E123
Connector Name	IPMA I/R INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	NS10PW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
52	Y	-
54	SB	-
55	W	-
56	L	-
57	LG	-
58	P	-
59	R	-
61	GR	-

Connector No.	E124
Connector Name	IPMA I/R INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	TH12FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
62	G	-
64	SB	-
65	V	-
69	G	-
71	W	-
72	Y	-

Connector No.	E126
Connector Name	IPMA I/R INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	TH16FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
85	L	-
90	BR	-
93	V	-
94	Y	-
96	P	- [With VR30 engine]
96	SB	- [With 2.0L turbo gasoline engine]

Connector No.	E142
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR 2
Connector Type	EO2FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	MCV_TW1
2	GR	GND

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	E143
Connector Name	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1
Connector Type	RS04FG



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	R	-
3	G	-
4	B	-

Connector No.	E145
Connector Name	WIRE TO WIRE
Connector Type	RS08MB-PR



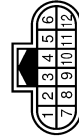
Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
3	B	-
4	B	-
6	B	-
8	B	-

Connector No.	E146
Connector Name	WIRE TO WIRE
Connector Type	RH06MB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	BG	-
3	LG	-
4	G	-
6	P	-

Connector No.	E147
Connector Name	WIRE TO WIRE
Connector Type	RH12MB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	Y	-
3	Y	-
5	BR	- [With VR30 engine and with ISS]
6	V	- [Except with VR30 engine and with ISS]
7	P	- [Color of wire differs depending on production]
8	L	- [Color of wire differs depending on production]
9	W	-
10	BR	-
11	GR	- [With VR30 engine and with ISS]
11	V	- [Except with VR30 engine and with ISS]

Connector No.	E149
Connector Name	HIGH PRESSURE FUEL PUMP RELAY
Connector Type	MS02FL-M2-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	G	-
5	LG	-

Connector No.	E150
Connector Name	FUEL INJECTOR RELAY
Connector Type	MO6FBR-R-LC



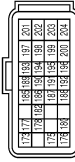
Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	L	-
5	G	-
6	R	-
7	V	-

Connector No.	E151
Connector Name	CHARGE AIR COOLER COOLING RELAY
Connector Type	MS02FL-M2-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	R	-
3	R	-
5	BG	-

Connector No.	E152
Connector Name	ECM
Connector Type	RH24FB-RZL-LRH



Terminal No.	Color Of Wire	Signal Name [Specification]
173	SR	FUEL TANK PRESSURE SENSOR
175	P	CAN-L
176	L	CAN-H
177	G	SENSOR POWER SUPPLY FUEL TANK PRESSURE SENSOR
178	Y	TACHO METER SIGNAL
180	P	FUEL TANK TEMPERATURE SENSOR
182	W	FUEL PUMP CONTROL MODULE (PPCM) CHECK
185	SB	IGNITION SWITCH
186	SB	ASC2 STEERING SWITCH
187	BG	SENSOR GROUND JASCO STEERING SWITCH
188	Y	FUEL PUMP CONTROL MODULE (PPCM)
189	Y	ENGINE COMMUNICATION LINE-L
190	L	ENGINE COMMUNICATION LINE-H
191	P	STOP LAMP SWITCH
192	BG	BRAKE PEDAL POSITION SWITCH
193	GR	

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

Terminal No.	Wire	Signal Name [Specification]
133	CG	SENSOR POWER SUPPLY
134	W	SENSOR POWER SUPPLY
135	W	ACCELERATOR PEDAL POSITION SENSOR 2
136	BR	ACCELERATOR PEDAL POSITION SENSOR 3
137	R	SENSOR GROUND
138	R	SENSOR GROUND
139	L	ECM POWER SUPPLY
140	B	ECM GROUND
200	V	SENSOR GROUND
201	B	ECM GROUND
202	Y	ACCELERATOR PEDAL POSITION SENSOR 1
203	G	SENSOR GROUND
204	B	ECM GROUND

Terminal No.	Wire	Signal Name [Specification]
31	GR	SENSOR POWER SUPPLY
32	G	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1
33	P	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 2

Terminal No.	Wire	Signal Name [Specification]
39	R	POWER SUPPLY
40	L	POWER SUPPLY
41	B	GROUND

Terminal No.	Wire	Signal Name [Specification]
1	W	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 PHASE 1
2	R	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 PHASE 2
3	B	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 PHASE 3
4	W	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 2 PHASE 1
5	B	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 2 PHASE 2
6	R	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 2 PHASE 3
7	Y	SENSOR POWER SUPPLY
8	W	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 - HALLSENSOR 1
9	BG	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 - HALLSENSOR 2
11	B	SHIELD
12	L	ENGINE COMMUNICATION LINE-H
14	Y	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 - HALLSENSOR 3
15	G	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 - HALLSENSOR 3
16	R	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 - HALLSENSOR 2
17	B	SENSOR GROUND
19	Y	ENGINE COMMUNICATION LINE-L
21	L	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 - HALLSENSOR 3
24	BR	ELECTRIC INFLATE VALVE TIMING CONTROL MOTOR 1 - HALLSENSOR 3
25	V	SENSOR GROUND
28	W	IGNITION SWITCH
30	G	GROUND

Terminal No.	Wire	Signal Name [Specification]
1	B	Signal Name [Specification]
2	W	Signal Name [Specification]
3	W	Signal Name [Specification]
4	R	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	SHIELD	Signal Name [Specification]
2	B	Signal Name [Specification]
3	SHIELD	Signal Name [Specification]
6	SHIELD	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	B	Signal Name [Specification]
2	W	Signal Name [Specification]
3	W	Signal Name [Specification]
4	R	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	SHIELD	Signal Name [Specification]
2	B	Signal Name [Specification]
3	SHIELD	Signal Name [Specification]
6	SHIELD	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	SHIELD	Signal Name [Specification]
2	B	Signal Name [Specification]
3	SHIELD	Signal Name [Specification]
6	SHIELD	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	SHIELD	Signal Name [Specification]
2	B	Signal Name [Specification]
3	SHIELD	Signal Name [Specification]
6	SHIELD	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	SHIELD	Signal Name [Specification]
2	B	Signal Name [Specification]
3	SHIELD	Signal Name [Specification]
6	SHIELD	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	SHIELD	Signal Name [Specification]
2	B	Signal Name [Specification]
3	SHIELD	Signal Name [Specification]
6	SHIELD	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	SHIELD	Signal Name [Specification]
2	B	Signal Name [Specification]
3	SHIELD	Signal Name [Specification]
6	SHIELD	Signal Name [Specification]

Terminal No.	Wire	Signal Name [Specification]
1	SHIELD	Signal Name [Specification]
2	B	Signal Name [Specification]
3	SHIELD	Signal Name [Specification]
6	SHIELD	Signal Name [Specification]

JRBWD9509GB

ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	[With VRS0 in output engine]
2	GR	[With VRS0 in output engine]
3	BG	[With VRS0 in output engine]
4	B	[With VRS0 in output engine]

Connector No.	E162
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB



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

Connector No.	E167
Connector Name	COOLING FAN CONTROL MODULE 1
Connector Type	SJ201FGY-SN22



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

Connector No.	E168
Connector Name	COOLING FAN CONTROL MODULE 2
Connector Type	SJ201FGY-SN22



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

Connector No.	E169
Connector Name	COOLING FAN RELAY 2
Connector Type	24347_9F900



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

Connector No.	E170
Connector Name	WIRE TO WIRE
Connector Type	SMA36MP-RS1D-S122



Terminal No.	Color Of Wire	Signal Name [Specification]
10	V	-
11	GR	-
19	V	-
20	SB	-
24	B	-
26	L	-
27	P	-
28	SHIELD	-
29	B	-
30	B	-
31	P	-
32	B	-
33	V	-
34	G	-
35	R	-
36	B	-

Terminal No.	Color Of Wire	Signal Name [Specification]
31	P	-
32	B	-
33	B	-
34	GR	-
35	P	-
36	B	-
37	R	-
38	V	-
39	V	-
40	P	-
41	L	-
42	W	-
43	B	-
44	L	-
45	Y	-
47	BG	-
48	GR	-

Connector No.	E171
Connector Name	WIRE TO WIRE
Connector Type	SMA36FB-RS1D-S122



Terminal No.	Color Of Wire	Signal Name [Specification]
10	V	-
11	GR	-
19	V	-
20	SB	-
22	B	-
24	B	-
26	L	-
27	P	-
28	SHIELD	-
29	B	-
30	B	-
31	P	-
32	B	-
33	V	-
34	G	-
35	R	-
36	B	-

Terminal No.	Color Of Wire	Signal Name [Specification]
37	BG	-
38	LG	-
39	P	-
40	L	-
41	L	-
42	W	-
43	B	-
44	L	-
45	Y	-
47	BG	-
48	GR	-

Connector No.	E172
Connector Name	JOINT CONNECTOR-E01
Connector Type	SGA28FLER-J



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	V	-
3	W	-
4	GR	-
5	GR	-
6	V	-
7	W	-
8	L	-
9	GR	-
10	Y	-
11	W	-
12	L	-
15	W	-
16	BG	-
17	P	-
18	L	-
19	W	-
20	BG	-
21	P	-
22	L	-
23	SB	- [Color of wire differs depending on production]
24	W	- [Color of wire differs depending on production]
24	BG	- [Color of wire differs depending on production]

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

24	LG	- [Color or wire differs depending on production]
25	L	-
26	L	-
27	Y	-
28	L	-

Connector No.	E173
Connector Name	JOINT CONNECTOR-ED2
Connector Type	SCA28FDG-VJ



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [Color or wire differs depending on production]
1	R	- [Color or wire differs depending on production]
3	B	-
4	B	-
5	G	-
6	BR	-
7	B	-
8	B	-
9	G	-
10	G	-
13	B	-
14	BR	-
17	G	-
21	G	-
25	R	-
26	L	-

Connector No.	E301
Connector Name	COOLING FAN CONTROL MODULE 1
Connector Type	61388-0259



Terminal No.	Color Of Wire	Signal Name [Specification]
4	-	-
5	-	-

Connector No.	E302
Connector Name	COOLING FAN CONTROL MODULE 1
Connector Type	61388-0259



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

Connector No.	E303
Connector Name	COOLING FAN CONTROL MODULE 2
Connector Type	61388-0259



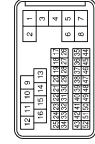
Terminal No.	Color Of Wire	Signal Name [Specification]
4	-	-
5	-	-

Connector No.	F2
Connector Name	A/T ASSEMBLY
Connector Type	BR1DFG-DGT



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	IGNITION POWER SUPPLY (With VR30 engine)
1	L	IGNITION POWER SUPPLY (With VR30 engine)
2	P	BATTERY POWER SUPPLY (MEMORY BACK-UP)
3	L	CAN-H
4	R	K-LINE
5	B	GROUND (With 2.0L Turbo gasoline engine)
5	BR	GROUND (With VR30 engine)
6	GR	IGNITION POWER SUPPLY
7	BCG	BACK-UP LAMP RELAY
8	P	CAN-L
9	V	STARTER RELAY
10	B	GROUND

Connector No.	F12
Connector Name	WIRE TO WIRE
Connector Type	SCA28F8-RSS-SH28



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	GR	-
3	BCG	-
4	R	-
5	G	-
7	L	-
8	W	-
9	W	-
10	BGG	-
11	R	-
12	LG	-
13	L	-
14	V	-
15	LG	-
16	L	-
17	L	-
18	P	-
19	GR	-
20	BGG	-
21	GR	-
22	W	-
23	G	-
24	5B	-
25	V	-
26	W	-
27	V	-
28	W	-
29	Y	-
30	R	-
31	P	-
32	R	-
33	P	-
34	BGG	-
35	LG	-
36	5B	-
37	V	-

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

Terminal No.	Color Of Wire	Signal Name [Specification]
38	BR	-
39	GR	-
40	SHIELD	-
41	B	-
42	R	-
43	Y	-
45	Y	-
46	P	-
47	L	-
48	LG	-
49	RG	-
50	SHIELD	-
51	W	-
52	G	-

Connector No.	Color Of Wire	Signal Name [Specification]
F42	GR	ENGINE OIL PRESSURE SENSOR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	GND
2	P	VOUT
3	P	VCC

Connector No.	Color Of Wire	Signal Name [Specification]
F84	GR	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	POWER SUPPLY
2	W	CVT(ECM)

Connector No.	Color Of Wire	Signal Name [Specification]
F85	GR	COMPRESSOR



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

Connector No.	Color Of Wire	Signal Name [Specification]
F86	GR	ENGINE COOLANT TEMPERATURE SENSOR 1



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	TV
2	B	GND-TV

Connector No.	Color Of Wire	Signal Name [Specification]
F87	GR	ENGINE OIL TEMPERATURE SENSOR



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

Connector No.	Color Of Wire	Signal Name [Specification]
F88	GR	CRANKSHAFT POSITION SENSOR



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

Connector No.	Color Of Wire	Signal Name [Specification]
F89	GR	ENGINE OIL PRESSURE CONTROL SOLENOID VALVE



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

Connector No.	Color Of Wire	Signal Name [Specification]
F90	GR	TURBOCHARGER ROOST SENSOR (BANK 1)



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

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










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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

<table border="1"> <tr><td>Connector No.</td><td>F91</td></tr> <tr><td>Connector Name</td><td>TURBOCHARGER BOOST SENSOR (BANK 2)</td></tr> <tr><td>Connector Type</td><td>RH04FB</td></tr> </table>  	Connector No.	F91	Connector Name	TURBOCHARGER BOOST SENSOR (BANK 2)	Connector Type	RH04FB	<table border="1"> <tr><td>Terminal No.</td><td>Color Of Wire</td><td>Signal Name [Specification]</td></tr> <tr><td>1</td><td>L</td><td>-</td></tr> <tr><td>2</td><td>L</td><td>-</td></tr> <tr><td>3</td><td>W</td><td>-</td></tr> <tr><td>4</td><td>R</td><td>-</td></tr> </table>	Terminal No.	Color Of Wire	Signal Name [Specification]	1	L	-	2	L	-	3	W	-	4	R	-
Connector No.	F91																					
Connector Name	TURBOCHARGER BOOST SENSOR (BANK 2)																					
Connector Type	RH04FB																					
Terminal No.	Color Of Wire	Signal Name [Specification]																				
1	L	-																				
2	L	-																				
3	W	-																				
4	R	-																				
<table border="1"> <tr><td>Connector No.</td><td>F92</td></tr> <tr><td>Connector Name</td><td>HEATED OXYGEN SENSOR 2 (BANK 1)</td></tr> <tr><td>Connector Type</td><td>RH04FDGYP</td></tr> </table>  	Connector No.	F92	Connector Name	HEATED OXYGEN SENSOR 2 (BANK 1)	Connector Type	RH04FDGYP	<table border="1"> <tr><td>Terminal No.</td><td>Color Of Wire</td><td>Signal Name [Specification]</td></tr> <tr><td>1</td><td>Y</td><td>-</td></tr> <tr><td>2</td><td>L</td><td>-</td></tr> <tr><td>3</td><td>W</td><td>-</td></tr> <tr><td>4</td><td>R</td><td>-</td></tr> </table>	Terminal No.	Color Of Wire	Signal Name [Specification]	1	Y	-	2	L	-	3	W	-	4	R	-
Connector No.	F92																					
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 1)																					
Connector Type	RH04FDGYP																					
Terminal No.	Color Of Wire	Signal Name [Specification]																				
1	Y	-																				
2	L	-																				
3	W	-																				
4	R	-																				
<table border="1"> <tr><td>Connector No.</td><td>F93</td></tr> <tr><td>Connector Name</td><td>HEATED OXYGEN SENSOR 2 (BANK 2)</td></tr> <tr><td>Connector Type</td><td>RH04FDGYP</td></tr> </table>  	Connector No.	F93	Connector Name	HEATED OXYGEN SENSOR 2 (BANK 2)	Connector Type	RH04FDGYP	<table border="1"> <tr><td>Terminal No.</td><td>Color Of Wire</td><td>Signal Name [Specification]</td></tr> <tr><td>1</td><td>Y</td><td>-</td></tr> <tr><td>2</td><td>SB</td><td>-</td></tr> <tr><td>3</td><td>L</td><td>-</td></tr> <tr><td>4</td><td>R</td><td>-</td></tr> </table>	Terminal No.	Color Of Wire	Signal Name [Specification]	1	Y	-	2	SB	-	3	L	-	4	R	-
Connector No.	F93																					
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 2)																					
Connector Type	RH04FDGYP																					
Terminal No.	Color Of Wire	Signal Name [Specification]																				
1	Y	-																				
2	SB	-																				
3	L	-																				
4	R	-																				
<table border="1"> <tr><td>Connector No.</td><td>F94</td></tr> <tr><td>Connector Name</td><td>EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)</td></tr> <tr><td>Connector Type</td><td>E02FG-RS</td></tr> </table>  	Connector No.	F94	Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)	Connector Type	E02FG-RS	<table border="1"> <tr><td>Terminal No.</td><td>Color Of Wire</td><td>Signal Name [Specification]</td></tr> <tr><td>1</td><td>R</td><td>-</td></tr> <tr><td>2</td><td>G</td><td>-</td></tr> </table>	Terminal No.	Color Of Wire	Signal Name [Specification]	1	R	-	2	G	-						
Connector No.	F94																					
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)																					
Connector Type	E02FG-RS																					
Terminal No.	Color Of Wire	Signal Name [Specification]																				
1	R	-																				
2	G	-																				
<table border="1"> <tr><td>Connector No.</td><td>F95</td></tr> <tr><td>Connector Name</td><td>EXHAUST GAS TEMPERATURE SENSOR (BANK 1)</td></tr> <tr><td>Connector Type</td><td>HS02MW-1V</td></tr> </table>  	Connector No.	F95	Connector Name	EXHAUST GAS TEMPERATURE SENSOR (BANK 1)	Connector Type	HS02MW-1V	<table border="1"> <tr><td>Terminal No.</td><td>Color Of Wire</td><td>Signal Name [Specification]</td></tr> <tr><td>1</td><td>LG</td><td>-</td></tr> <tr><td>2</td><td>B</td><td>-</td></tr> </table>	Terminal No.	Color Of Wire	Signal Name [Specification]	1	LG	-	2	B	-						
Connector No.	F95																					
Connector Name	EXHAUST GAS TEMPERATURE SENSOR (BANK 1)																					
Connector Type	HS02MW-1V																					
Terminal No.	Color Of Wire	Signal Name [Specification]																				
1	LG	-																				
2	B	-																				
<table border="1"> <tr><td>Connector No.</td><td>F96</td></tr> <tr><td>Connector Name</td><td>EXHAUST GAS TEMPERATURE SENSOR (BANK 2)</td></tr> <tr><td>Connector Type</td><td>HS02MW-1V</td></tr> </table>  	Connector No.	F96	Connector Name	EXHAUST GAS TEMPERATURE SENSOR (BANK 2)	Connector Type	HS02MW-1V	<table border="1"> <tr><td>Terminal No.</td><td>Color Of Wire</td><td>Signal Name [Specification]</td></tr> <tr><td>1</td><td>SB</td><td>-</td></tr> <tr><td>2</td><td>B</td><td>-</td></tr> </table>	Terminal No.	Color Of Wire	Signal Name [Specification]	1	SB	-	2	B	-						
Connector No.	F96																					
Connector Name	EXHAUST GAS TEMPERATURE SENSOR (BANK 2)																					
Connector Type	HS02MW-1V																					
Terminal No.	Color Of Wire	Signal Name [Specification]																				
1	SB	-																				
2	B	-																				
<table border="1"> <tr><td>Connector No.</td><td>F97</td></tr> <tr><td>Connector Name</td><td>INTAKE CAMSHAFT POSITION SENSOR (BANK 2)</td></tr> <tr><td>Connector Type</td><td>RH03FB</td></tr> </table>  	Connector No.	F97	Connector Name	INTAKE CAMSHAFT POSITION SENSOR (BANK 2)	Connector Type	RH03FB	<table border="1"> <tr><td>Terminal No.</td><td>Color Of Wire</td><td>Signal Name [Specification]</td></tr> <tr><td>1</td><td>W</td><td>-</td></tr> <tr><td>2</td><td>G</td><td>-</td></tr> <tr><td>3</td><td>L</td><td>-</td></tr> </table>	Terminal No.	Color Of Wire	Signal Name [Specification]	1	W	-	2	G	-	3	L	-			
Connector No.	F97																					
Connector Name	INTAKE CAMSHAFT POSITION SENSOR (BANK 2)																					
Connector Type	RH03FB																					
Terminal No.	Color Of Wire	Signal Name [Specification]																				
1	W	-																				
2	G	-																				
3	L	-																				
<table border="1"> <tr><td>Connector No.</td><td>F98</td></tr> <tr><td>Connector Name</td><td>MASS AIR FLOW SENSOR (BANK 2)</td></tr> <tr><td>Connector Type</td><td>RH04FB</td></tr> </table>  	Connector No.	F98	Connector Name	MASS AIR FLOW SENSOR (BANK 2)	Connector Type	RH04FB	<table border="1"> <tr><td>Terminal No.</td><td>Color Of Wire</td><td>Signal Name [Specification]</td></tr> <tr><td>1</td><td>G</td><td>-</td></tr> <tr><td>2</td><td>GR</td><td>-</td></tr> <tr><td>3</td><td>BR</td><td>-</td></tr> </table>	Terminal No.	Color Of Wire	Signal Name [Specification]	1	G	-	2	GR	-	3	BR	-			
Connector No.	F98																					
Connector Name	MASS AIR FLOW SENSOR (BANK 2)																					
Connector Type	RH04FB																					
Terminal No.	Color Of Wire	Signal Name [Specification]																				
1	G	-																				
2	GR	-																				
3	BR	-																				

JRBWD9513GB

ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

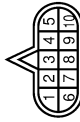
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F99
Connector Name	MASS AIR FLOW SENSOR (BANK 1)
Connector Type	RH04FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	Y	-
3	LG	-
4	P	-

Connector No.	F100
Connector Name	TCM
Connector Type	SPT0FG



Terminal No.	Color Of Wire	Signal Name [Specification]
1	-	IGNITION POWER SUPPLY
2	-	BATTERY POWER SUPPLY (MEMORY BACK-UP)
3	-	CAN+
4	-	CAN-
5	-	GROUND
6	-	IGNITION POWER SUPPLY
7	-	BACK-UP LAMP RELAY
8	-	CANL
9	-	STARTER RELAY
10	-	GROUND

Connector No.	F101
Connector Name	(MUST COMBINE POSITION SENSOR (BANK 1))
Connector Type	RH03FB



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

Connector No.	F102
Connector Name	MANIFOLD ABSOLUTE PRESSURE SENSOR
Connector Type	RH04FB



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

Connector No.	F104
Connector Name	(MUST COMBINE POSITION SENSOR (BANK 2))
Connector Type	RH03FB



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

Connector No.	F105
Connector Name	WIRE TO WIRE
Connector Type	RS04FL



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

Connector No.	F106
Connector Name	WIRE TO WIRE
Connector Type	RS08FB-PR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
3	GR	-
4	GR	-
6	B	-
8	B	-

Connector No.	F107
Connector Name	WIRE TO WIRE
Connector Type	RH08FB



Terminal No.	Color Of Wire	Signal Name [Specification]
2	LG	-
3	W	-
4	BR	-
5	L	-
7	R	-
8	Y	-

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

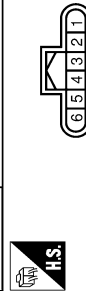
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F108
Connector Name	WIRE TO WIRE
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	BG	-
3	LG	-
4	G	-
6	P	-

Connector No.	F109
Connector Name	WIRE TO WIRE
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	L	-
3	P	-
4	V	-
5	SB	-
6	GR	-

Connector No.	F110
Connector Name	WIRE TO WIRE
Connector Type	RH12FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	Y	-
3	SB	-
5	BR	- [With VR30 engine and with ISS]
7	P	- [Except with VR30 engine and with ISS]
8	V	-
9	W	-
10	BR	-
11	GR	- [With VR30 engine and with ISS]
11	V	- [Except with VR30 engine and with ISS]

Connector No.	F111
Connector Name	WIRE TO WIRE
Connector Type	E03FGY-RS



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

Connector No.	F112
Connector Name	WIRE TO WIRE
Connector Type	E03FGY-RS



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

Connector No.	F113
Connector Name	WIRE TO WIRE
Connector Type	E03FGY-RS



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

Connector No.	F114
Connector Name	WIRE TO WIRE
Connector Type	E03FGY-RS



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

Connector No.	F115
Connector Name	WIRE TO WIRE
Connector Type	E03FGY-RS



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

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F116
Connector Name	IGNITION COIL NO. 6 (WITH POWER TRANSFORMER)
Connector Type	ED3FGYHS



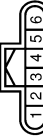
Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	BR	-
3	BG	-

Connector No.	F117
Connector Name	MULTI-WAY CONTROL VALVE
Connector Type	ED5FGYHS



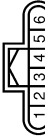
Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	G	-
3	GR	-
4	LG	-
5	L	-

Connector No.	F118
Connector Name	ELECTRIC FIBRE/TEL CONTROL ACTUATOR (BANK 1)
Connector Type	RH06FB



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

Connector No.	F119
Connector Name	ELECTRIC FIBRE/TEL CONTROL ACTUATOR (BANK 2)
Connector Type	RH06FB



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

Connector No.	F120
Connector Name	HIGH PRESSURE FUEL PUMP
Connector Type	HS02FGYVR



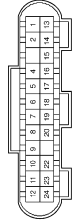
Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	R	-

Connector No.	F121
Connector Name	JOINT CONNECTOR-F01
Connector Type	SAA24FB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
4	R	-
5	BG	-
8	B	-
9	B	-
11	R	-
12	R	-
13	BG	-
14	BG	-
15	BG	-
16	L	-
17	L	-
18	V	-
22	P	-
23	P	-
24	P	-

Connector No.	F122
Connector Name	JOINT CONNECTOR-F02
Connector Type	SAA24FB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	LG	-
4	B	-
5	B	-
6	SHIELD	-
7	SHIELD	-
8	SHIELD	-
9	SHIELD	-
10	SHIELD	-
11	SHIELD	-
12	SHIELD	-
13	GR	-
14	GR	-
15	GR	-
16	W	-
17	GR	-
18	SHIELD	-
19	B	-
20	SHIELD	-
22	B	-
23	SHIELD	-
24	SHIELD	-

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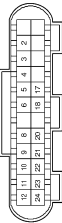
ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

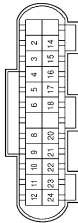
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F123
Connector Name	JOINT CONNECTOR-F03
Connector Type	SAAZ4FB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
3	V	-
4	G	-
5	G	-
6	G	-
8	L	-
9	BG	- [Color of wire differs depending on production]
9	L	- [Color of wire differs depending on production]
10	W	-
11	W	-
12	W	-
17	Y	-
18	Y	-
20	W	-
21	W	-
22	R	-
23	R	-
24	R	-

Connector No.	F124
Connector Name	JOINT CONNECTOR-F04
Connector Type	SAAZ4FB-J



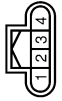
Terminal No.	Color Of Wire	Signal Name [Specification]
2	G	-
3	G	-
4	BR	-
5	BR	-
6	BR	-
8	SB	-
9	SB	-
10	GR	-
11	GR	-
12	GR	-
14	L	-
15	Y	-
16	R	-
17	R	-
18	R	-
20	W	-
21	W	-
22	BG	-
23	BG	-
24	R	-

Connector No.	F125
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 1)
Connector Type	RH04FB-P-BR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	POWER SUPPLY
2	L	HEATER-SENSOR-
3	W	SENSOR-
4	R	SENSOR-

Connector No.	F126
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 2)
Connector Type	RH04FB-P-BR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	POWER SUPPLY
2	SB	HEATER-SENSOR+
3	L	SENSOR+
4	R	SENSOR-

Connector No.	F131
Connector Name	WIRE TO WIRE
Connector Type	X04MGY



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

Connector No.	F132
Connector Name	WIRE TO WIRE
Connector Type	X04MGY



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

Connector No.	F133
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)
Connector Type	RH04FB



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

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ENGINE CONTROL SYSTEM

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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F134
Connector Name	AIR FUEL RATIO (AF) SENSOR (BANK 2)
Connector Type	RH03FB



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

Connector No.	F135
Connector Name	INTAKE CAM SHAFT POSITION SENSOR (BANK 1)
Connector Type	RH03FB



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

Connector No.	F136
Connector Name	LOW COMPRESSION VOLUME CONTROL VALVE
Connector Type	E02FLRS



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

Connector No.	F137
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	RH03FB



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

Connector No.	F138
Connector Name	ELECTRICAL WATERGATE CONTROL ACTUATOR (BANK 2)
Connector Type	SGZ06FGY-S



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	P	-
3	R	-
4	L	- [Color of wire differs depending on production]
4	LG	- [Color of wire differs depending on production]
6	G	-

Connector No.	F139
Connector Name	ELECTRICAL WATERGATE CONTROL ACTUATOR (BANK 1)
Connector Type	SGZ06FGY-S



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

Connector No.	F140
Connector Name	TURBOCHARGER SPEED SENSOR (BANK 2)
Connector Type	E04FGY-AS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	- [With VR30 HI output engine]
2	W	- [With VR30 HI output engine]
3	B	- [With VR30 HI output engine]

Connector No.	F141
Connector Name	TURBOCHARGER SPEED SENSOR (BANK 1)
Connector Type	E04FGY-AS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [With VR30 HI output engine]
2	Y	- [With VR30 HI output engine]
3	L	- [With VR30 HI output engine]

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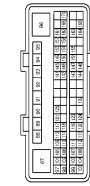
ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

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ENGINE CONTROL SYSTEM (VR ENGINE)

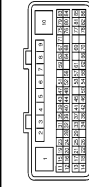
Connector No.	F142
Connector Name	ECM
Connector Type	RH76FCY-R28-FHYZ-RH



Terminal No.	Color Of Wire	Signal Name [Specification]
87	B	ECM GROUND
88	B	ECM GROUND
89	L	ECM GROUND
90	G	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (1) (BANK 2)
91	BG	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (1) (BANK 2)
92	L	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (1) (BANK 2)
93	R	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (1) (BANK 2)
94	W	A/F SENSOR 1 HEATER (BANK 1)
95	GR	ECM GROUND
96	R	THROTTLE CONTROL MOTOR POWER SUPPLY
97	GR	SENSOR GROUND
98	Y	HEATED OXYGEN SENSOR 2 (BANK 2)
99	R	SENSOR GROUND
100	P	SENSOR GROUND
101	L	A/F SENSOR 1 (BANK 1)
102	P	A/F SENSOR 1 (BANK 1)
103	B	A/F SENSOR SHIELD
104	SB	SENSOR GROUND (THROTTLE POSITION SENSOR) (BANK 2)
105	BR	SENSOR POWER SUPPLY (THROTTLE POSITION SENSOR) (BANK 2)
106	P	THROTTLE POSITION SENSOR (BANK 2)
107	LG	A/F SENSOR 1 (BANK 2)
108	R	SENSOR POWER SUPPLY
109	G	SENSOR POWER SUPPLY
110	W	HEATED OXYGEN SENSOR 2 (BANK 1)
111	V	A/F SENSOR 1 (BANK 2)
112	LG	THROTTLE POSITION SENSOR 2 (BANK 2)
113	V	MANIFOLD ABSOLUTE PRESSURE SENSOR
114	G	SENSOR GROUND
116	L	SENSOR GROUND
117	LG	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1
118	BG	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2
119	Y	TURBOCHARGER SPEED SENSOR (BANK 1)
120	W	TURBOCHARGER SPEED SENSOR (BANK 2)
121	V	PNP SIGNAL
123	BG	THROTTLE MOTOR RELAY

124	R	FUEL PUMP RELAY
125	P	ECM RELAY (SELF SHUT-OFF)
132	B	SENSOR GROUND
141	R	MULTI-WAY CONTROL VALVE MOTOR (1)
142	L	ENGINE OIL PRESSURE CONTROL SOLENOID VALVE
143	G	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1
144	BG	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2
145	BG	MULTI-WAY CONTROL VALVE POWER SUPPLY
146	G	MULTI-WAY CONTROL VALVE MOTOR (1)
147	W	THROTTLE CONTROL VALVE (BANK 2)
148	GR	THROTTLE CONTROL MOTOR (1) (BANK 2)
149	G	THROTTLE CONTROL MOTOR (1) (BANK 1)
150	GR	THROTTLE CONTROL MOTOR (1) (BANK 1)
151	BR	A/F SENSOR 1 HEATER (BANK 2)
153	L	IGNITION SIGNAL No. 3
154	GR	IGNITION SIGNAL No. 6
155	GR	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
157	W	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)
158	G	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)
161	Y	IGNITION SIGNAL No. 1
162	GR	IGNITION SIGNAL No. 4
163	SB	HEATED OXYGEN SENSOR HEATER 2 (BANK 2)
164	G	IGNITION SIGNAL No. 2
166	L	HEATED OXYGEN SENSOR HEATER 2 (BANK 1)
168	V	IGNITION SIGNAL No. 5
170	P	POWER SUPPLY FOR ECM

Connector No.	F143
Connector Name	ECM
Connector Type	RH76FBR-R28-FHYZ-RH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	HIGH PRESSURE FUEL PUMP POWER SUPPLY
2	GR	ECM GROUND
3	G	FUEL INJECTOR DRIVER POWER SUPPLY A1
4	L	FUEL INJECTOR DRIVER POWER SUPPLY A2
5	LG	FUEL INJECTOR DRIVER POWER SUPPLY B1
6	V	FUEL INJECTOR DRIVER POWER SUPPLY B2
7	BG	ECM GROUND
8	W	KNOCK SENSOR (BANK 1)

9	R	HIGH PRESSURE FUEL PUMP (LO)
10	B	HIGH PRESSURE FUEL PUMP (HI)
11	BR	FUEL INJECTOR No. 3 (HI)
12	W	FUEL INJECTOR No. 3 (HI)
13	LG	FUEL INJECTOR No. 5 (HI)
14	R	FUEL INJECTOR No. 3 (LO)
15	GR	FUEL INJECTOR No. 2 (HI)
16	V	FUEL INJECTOR No. 4 (HI)
17	Y	FUEL INJECTOR No. 1 (LO)
18	L	FUEL INJECTOR No. 5 (LO)
19	L	FUEL INJECTOR No. 6 (HI)
20	SB	FUEL INJECTOR No. 2 (LO)
21	P	FUEL INJECTOR No. 4 (LO)
22	W	FUEL INJECTOR No. 6 (LO)
23	GR	SENSOR GROUND (TURBOCHARGER BOOST SENSOR) (BANK 2)
24	W	SENSOR GROUND (ENGINE OIL PRESSURE SENSOR)
25	Y	SENSOR POWER SUPPLY (CAMSHAFT POSITION SENSOR) (BANK 2)
26	SB	INTAKE CAMSHAFT POSITION SENSOR (BANK 2)
28	Y	SENSOR GROUND (CAMSHAFT POSITION SENSOR) (BANK 1)
29	BR	CRANKSHAFT POSITION SENSOR
31	W	SENSOR GROUND (TURBOCHARGER BOOST SENSOR) (BANK 1)
32	G	EXHAUST CAMSHAFT POSITION SENSOR (BANK 1)
33	G	EXHAUST CAMSHAFT POSITION SENSOR (BANK 2)
34	R	SENSOR POWER SUPPLY (CAMSHAFT POSITION SENSOR) (BANK 1)
35	G	SENSOR POWER SUPPLY (CAMSHAFT POSITION SENSOR) (BANK 2)
36	GR	SENSOR POWER SUPPLY (CAMSHAFT POSITION SENSOR) (BANK 1)
37	Y	SENSOR POWER SUPPLY (CAMSHAFT POSITION SENSOR) (BANK 2)
38	L	SENSOR POWER SUPPLY (MULTI-WAY CONTROL VALVE MOTOR)
39	BG	SENSOR POWER SUPPLY (ELECTRIC WASTEGATE CONTROL ACTUATOR)
40	P	INTAKE AIR TEMPERATURE SENSOR 1 (BANK 1)
41	R	MASS AIR FLOW SENSOR (BANK 1)
42	LG	SENSOR GROUND (MASS AIR FLOW SENSOR)
43	W	THROTTLE POSITION SENSOR (BANK 1)
44	R	SENSOR GROUND (ELECTRIC WASTEGATE CONTROL ACTUATOR) (BANK 1)
45	L	SENSOR GROUND (ELECTRIC WASTEGATE CONTROL ACTUATOR) (BANK 2)
46	G	MASS AIR FLOW SENSOR (BANK 2)
47	SB	EXHAUST GAS TEMPERATURE SENSOR (BANK 2)
48	B	THROTTLE POSITION SENSOR 2 (BANK 1)
50	BR	ENGINE OIL TEMPERATURE SENSOR
51	BP	ENGINE OIL PRESSURE SENSOR
52	R	BATTERY CURRENT SENSOR
53	V	FUEL RAIL PRESSURE SENSOR
54	SB	BATTERY TEMPERATURE SENSOR
56	Y	ENGINE COOLANT TEMPERATURE SENSOR 1
57	W	ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)
58	W	TURBOCHARGER BOOST SENSOR (BANK 1)
59	V	CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR
61	W	ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)
62	R	INTAKE AIR TEMPERATURE SENSOR 2 (BANK 2)
63	L	TURBOCHARGER BOOST SENSOR (BANK 2)

64	W	INTAKE AIR TEMPERATURE SENSOR 2 (BANK 2)
65	P	SENSOR GROUND (ELECTRIC WASTEGATE CONTROL ACTUATOR) (BANK 2)
67	LG	EXHAUST GAS TEMPERATURE SENSOR (BANK 1)
68	R	SENSOR GROUND
69	LG	MULTI-WAY CONTROL VALVE POSITION SENSOR
70	V	REFRIGERANT PRESSURE SENSOR
71	W	ENGINE COOLANT TEMPERATURE SENSOR 2
75	V	EXHAUST CAMSHAFT POSITION SENSOR (BANK 2)
76	GR	SENSOR POWER SUPPLY (MASS AIR FLOW SENSOR) (BANK 2)
77	BG	SENSOR GROUND (MASS AIR FLOW SENSOR) (BANK 2)
77	L	SENSOR GROUND (TURBOCHARGER BOOST SENSOR) (BANK 1)
78	SB	SENSOR GROUND (TURBOCHARGER BOOST SENSOR) (BANK 2)
79	BR	SENSOR GROUND (MASS AIR FLOW SENSOR) (BANK 2)
80	P	SENSOR POWER SUPPLY (FUEL RAIL PRESSURE SENSOR)
81	Y	SENSOR POWER SUPPLY
82	G	SENSOR GROUND
83	Y	SENSOR GROUND (FUEL RAIL PRESSURE SENSOR)
84	B	SENSOR GROUND (KNOCK SENSOR)
85	W	SENSOR POWER SUPPLY (CAMSHAFT POSITION SENSOR) (BANK 2)
86	W	KNOCK SENSOR (BANK 2)

Connector No.	F144
Connector Name	ELECTRIC IN-VALVE TIMING CONTROL MOTOR (BANK 1)
Connector Type	PH03BF



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

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ENGINE CONTROL SYSTEM

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Connector No.	F145
Connector Name	ELECTRIC INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 2)
Connector Type	PHY03FB



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

Connector No.	F146
Connector Name	ELECTRIC INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 1)
Connector Type	PEB06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
4	Y	-
5	G	-
6	W	-
7	R	-
8	B	-
9	BG	-

Connector No.	F147
Connector Name	ELECTRIC INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 2)
Connector Type	PEB06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
4	GR	-
5	LG	-
6	L	-
7	BR	-
8	V	-
9	P	-

Connector No.	F200
Connector Name	WIRE TO WIRE
Connector Type	RSD4ML



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

Connector No.	F201
Connector Name	KNOCK SENSOR (BANK 1)
Connector Type	ED2FG4S



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

Connector No.	F202
Connector Name	KNOCK SENSOR (BANK 2)
Connector Type	ED2FG4S



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

Connector No.	F203
Connector Name	WIRE TO WIRE
Connector Type	RH08MB



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

Connector No.	F204
Connector Name	WIRE TO WIRE
Connector Type	RH08MB



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

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JRBWD9520GB

ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F205
Connector Name	FUEL INJECTOR No. 1
Connector Type	H502FGY



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

Connector No.	F206
Connector Name	FUEL INJECTOR No. 2
Connector Type	H502FGY



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

Connector No.	F207
Connector Name	FUEL INJECTOR No. 3
Connector Type	H502FGY



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

Connector No.	F208
Connector Name	FUEL INJECTOR No. 4
Connector Type	H502FGY



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

Connector No.	F209
Connector Name	FUEL INJECTOR No. 5
Connector Type	H502FGY



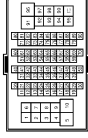
Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	W	-

Connector No.	F210
Connector Name	FUEL INJECTOR No. 6
Connector Type	H502FGY



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

Connector No.	M22
Connector Name	WIRE TO WIRE
Connector Type	TH80MMV-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	L	- [With VR30 engine]
3	BR	- [With 2.0L turbo gasoline engine]
3	R	- [With VR30 engine]
4	SHIELD	- [With 2.0L turbo gasoline engine]
4	Y	- [With VR30 engine]
5	G	- [With 2.0L turbo gasoline engine]
5	V	- [With 2.0L turbo gasoline engine]
6	BG	- [With VR30 engine]
6	BR	- [With 2.0L turbo gasoline engine]
7	LG	- [With VR30 engine]
7	P	- [With 2.0L turbo gasoline engine]
8	G	- [With 2.0L turbo gasoline engine]
8	P	- [With VR30 engine]
9	LG	- [With 2.0L turbo gasoline engine]
9	SHIELD	- [With VR30 engine]
10	V	-
11	GR	-
12	V	-
13	LG	-
14	LG	-
15	BR	- [With 2.0L turbo gasoline engine]
15	P	- [With VR30 engine]
16	SB	- [With VR30 engine]
16	V	- [Without DCM]
17	Y	-
18	L	-
19	G	-
20	GR	-
21	R	-
22	V	-
23	L	-
24	BG	- [With 2.0L turbo gasoline engine]
24	V	- [With VR30 engine]
25	L	- [With 2.0L turbo gasoline engine]

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

25	SB	- [With VR30 engine]
26	G	- [With VR30 engine]
26	W	- [With 2.0L turbo gasoline engine]
27	R	-
29	LG	- [With VR30 engine]
30	SB	- [With VR30 engine]
30	W	- [With 2.0L turbo gasoline engine]
31	SHIELD	-
32	L	-
33	B	- [With VR30 engine]
33	LG	- [With 2.0L turbo gasoline engine]
34	SHIELD	-
35	LG	- [With VR30 engine]
35	W	- [With 2.0L turbo gasoline engine]
36	R	- [With VR30 engine]
36	V	- [With 2.0L turbo gasoline engine]
37	R	- [With VR30 engine]
37	V	- [With 2.0L turbo gasoline engine]
38	W	-
39	P	- [With VR30 engine and without BOSE system]
39	R	- [With 2.0L turbo gasoline engine]
39	V	- [With VR30 engine and with BOSE system]
40	G	-
41	L	-
42	R	-
43	SHIELD	-
44	P	-
45	B	- [With 2.0L turbo gasoline engine]
45	G	- [With VR30 engine]
46	SHIELD	-
47	G	-
48	BG	- [Except with VR30 engine and with BOSE system]
48	BR	- [With VR30 engine and with BOSE system]
49	G	-
50	V	-
51	L	-
52	Y	- [With 2.0L turbo gasoline engine]
53	R	- [With VR30 engine]
54	GR	-
55	L	-
56	P	-
57	R	-
58	LG	-
59	SB	-
61	L	-
62	P	- [With 2.0L turbo gasoline engine]
62	V	- [With VR30 engine]
63	L	-
64	W	-

66	R	-
68	L	-
69	P	- [With 2.0L turbo gasoline engine]
71	GR	- [With VR30 engine]
71	R	- [With VR30 engine]
72	G	- [With VR30 engine]
72	V	- [With 2.0L turbo gasoline engine]
73	LG	- [With 2.0L turbo gasoline engine]
73	SHIELD	- [With VR30 engine]
74	LC	- [With VR30 engine]
74	LG	- [With 2.0L turbo gasoline engine]
75	P	-
76	SB	- [With 2.0L turbo gasoline engine]
76	V	- [With VR30 engine]
77	Y	-
78	L	-
79	G	-
80	GR	- [With 2.0L turbo gasoline engine]
80	W	- [With VR30 engine]
81	B	- [With VR30 engine]
81	R	- [With 2.0L turbo gasoline engine]
82	G	- [With 2.0L turbo gasoline engine]
82	SHIELD	- [With VR30 engine]
83	R	- [With 2.0L turbo gasoline engine]
83	W	- [With VR30 engine]
84	BR	- [With VR30 engine]
84	SHIELD	- [With 2.0L turbo gasoline engine]
85	BR	- [With VR30 engine]
85	G	- [With 2.0L turbo gasoline engine]
86	V	- [With VR30 engine]
86	LG	- [With VR30 engine]
87	SHIELD	- [With 2.0L turbo gasoline engine]
89	BR	- [With VR30 engine]
89	LG	- [With 2.0L turbo gasoline engine]
90	SB	- [With 2.0L turbo gasoline engine]
90	V	- [With VR30 engine]
92	L	- [With 2.0L turbo gasoline engine]
92	W	- [With VR30 engine]
93	R	- [With VR30 engine]
93	SHIELD	- [With 2.0L turbo gasoline engine]
94	R	-
95	L	- [With 2.0L turbo gasoline engine]
95	Y	- [With VR30 engine]
96	R	- [With 2.0L turbo gasoline engine]
96	W	- [With VR30 engine]
97	L	- [With VR30 engine]
97	R	- [With 2.0L turbo gasoline engine]
98	BR	-
99	BR	- [With VR30 engine and with BOSE system]

99	P	- [With 2.0L turbo gasoline engine]
99	Y	- [With VR30 engine and without BOSE system]
100	BR	- [With VR30 engine]
100	W	- [With 2.0L turbo gasoline engine]

Connector No.	M25
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW



Terminal No.	Color Of Wire	Signal Name [Specification]
3	LG	M_CAN_L
4	B	EARTH
5	B	EARTH
6	L	CAN-H
7	V	KLINE [With 2.0L turbo gasoline engine]
7	W	KLINE [With VR30 engine]
8	W	IGM_SW
11	SB	M_CAN_H
12	R	CAN-L
13	L	CAN-H
14	P	CAN-L
16	W	POWER

Connector No.	M39
Connector Name	WIRE TO WIRE
Connector Type	TH22FW-4H



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W/B	-
2	SB	-
3	L	-
4	P	- [Without Gateways]
4	R	- [With Gateways]
5	BR	-
6	SB	-
7	L	-
8	W	-
9	P	- [Without BOSE system]
9	V	- [With BOSE system]
10	V	-
11	SB	-
12	G	-
13	R	-
15	R	-
16	SB	-
17	SHIELD	-
18	W	-
19	Y	-
20	L	-
21	G	-
22	R	-
23	BR	-
24	R	-
25	L	-
26	Y	-
27	LG	-
28	BR	-
29	W/B	-
30	Y	-
31	W	-
32	L	-
32	LG	- [With Anti-theft diode]
		- [Without Anti-theft diode]

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ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	M40
Connector Name	WIRE TO WIRE
Connector Type	TH80M/M-C516-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
6	W/B	-
7	V	-
8	BG	- [With VR30 engine]
8	BR	- [With 2.0L turbo gasoline engine]
9	LG	- [With VR30 engine]
9	P	- [With 2.0L turbo gasoline engine]
10	W	-
11	W	- [With VR30 engine]
11	Y	- [With 2.0L turbo gasoline engine]
12	B	- [With VR30 engine]
12	BR	- [With 2.0L turbo gasoline engine]
13	GR	- [With VR30 engine]
13	SHIELD	- [With 2.0L turbo gasoline engine]
14	B	-
15	BG	- [With 2.0L turbo gasoline engine]
15	SB	- [With VR30 engine]
16	B	- [With VR30 engine]
16	BR	- [With 2.0L turbo gasoline engine]
17	LG	-
18	B	- [With VR30 engine]
18	W/B	- [With 2.0L turbo gasoline engine]
19	Y	-
31	W	-
32	G	- [With 2.0L turbo gasoline engine]
32	V	- [With VR30 engine]
33	L	- [With VR30 engine]
33	Y	- [With 2.0L turbo gasoline engine]
34	P	-
35	BG	-
37	B	- [With VR30 engine]
37	L	- [With 2.0L turbo gasoline engine]
38	P	- [With VR30 engine]
38	L	- [With 2.0L turbo gasoline engine and without gateway]
38	R	- [With 2.0L turbo gasoline engine and with gateway]

39	R	- [With 2.0L turbo gasoline engine]
39	Y	- [With VR30 engine]
40	GR	-
41	L	-
44	BR	- [With 2.0L turbo gasoline engine]
45	L	- [With VR30 engine]
46	Y	- [With 2.0L turbo gasoline engine]
46	Y	- [With VR30 engine]
47	BG	- [With 2.0L turbo gasoline engine]
47	R	- [With VR30 engine]
48	SHIELD	-
49	B	- [With VR30 engine]
49	G	- [With 2.0L turbo gasoline engine]
50	B	- [With 2.0L turbo gasoline engine]
50	BR	- [With VR30 engine]
51	L	-
52	W	-
53	G	-
54	SB	- [With 2.0L turbo gasoline engine]
55	B	- [With VR30 engine]
55	P	- [With 2.0L turbo gasoline engine]
56	BG	- [With VR30 engine]
56	GR	- [With 2.0L turbo gasoline engine]
57	GR	- [With VR30 engine]
57	P	- [With 2.0L turbo gasoline engine]
58	B	-
59	SB	-
61	W/B	-
64	Y	-
65	R	- [Color of wire differs depending on production]
66	P	- [Color of wire differs depending on production]
67	LG	-
68	BG	-
69	L	-
70	R	-
71	V	- [With VR30 engine]
71	W	- [With 2.0L turbo gasoline engine]
72	L	- [With 2.0L turbo gasoline engine]
72	LG	- [With VR30 engine]
73	R	- [With VR30 engine]
73	W	- [With 2.0L turbo gasoline engine]
74	BR	- [With VR30 engine]
74	L	- [With 2.0L turbo gasoline engine]
75	B	- [With VR30 engine]
75	P	- [With 2.0L turbo gasoline engine and without gateway]
75	R	- [With 2.0L turbo gasoline engine and with gateway]
76	W/B	-

77	SB	-
78	G	- [With VR30 engine]
78	LG	- [With 2.0L turbo gasoline engine]
79	R	-
80	G	-
81	R	-
82	LG	- [With 2.0L turbo gasoline engine]
83	BR	- [With VR30 engine]
83	R	- [With 2.0L turbo gasoline engine]
84	V	-
86	V	-
87	G	-
89	V	-
90	G	- [With VR30 engine]
90	V	- [With 2.0L turbo gasoline engine]
91	W	-
92	G	-
93	BR	-
94	GR	- [With VR30 engine]
94	L	- [With 2.0L turbo gasoline engine]
95	BR	- [With VR30 engine]
95	P	- [With 2.0L turbo gasoline engine and without gateway]
95	R	- [With 2.0L turbo gasoline engine and with gateway]
96	W	-
97	LG	-
98	Y	-
99	BR	-
99	LG	- [With 2.0L turbo gasoline engine]
100	SHIELD	-

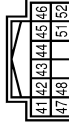
Connector No.	MS7
Connector Name	COMBINATION METER
Connector Type	TH40P/A-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
1	B	GROUND
6	GR	STOP/START OFF SWITCH INDICATOR SIGNAL
7	G	SECURITY SIGNAL
8	B	-
11	W	ALTERNATOR SIGNAL

12	G	LED HEADLAMP (RH) WARNING SIGNAL
13	BR	LED HEADLAMP (LH) WARNING SIGNAL
14	V	ACC POWER SUPPLY
16	V	AIR BAG SIGNAL
17	BR	METER CONTROL SWITCH GROUND
18	SB	TRIP/RESET SIGNAL
21	B	STEERING SWITCH SIGNAL GROUND
22	P	STEERING SWITCH SIGNAL A
23	W/B	STEERING SWITCH SIGNAL B
24	L	WASHER FLUID LEVEL SWITCH SIGNAL
26	LG	BRAKE FLUID LEVEL SWITCH SIGNAL
26	V	PARKING BRAKE SWITCH SIGNAL
27	G	PASSENGER SEAT BELT WARNING SIGNAL
28	W	SEAT BELT BUCKLE SWITCH SIGNAL (DRIVER SIDE)
30	G	MANUAL MODE SIGNAL [With 2.0L turbo gasoline engine]
30	SB	MANUAL MODE SIGNAL [With VR30 engine]
31	G	NON-MANUAL MODE SIGNAL [With VR30 engine]
31	L	NON-MANUAL MODE SIGNAL [With 2.0L turbo gasoline engine]
32	BG	MANUAL MODE SHIFT UP SIGNAL
33	GR	MANUAL MODE SHIFT DOWN SIGNAL [With VR30 engine]
33	P	MANUAL MODE SHIFT DOWN SIGNAL [With 2.0L turbo gasoline engine]
34	BG	PADDLE SHIFTER UP SWITCH SIGNAL
35	G	PADDLE SHIFTER DOWN SWITCH SIGNAL
36	V	ILLUMINATION CONTROL SWITCH SIGNAL (+)
37	GR	ILLUMINATION CONTROL SWITCH SIGNAL (-)
38	R	VEHICLE SPEED SIGNAL (R-PULSE)

Connector No.	M58
Connector Name	COMBINATION METER
Connector Type	TH12F/A-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
41	L	CAN-H
42	P	CAN-L
43	B	ILLUMINATION CONTROL SIGNAL
44	Y	FUEL LEVEL SENSOR GROUND
45	W	BATTERY POWER SUPPLY
46	BG	IGNITION SIGNAL [Except with VR30 engine and without IS]
46	R	IGNITION SIGNAL [With VR30 engine and without IS]
47	SB	AV COMMUNICATION SIGNAL (H)

ENGINE CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

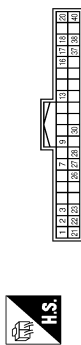
48	LG	AV COMMUNICATION SIGNAL (U)
51	BR	FUEL LEVEL SENSOR SIGNAL
52	B	GROUND

Connector No.	M87
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TR08FGY-1V



Terminal No.	Color Of Wire	Signal Name [Specification]
24	P	-
25	SB	-
31	W/B	-
32	Y	-
33	B	-

Connector No.	M88
Connector Name	A/C AUTO AMP.
Connector Type	TH40FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	CAN-H
2	B	GROUND
3	W	BATTERY POWER SUPPLY
7	G	AMBIENT SENSOR SIGNAL
9	R	SUNLOAD SENSOR SIGNAL
13	SB	ACC POWER SUPPLY [With 2.0L turbo gasoline engine]
13	V	ACC POWER SUPPLY [With VR30 engine]
16	P	LIN SIGNAL
17	R	DOOR MOTOR POWER SUPPLY
18	P	BLOWER MOTOR CONTROL SIGNAL

20	L	HEATED STEERING WHEEL RELAY CONTROL SIGNAL
21	P	CAN-L
22	B	GROUND
23	R	IGNITION POWER SUPPLY [With VR30 engine and with IS3]
23	W	IGNITION POWER SUPPLY [With VR30 engine and with IS1]
26	B	SENSOR GROUND
27	LG	IN-VEHICLE SENSOR SIGNAL
28	BR	INTAKE SENSOR SIGNAL
30	BG	EXHAUST GAS/CUTTERS COLOR SELECTIVE SENSOR SIGNAL
32	B	GROUND
38	BG	IGNITER (D/W/GFT) CONTROL SIGNAL
40	BG	ECV CONTROL SIGNAL

Connector No.	M124
Connector Name	ACCELERATOR PEDAL ACTUATOR/ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH12FB



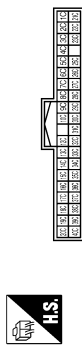
Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	BATTERY
2	G	IGNITION
3	L	ITS COMM-H
4	W	-
5	G	-
6	Y	-
7	B	GROUND
9	Y	ITS COMM-L
10	L	-
11	B	-
12	BR	-

Connector No.	M126
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH08FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	APS2_OUT
2	R	APS2_GND
3	Y	APS1_OUT
4	G	APS1_GND
5	W	APS1_IN
6	L	APS2_IN

Connector No.	M133
Connector Name	FUSE BLOCK (J/B)
Connector Type	TH40FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
10C	V	-
12C	L	-
13C	L	-
14C	Y	-
15C	R	-
17C	L	-
18C	BG	- [Without DRPO]
18C	P	- [With DRPO]
19C	B	-
1C	R	-
20C	W	-
21C	L	-
22C	L	-

23C	L	-
25C	LG	-
26C	SB	-
27C	P	-
28C	W	-
29C	W	-
30C	R	-
31C	W	-
31C	R	-
33C	B	- [With VR30 engine]
33C	R	- [With 2.0L turbo gasoline engine]
34C	W/B	-
35C	SB	-
36C	R	-
37C	W	-
38C	SB	-
39C	V	-
3C	P	-
40C	G	-
4C	P	-
5C	P	-
6C	G	-
7C	G	-
8C	G	-
9C	V	-

Connector No.	M157
Connector Name	WIRE TO WIRE
Connector Type	TH12FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	G	- [With VR30 engine]
2	L	- [With 2.0L turbo gasoline engine]
3	L	-
4	W	- [With VR30 engine]
4	Y	- [With 2.0L turbo gasoline engine]
5	BR	- [With 2.0L turbo gasoline engine]
5	G	- [With VR30 engine]

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ENGINE CONTROL SYSTEM

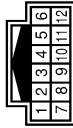
[VR30DDTT FOR USA AND CANADA]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

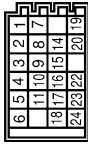
6	G	- [With 2.0L turbo gasoline engine]
6	Y	- [With VR30 engine]
7	B	-
9	Y	-
10	L	- [With VR30 engine]
10	R	- [With 2.0L turbo gasoline engine]
11	R	- [With 2.0L turbo gasoline engine]
11	R	- [With VR30 engine]
12	BR	- [With VR30 engine]
12	W	- [With 2.0L turbo gasoline engine]

Connector No.	M158
Connector Name	WIRE TO WIRE
Connector Type	TH12MW-NH



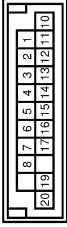
Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	G	-
3	L	-
4	W	-
5	G	-
6	Y	-
7	B	-
9	Y	-
10	L	-
11	R	-
12	BR	-

Connector No.	M171
Connector Name	JOINT CONNECTOR-M01
Connector Type	24342_4GA2A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	B	-
3	B	-
4	B	-
5	B	-
6	B	-
7	B	-
8	B	-
9	B	-
10	G	-
11	G	-
14	B	-
15	B	-
16	SB	- [With VR30 engine]
16	Y	- [With 2.0L turbo gasoline engine]
17	SB	- [With VR30 engine]
17	Y	- [With 2.0L turbo gasoline engine]
18	SB	- [With VR30 engine]
18	Y	- [With 2.0L turbo gasoline engine]
19	G	-
20	G	-
22	LG	- [With VR30 engine]
22	SB	- [With 2.0L turbo gasoline engine]
23	LG	- [With VR30 engine]
23	SB	- [With 2.0L turbo gasoline engine]
24	LG	- [With VR30 engine]
24	SB	- [With 2.0L turbo gasoline engine]

Connector No.	M175
Connector Name	JOINT CONNECTOR-M05
Connector Type	NH20FL-DC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	L	-
3	L	-
4	L	-
5	L	-
6	L	-
7	L	-
8	L	-
10	P	-
11	P	-
12	P	-
13	P	-
14	P	-
15	P	-
16	P	- [With VR30 engine]
16	R	- [With 2.0L turbo gasoline engine]
17	P	- [With VR30 engine]
17	R	- [With 2.0L turbo gasoline engine]
19	R	- [With VR30 engine and with ISS]
19	W	- [Except with VR30 engine and with ISS]
20	R	- [With VR30 engine and with ISS]
20	W	- [Except with VR30 engine and with ISS]

Connector No.	M301
Connector Name	COMBINATION SWITCH (SPKAL CABLE)
Connector Type	TK08FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
13	L	-
14	L	-
15	L	-
16	L	-
17	L	-
18	L	-
19	L	-
20	L	-

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DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

BASIC INSPECTION

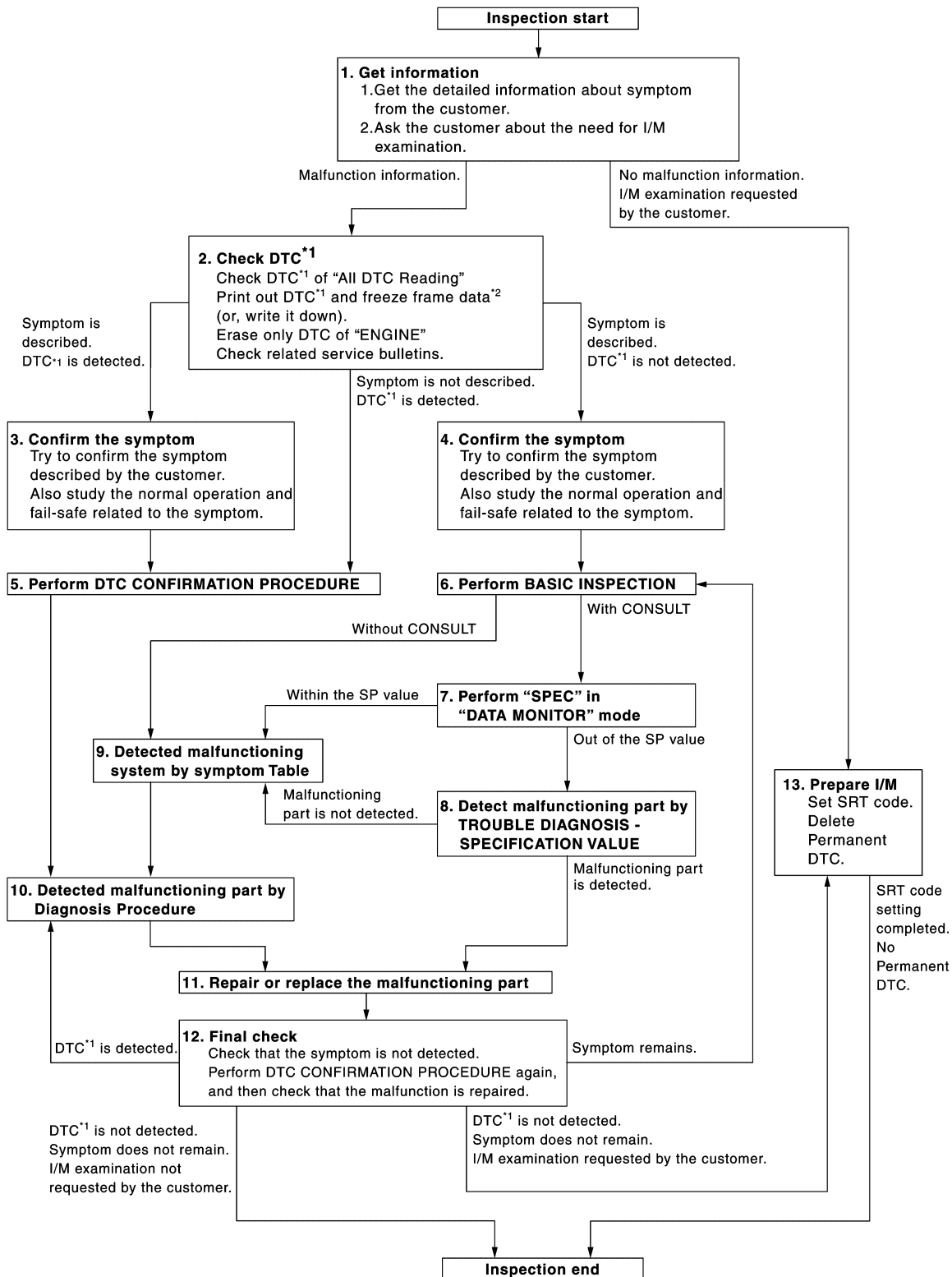
DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000013591464

EC6

OVERALL SEQUENCE



JSBIA0123GB

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

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*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

1. GET INFORMATION FOR SYMPTOM

1. Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to [EC6-260, "Diagnostic Work Sheet"](#).)
2. Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.

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

2. CHECK DTC

With CONSULT

1. Check DTC of "All DTC Reading".
2. 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". Refer to "How to Erase DTC and 1st Trip DTC" in [EC6-115, "CONSULT Function"](#).
 - Turn ignition switch OFF.
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to [EC6-1002, "Symptom Table"](#).)
3. Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

Symptom is described, DTC is detected>>GO TO 3.

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

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

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

Also study the normal operation and fail-safe related to the symptom. Refer to [EC6-1008, "Description"](#) and [EC6-157, "TURBO HIGH PRESSURE MODEL : Fail safe \(Turbo High Pressure Model\)"](#) (For turbo high pressure model) or [EC6-198, "TURBO LOW PRESSURE MODEL : Fail safe \(Turbo Low Pressure Model\)"](#) (For turbo low pressure model).

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail-safe related to the symptom. Refer to [EC6-1008, "Description"](#) and [EC6-157, "TURBO HIGH PRESSURE MODEL : Fail safe \(Turbo High Pressure Model\)"](#) (For turbo high pressure model) or [EC6-198, "TURBO LOW PRESSURE MODEL : Fail safe \(Turbo Low Pressure Model\)"](#) (For turbo low pressure model).

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

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

If two or more DTCs are detected, refer to [EC6-162, "TURBO HIGH PRESSURE MODEL : DTC Inspection Priority Chart"](#) (For turbo high pressure model) or [EC6-203, "TURBO LOW PRESSURE](#)

DIAGNOSIS AND REPAIR WORKFLOW

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[MODEL : DTC Inspection Priority Chart](#) (For turbo low pressure model) and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.

If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.

NO >> Check according to [GI-45, "Intermittent Incident"](#).

6. PERFORM BASIC INSPECTION

Perform [EC6-262, "Work Procedure"](#).

Do you have CONSULT?

YES >> GO TO 7.

NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT

Check that "MASS AIR FLOW SENSOR (Hz)", "MASS AIR FLOW SENSOR B2 (Hz)", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA-B2" are within the SP value using CONSULT "SPEC" in "DATA MONITOR" mode of "ENGINE". Refer to [EC6-294, "Component Function Check"](#).

Is the measurement value within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to [EC6-295, "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 [EC6-1002, "Symptom Table"](#) 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 [GI-48, "Circuit Inspection"](#).

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to [EC6-131, "TURBO HIGH PRESSURE MODEL : Reference Value"](#) (For turbo high pressure model) or [EC6-172, "TURBO LOW PRESSURE MODEL : Reference Value"](#) (For turbo low pressure model).

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

With CONSULT

- Repair or replace the malfunctioning part.
- Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.

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DIAGNOSIS AND REPAIR WORKFLOW

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3. Check DTC. If DTC is displayed, erase it. Refer to "How to Erase DTC and 1st Trip DTC" in [EC6-115, "CONSULT Function"](#).

>> GO TO 12.

12.FINAL CHECK

With **CONSULT**

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been completely repaired.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

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

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

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM. Refer to "How to Read DTC and 1st Trip DTC" in [EC6-115, "CONSULT Function"](#).

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

13.PREPARE FOR I/M EXAMINATION

1. Set SRT codes. Refer to [EC6-282, "Description"](#).
2. Erase permanent DTCs. Refer to [EC6-288, "Description"](#).

>> INSPECTION END.

Diagnostic Work Sheet

INFOID:000000013591465

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 an incident. 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 steady or blink and DTC to be detected. Examples:

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

KEY POINTS

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

SEF907L

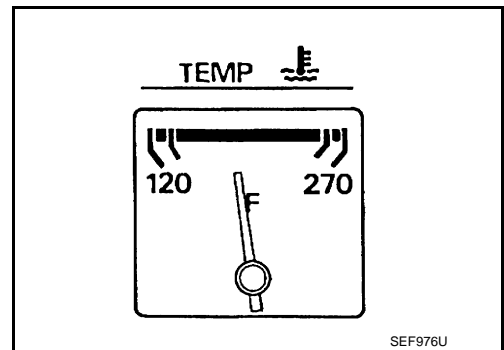
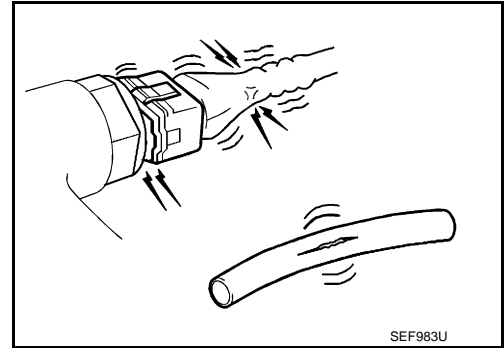
BASIC INSPECTION

Work Procedure

INFOID:000000013591466

1.INSPECTION START

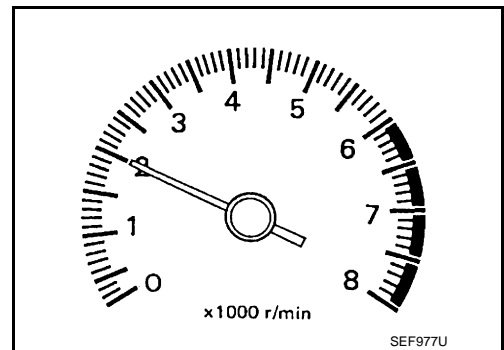
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Wiring harness for improper connections, pinches and cut
 - Vacuum hoses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



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

Are any DTCs detected?

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



2.REPAIR OR REPLACE

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

>> GO TO 3

3.CHECK IDLE SPEED

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

BASIC INSPECTION

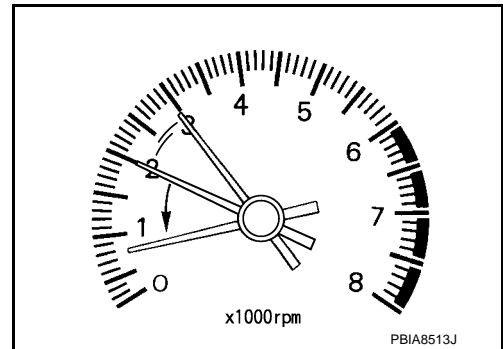
[VR30DDTT FOR USA AND CANADA]

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- 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 [EC6-1009, "Inspection"](#).
For specification, refer to [EC6-1017, "Idle Speed"](#).

Is the inspection result normal?

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



4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC6-271, "Description"](#).

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC6-272, "Description"](#).

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC6-273, "Description"](#).

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7.CHECK IDLE SPEED AGAIN

- Start engine and warm it up to normal operating temperature.
- Check idle speed.
For procedure, refer to [EC6-1009, "Inspection"](#).
For specification, refer to [EC6-1017, "Idle Speed"](#).

Is the inspection result normal?

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

8.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC6-533, "Component Inspection"](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC6-528, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

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

9.CHECK ECM FUNCTION

- Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to [SEC-95, "Description"](#).

>> GO TO 4.

10.CHECK IGNITION TIMING

- Run engine at idle.

BASIC INSPECTION

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< BASIC INSPECTION >

2. Check ignition timing with a timing light.

(A) :Timing indicator

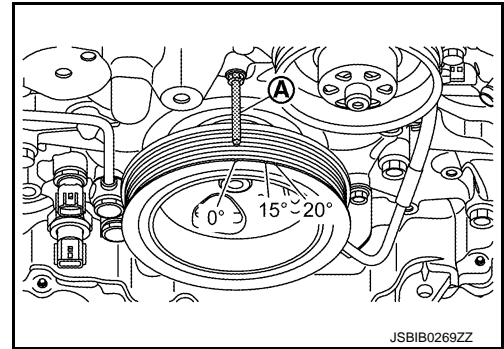
For procedure, refer to [EC6-1010, "Inspection"](#).

For specification, refer to [EC6-1017, "Ignition Timing"](#).

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 11.



11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform [EC6-271, "Description"](#).

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC6-272, "Description"](#).

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC6-273, "Description"](#).

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 IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

For procedure, refer to [EC6-1009, "Inspection"](#).

For specification, refer to [EC6-1017, "Idle Speed"](#).

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 17.

15.CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.

(A) :Timing indicator

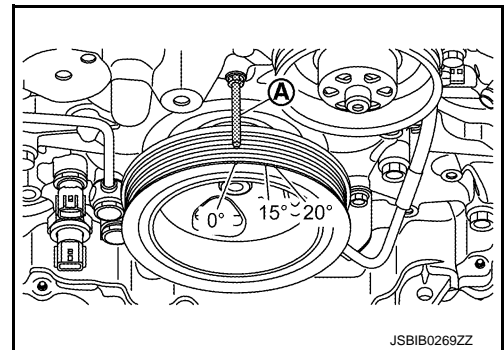
For procedure, refer to [EC6-1010, "Inspection"](#).

For specification, refer to [EC6-1017, "Ignition Timing"](#).

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 16.



16.CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-238, "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 17.

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

BASIC INSPECTION

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17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC6-533, "Component Inspection"](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC6-528, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 18.

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

18. CHECK ECM FUNCTION

1. Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to [SEC-95, "Description"](#).

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to [EC6-267, "Description"](#).

>> INSPECTION END

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SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

Special Repair Requirement List

INFOID:000000013591467

×:Applicable

Part name	Service performed		Service Manual item	Reference
	Replace-ment	Removal		
ECM	×	—	Additional service when replacing ECM	EC6-267
Accelerator pedal position sensor	×	× ^{*1}	Accelerator pedal released position learning	EC6-271
Electric throttle control actuator	×	× ^{*1, 2}	Throttle valve closed position learning	EC6-272
			Idle air volume learning	EC6-273
Electric intake valve timing control module	×	× ^{*1}	Electric intake valve timing control actuator refer-ence position learning	EC6-276
Electric intake valve timing control actuator	×	× ^{*1}	Electric intake valve timing control actuator refer-ence position learning	EC6-276
Crankshaft position sensor	×	—	Electric intake valve timing control actuator refer-ence position learning	EC6-276
Intake camshaft position sensor	×	—	Electric intake valve timing control actuator refer-ence position learning	EC6-276
Exhaust camshaft position sensor	×	—	Electric intake valve timing control actuator refer-ence position learning	EC6-276
engine mechanical parts • timing chain • intake/exhaust camshaft • intake/exhaust camshaft sprocket • Piston • Connecting rod • Crankshaft	×	×	Electric intake valve timing control actuator refer-ence position learning	EC6-276
Turbocharger	×	—	Turbocharger wastegate control actuator initializa-tion	EC6-277
A/F sensor 1	×	—	Idle air volume learning	EC6-273
O2 sensor 2	×	—	Idle air volume learning	EC6-273
Mass air flow sensor	×	—	Idle air volume learning	EC6-273
Repair or replacement of parts affecting air-fuel ratio	×	—	Idle air volume learning	EC6-273
Engine oil	×	—	Engine oil data reset	EC6-278

*1:Harness connector disconnection is included.

*2:Carbon deposit cleaning is included.

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:000000013591468

When replacing ECM, the following procedure must be performed. (For details, refer to [EC6-267, "Work Procedure"](#).)

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PROGRAMMING OPERATION

NOTE:

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

BEFORE REPLACEMENT

When replacing ECM, perform "SAVING DATA FOR REPLC CPU" in "WORK SUPPORT" of "ENGINE" by using CONSULT to save current ECM data before replacement.

AFTER REPLACEMENT

After replacing ECM, the following items must be performed:

- Write data after replace CPU
- Accelerator pedal released position learning
- Throttle valve closed position learning
- Idle air volume learning
- Electric intake valve timing control actuator reference position learning
- Turbocharger wastegate control actuator initialization
- Engine oil data reset

Work Procedure

INFOID:000000013591469

1. SAVE ECM DATA

 With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select "SAVING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
5. Follow the instruction of CONSULT display.

NOTE:

- Necessary data in ECM is copied and saved to CONSULT.
- Go to Step 2 regardless of with or without success in saving data.

>> GO TO 2.

2. CHECK ECM PART NUMBER

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

NOTE:

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

Is the ECM a blank ECM?

YES >> GO TO 3.

NO >> GO TO 5.

3. SAVE ECM PART NUMBER

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

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 4.

>> GO TO 4.

4. PERFORM ECM PROGRAMMING

ADDITIONAL SERVICE WHEN REPLACING ECM

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< BASIC INSPECTION >

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

NOTE:

- Refer to [EC6-1014, "Removal and Installation"](#) for replacement of ECM.
- During programming, maintain the following conditions:
 - Ignition switch: ON
 - Electric load: OFF
 - Brake pedal: Not depressed
 - Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.)

>> GO TO 6.

5. REPLACE ECM

Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

>> GO TO 6.

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

Refer to [SEC-95, "Description"](#).

>> GO TO 7.


7. CHECK ECM DATA STATUS

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

Is the data saved successfully?

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

8. WRITE ECM DATA

 With CONSULT

1. Select "WRITING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
2. Follow the instruction of CONSULT display.

NOTE:

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

>> GO TO 10.

9. PERFORM VIN REGISTRATION

Refer to [EC6-270, "Description"](#).

>> GO TO 10.

10. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to [EC6-271, "Description"](#).

>> GO TO 11.

11. ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR REFERENCE POSITION LEARNING

Refer to [EC6-276, "Description"](#).

>> GO TO 12.

12. TURBOCHARGER WASTEGATE CONTROL ACTUATOR INITIALIZATION

Refer to [EC6-277, "Description"](#).

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

>> GO TO 13.

13.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC6-272. "Description"](#).

>> GO TO 14.

14.PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC6-273. "Description"](#).

>> GO TO 15.

15.CHANGE ENGINE OIL

Change engine oil, then perform ENGINE OIL DATE RESET. Refer to [EC6-278. "Description"](#).

NOTE:

When replacing ECM, OCS data cannot be transferred. In addition, ENGINE OIL DATE RESET is performed, and therefore oil change is required.

>> GO TO 16.

16.ERASE 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. Check "Self-diagnostic result" of "ENGINE".

Is any DTC detected?

- YES >> Erase DTC.
NO >> END

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VIN REGISTRATION

Description

INFOID:000000013591470

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

(For details, refer to [EC6-270, "Work Procedure"](#).)

Work Procedure

INFOID:000000013591471

1. CHECK VIN

Check the VIN of the vehicle and note it. Refer to [GI-36, "Information About Identification or Model Code"](#).

>> GO TO 2.

2. PERFORM VIN REGISTRATION

 With CONSULT

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

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:000000013591472

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time the harness connector of the accelerator pedal position sensor or ECM is disconnected. (For details, refer to [EC6-271, "Work Procedure"](#).)

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Work Procedure

INFOID:000000013591473

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

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THROTTLE VALVE CLOSED POSITION LEARNING

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:000000013591474

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected or electric throttle control actuator is cleaned. (For details, refer to [EC6-272, "Work Procedure"](#).)

Work Procedure

INFOID:000000013591475

1. START

Ⓟ With CONSULT

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

ⓧ Without CONSULT

1. Start the engine.

NOTE:

1. Coolant temperature is less than 25°C (77°F) before engine starts.
2. Warm up the engine until engine coolant temperature reaches more than 65°C (149°F).
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

IDLE AIR VOLUME LEARNING

Description

INFOID:000000013591476

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

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

(For details, refer to [EC6-273, "Work Procedure"](#).)

Work Procedure

INFOID:000000013591477

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 - 105°C (158 - 221°F)
- Selector lever: P or N
- Electric load switch: OFF
(Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.

- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- With CONSULT: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
- Without CONSULT: Drive vehicle for 10 minutes.

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

With CONSULT

1. Perform Accelerator Pedal Released Position Learning. Refer to [EC6-271, "Description"](#).
2. Perform Throttle Valve Closed Position Learning. [EC6-272, "Description"](#).
3. Start engine and warm it up to normal operating temperature.
4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK IDLE SPEED AND IGNITION TIMING

1. Start engine and warm it up to normal operating temperature.
2. Let it idle for 20 seconds.
3. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to [EC6-1017, "Idle Speed"](#) and [EC6-1017, "Ignition Timing"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART-I

Check the following

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

Is the inspection result normal?

YES >> GO TO 5.

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IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

NO >> Repair or replace malfunctioning part.

5.DETECT MALFUNCTIONING PART-II

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

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to [EC6-294, "Description"](#).
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again:

- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

INFOID:000000013591478

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in "Diagnosis Procedure". (For details, refer to [EC6-275. "Work Procedure"](#).)

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Work Procedure

INFOID:000000013591479

1. START

With CONSULT

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

With GST

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

>> END

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ELECTRIC IVT CONTROL ACTUATOR POSITION LEARNING

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

ELECTRIC IVT CONTROL ACTUATOR POSITION LEARNING

Description

INFOID:000000013591480

Electric intake valve timing control (IVT) module requires the learning of camshaft reference position.

This learning must be performed where the following operations are performed:

- Replacement of electric IVT control module
- Replacement of intake/Exhaust camshaft position sensor
- Replacement of crankshaft position sensor
- Removal and installation of timing chain
- Replacement of the mechanical parts listed below:
 - Replacement of timing chain
 - Replacement of intake/exhaust camshaft
 - Replacement of intake/exhaust camshaft sprocket
 - Replacement of piston
 - Replacement of connecting rod
 - Replacement of crankshaft

(For details, refer to [EC6-276. "Work Procedure"](#).)

NOTE:

If learning is not performed after the replacement of the above listed parts, the engine may not be able to be started.

Work Procedure

INFOID:000000013591481

1. START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR REFERENCE POSITION LEARNING

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select All DTC Reading and check that any DTC is not detected.
3. Select "ENGINE" >> "Work support" >> "Electric intake valve timing control learning".
4. Touch "Start" and start the engine within 10 seconds.
5. Let the engine be idle.
6. Check that "COMPLETED" is displayed.

Is the learning completed normally?

YES >> END

NO >> Check that DTC is not detected and restart the learning.

3. PERFORM ELECTRIC IVT CONTROL ACTUATOR REFERENCE POSITION LEARNING

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator harness connector (actuator side).
3. Turn ignition switch ON and wait at least 70 seconds.
4. Turn ignition switch OFF.
5. Reconnect the disconnected harness connector.
6. Start engine and let it idle at least 15 seconds.
7. Turn ignition switch OFF.
8. Check and erase DTC.

>> END

TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE DATA INITIALIZATION

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE DATA INITIALIZATION

Description

INFOID:0000000013591482

ECM learns a turbocharger wastegate valve position at every engine start to perform more accurate boost control.

Learning value of turbocharger wastegate valve position must be initialized where the following operations are performed:

- Replacement of turbocharger
- Replacement of ECM

(For details, refer to [EC6-277, "Work Procedure"](#).)

Work Procedure

INFOID:0000000013591483

1. PRECONDITIONING

Check that the engine is cold [coolant temperature: 50 °C (122 °F) or less].

Is the engine cold?

YES >> GO TO 2.

NO >> Park the vehicle at a cold place and cool down the engine. And then, GO TO 2.

2. INITIALIZING A LEARNING VALUE

With CONSULT

1. Start the engine and let it idle at least 10 seconds.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "WASTEGATE ACTUATOR".
3. Operate the actuator from the fully closed position to the fully open position and check that actual value is within the range of (- 0.00052) – (+ 0.00052) m when the target value is set at 0 m.

>> END

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ENGINE OIL DATA RESET

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

ENGINE OIL DATA RESET

Description

INFOID:000000013591484

The oil control system allows calculating the remaining distance to drive before oil change request. The engine oil data reset must be performed after engine oil is changed. (For details, refer to [EC6-278, "Work Procedure"](#).)

CAUTION:

Never reset data except when changing engine oil.

NOTE:

Data cannot be reset until the vehicle travels 10 km (6.2 mile) from the previous data reset.

Work Procedure

INFOID:000000013591485

1. START

1. Turn ignition switch ON.
2. Check information display of the combination meter.

Is Distance to Engine Oil Change displayed?

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

2. SELECT OIL CONTROL SYSTEM MODE

Push the Display next switch and select oil control system mode.

>> GO TO 3.

3. RESET ENGINE OIL DATA

1. Press and hold the Display Next switch at least 1 second while Distance to Engine Oil Change is displayed.
2. Stop pressing the Display Next switch, and a few seconds later, check that the value of Distance to Engine Oil Change is reset.

>> END

FUEL PRESSURE CHECK

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

FUEL PRESSURE CHECK

Work Procedure

INFOID:000000013591486

FUEL PRESSURE RELEASE

1. FUEL PRESSURE RELEASE

☐ With CONSULT

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

☒ Without CONSULT

1. Remove fuel pump fuse.

NOTE:

- For the fuse number, refer to [EC6-224, "Wiring Diagram"](#).
- For the fuse arrangement, refer to [PG-203, "Fuse, Connector and Terminal Arrangement"](#).

2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

>> INSPECTION END

LOW 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 this model does not have fuel return system.

1. FUEL PRESSURE CHECK

1. Release fuel pressure to zero.
2. 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 fuel tube (engine side)
C : Clamp

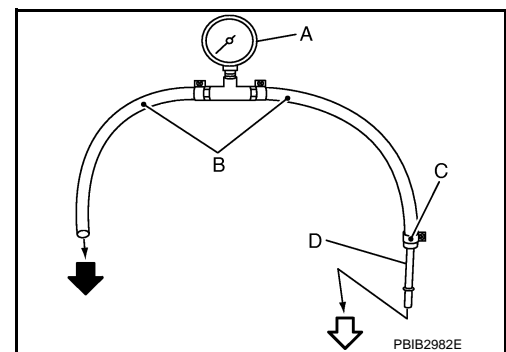
CAUTION:

- 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 CHECK

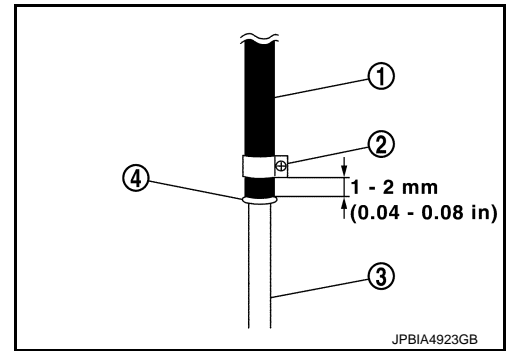
[VR30DDTT FOR USA AND CANADA]

< BASIC INSPECTION >

4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) (3) 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: 1.0 - 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 high pressure fuel pump does not come off.

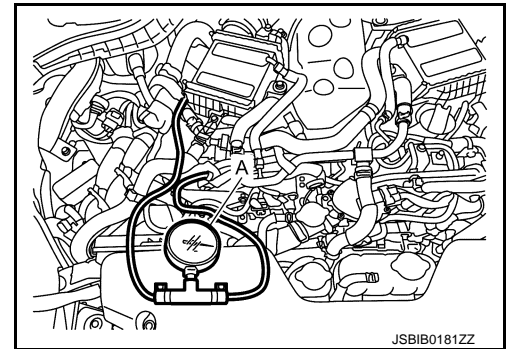
5. Connect fuel tube adapter to quick connector.

A :Fuel pressure gauge

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 (5.0 bar, 5.1 kg/cm², 73 psi)

Is the inspection result normal?

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

2.CHECK FUEL HOSES

Check the following.

- Fuel hoses for clogging
- Fuel filter for clogging
- 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.

HIGH FUEL PRESSURE CHECK

NOTE:

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

ⓘ WITH CONSULT

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

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Idle	0.73 – 1.0 V
	Revvng engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

FUEL PRESSURE CHECK

[VR30DDTT FOR USA AND CANADA]

< BASIC INSPECTION >

WITHOUT CONSULT

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

+		-	Condition	Value (Approx.)
Fuel rail pressure sensor				
Connector	Terminal			
F137	2	Ground	Engine speed: idle	0.73 – 1.0 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

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HOW TO SET SRT CODE

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

HOW TO SET SRT CODE

Description

INFOID:000000013591487

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)	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	Three way catalyst function	P0420, P0430
EVAP SYSTEM	EVAP control system purge flow monitoring	P0441
	EVAP control system	P0456
HO2S	Air fuel ratio (A/F) sensor 1	P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D
	Heated oxygen sensor 2	P0137, P0157
	Heated oxygen sensor 2	P0138, P0158
	Heated oxygen sensor 2	P0139, P0159
EGR/VVT SYSTEM	Intake valve timing control function	P0011, P0021
	Exhaust valve timing control function	P0014, P0024

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

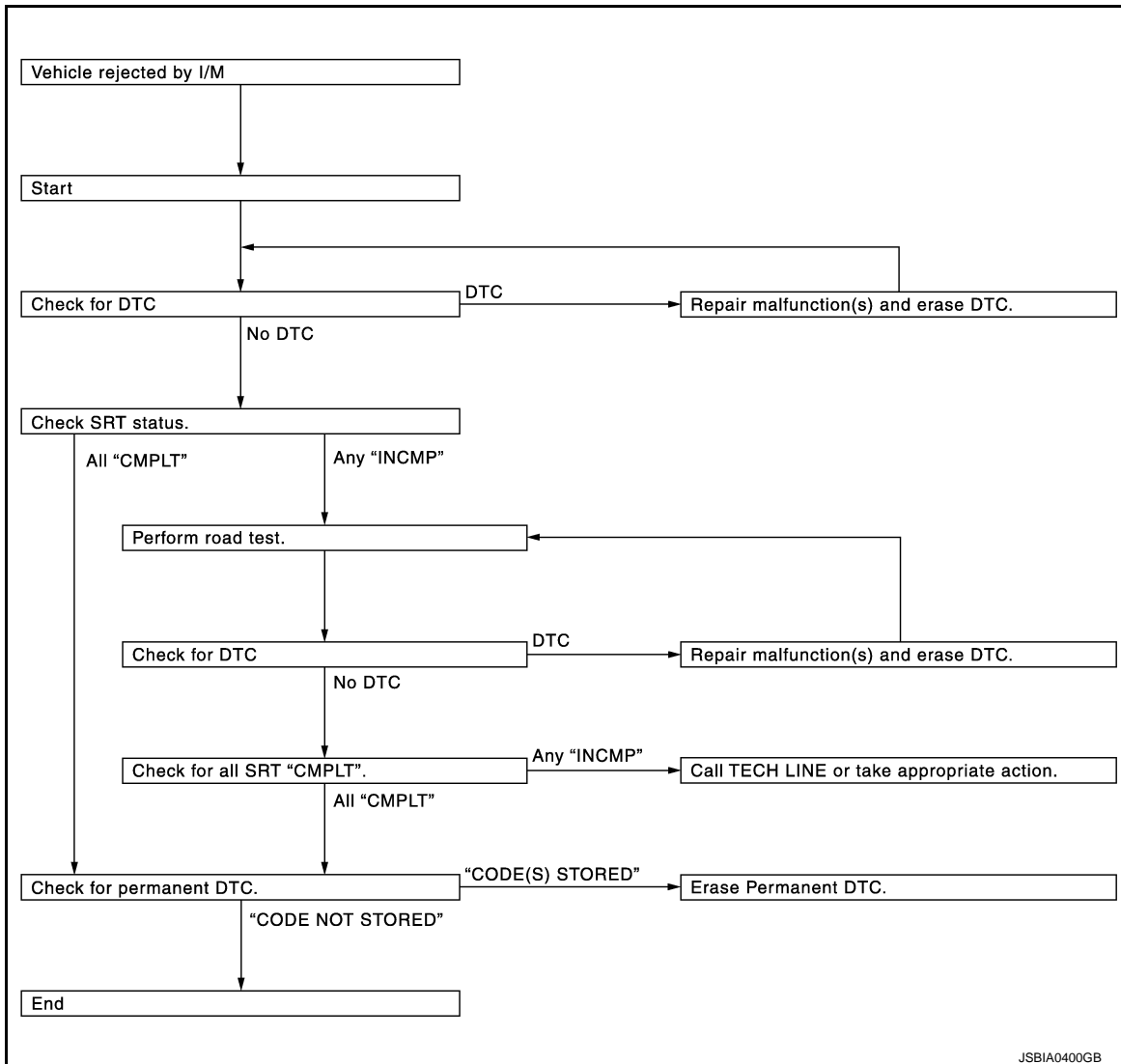
SRT SERVICE PROCEDURE

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

HOW TO SET SRT CODE

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]



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SRT Set Driving Pattern

INFOID:000000013591488

CAUTION:

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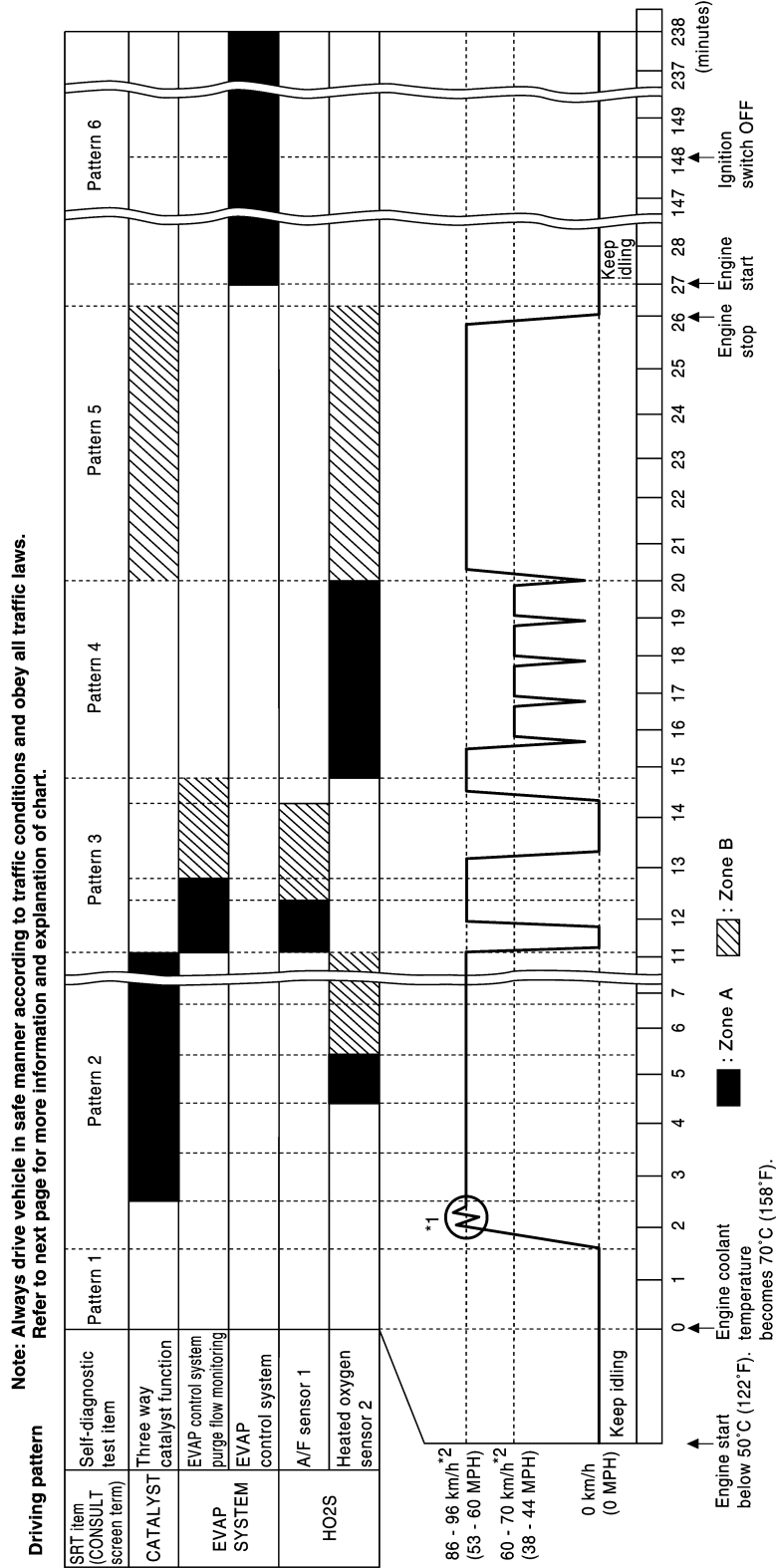
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HOW TO SET SRT CODE

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

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

HOW TO SET SRT CODE

[VR30DDTT FOR USA AND CANADA]

< BASIC INSPECTION >

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

*: Normal conditions refer to the following:

- Sea level
 - Flat road
 - Ambient air temperature: 20 - 30°C (68 - 86°F)
 - Diagnosis is performed as quickly as possible under normal conditions.
- Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

INFOID:000000013591489

Work Procedure

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. CHECK SRT STATUS

WITH CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

WITHOUT CONSULT

Perform "SRT status" mode with [EC6-114, "On Board Diagnosis Function"](#).

WITH GST

Select Service \$01 with GST.

Is SRT code(s) set?

YES >> GO TO 12.

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 4.

3. DTC CONFIRMATION PROCEDURE

1. Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT.
2. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to [EC6-282, "Description"](#).
3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 11.

4. PERFORM ROAD TEST

- Check the "Performance Priority" in the "SRT ITEM" table. Refer to [EC6-282, "Description"](#).
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to [EC6-283, "SRT Set Driving Pattern"](#).

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

>> GO TO 5.

5. PATTERN 1

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

NOTE:

HOW TO SET SRT CODE

[VR30DDTT FOR USA AND CANADA]

< BASIC INSPECTION >

ECM terminal voltage is follows;

- Engine coolant temperature
 - -10 to 35°C (14 to 95°F): 3.0 - 4.3 V
 - 70°(158°F): Less than 1.4 V
- Fuel tank temperature: Less than 4.1 V

Refer to [EC6-131, "TURBO HIGH PRESSURE MODEL : Reference Value"](#) (For turbo high pressure model) or [EC6-172, "TURBO LOW PRESSURE MODEL : Reference Value"](#) (For turbo low pressure model).

>> GO TO 6.

6.PATTERN 2

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

NOTE:

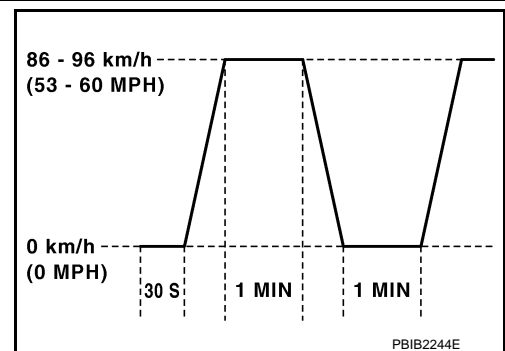
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7.PATTERN 3

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

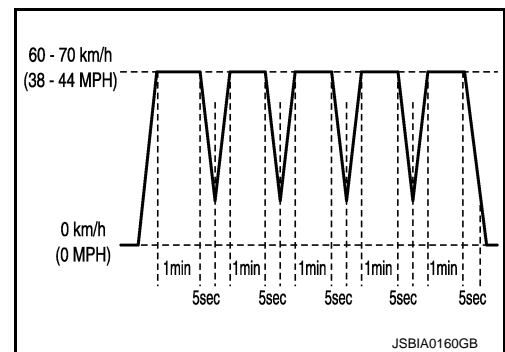
>> GO TO 8.



8.PATTERN 4

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

>> GO TO 9.



9.PATTERN 5

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

>> GO TO 10.

10.PATTERN 6

Start engine and wait at least 2 hours. Then turn ignition switch OFF and wait at least 90 minutes.

>> GO TO 11.

HOW TO SET SRT CODE

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

11.CHECK SRT STATUS

WITH CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

WITHOUT CONSULT

Perform "SRT status" mode with [EC6-114, "On Board Diagnosis Function"](#).

WITH GST

Select Service \$01 with GST.

Is SRT(s) set?

YES >> GO TO 12.

NO >> Call TECH LINE or take appropriate action.

12.CHECK PERMANENT DTC

NOTE:

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

WITH CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

WITH GST

Select Service \$0A with GST.

Is permanent DTC(s) detected?

YES >> Go to [EC6-288, "Description"](#).

NO >> END

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HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

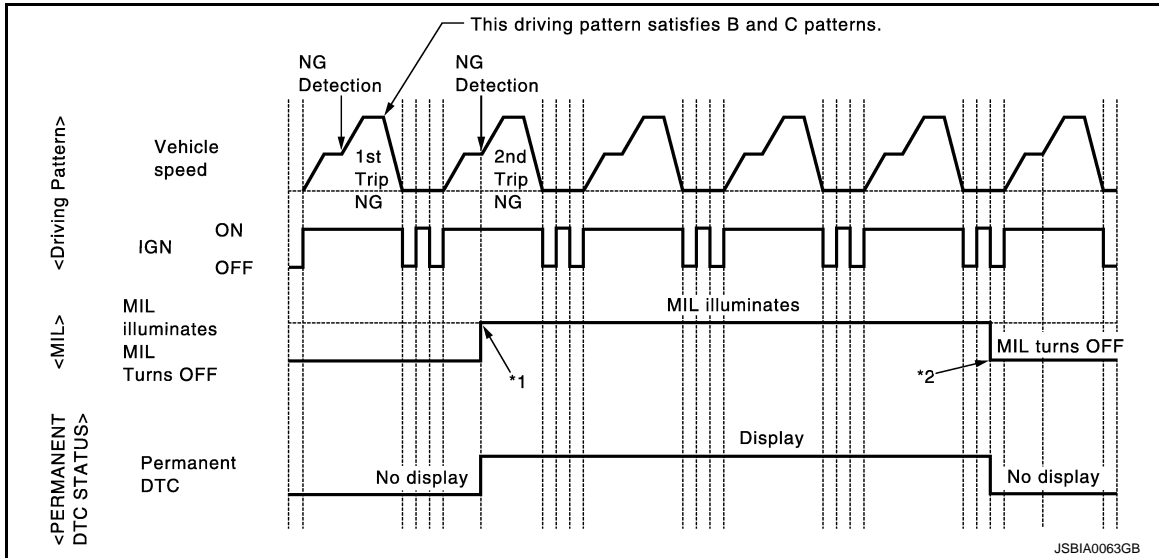
HOW TO ERASE PERMANENT DTC

Description

INFOID:000000013591490

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 row.



*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 (pattern B) without any malfunctions.

When a DTC is not stored in ECM

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

NOTE:

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

×: Applicable —: Not applicable

Group*	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern	
		B	D
A	×	—	—
B	—	×	×

*: For group, refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

Permanent DTC item

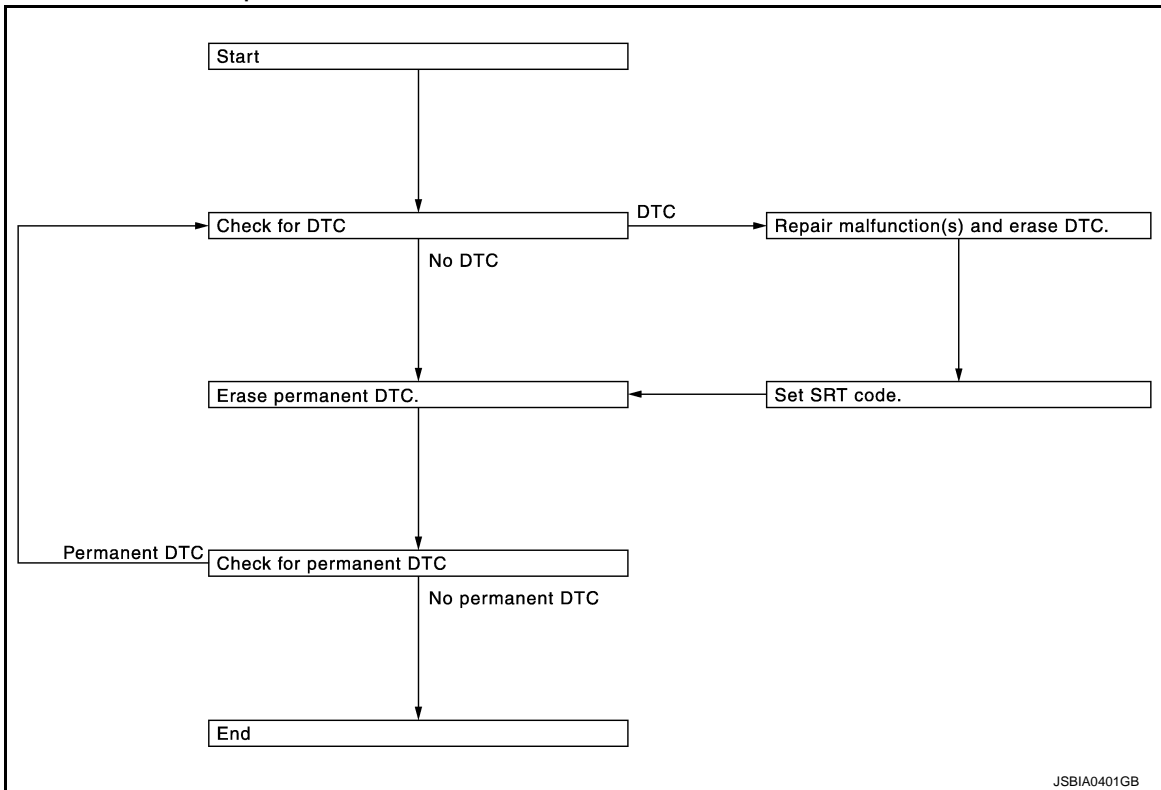
For permanent DTC items, MIL turns ON. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

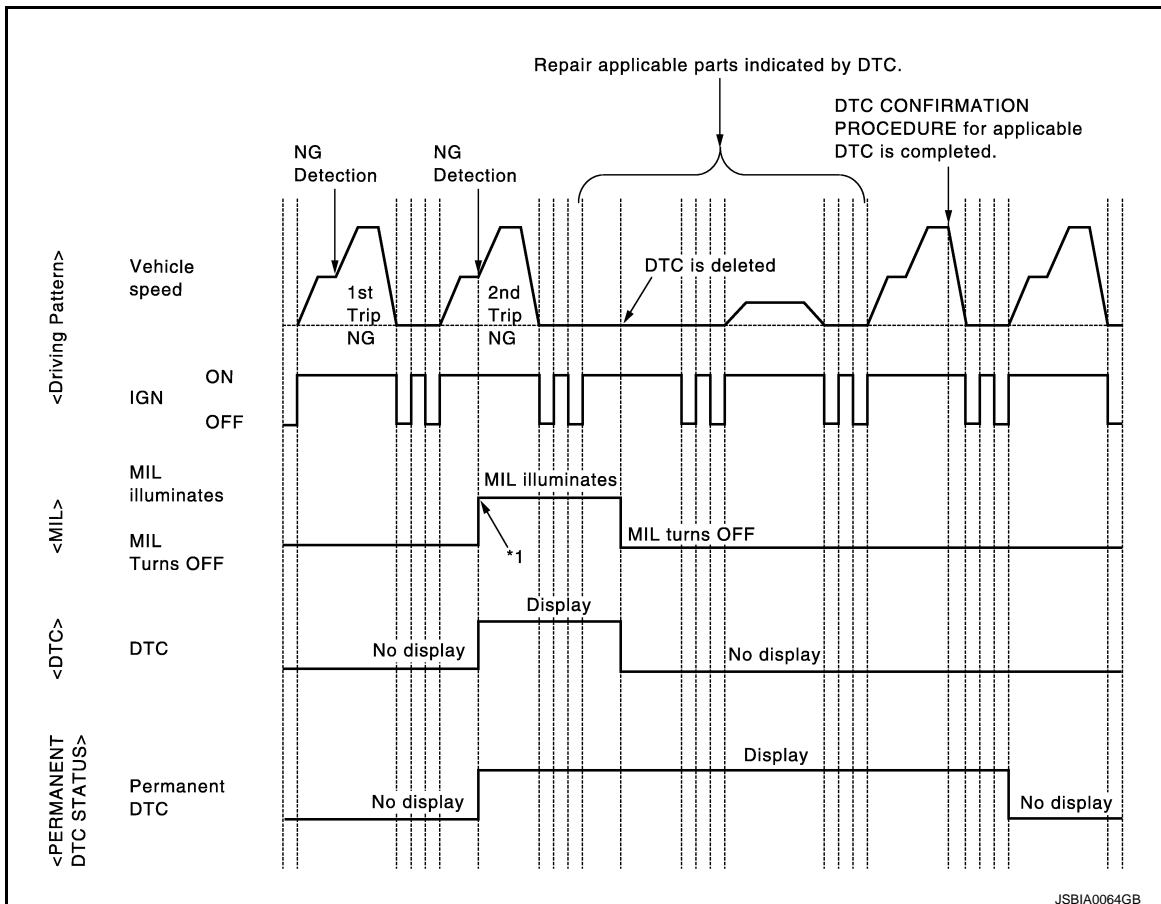
[VR30DDTT FOR USA AND CANADA]

Permanent DTC service procedure



Work Procedure (Group A)

INFOID:000000013591491



HOW TO ERASE PERMANENT DTC

[VR30DDTT FOR USA AND CANADA]

< BASIC INSPECTION >

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

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to [EC6-114. "On Board Diagnosis Function"](#), [EC6-115. "CONSULT Function"](#).

NO >> GO TO 2.

2. CHECK PERMANENT DTC

 With CONSULT

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

 With GST

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

Is any permanent DTC detected?

YES >> GO TO 3.

NO >> END

3. PERFORM DTC CONFIRMATION PROCEDURE

Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

>> 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

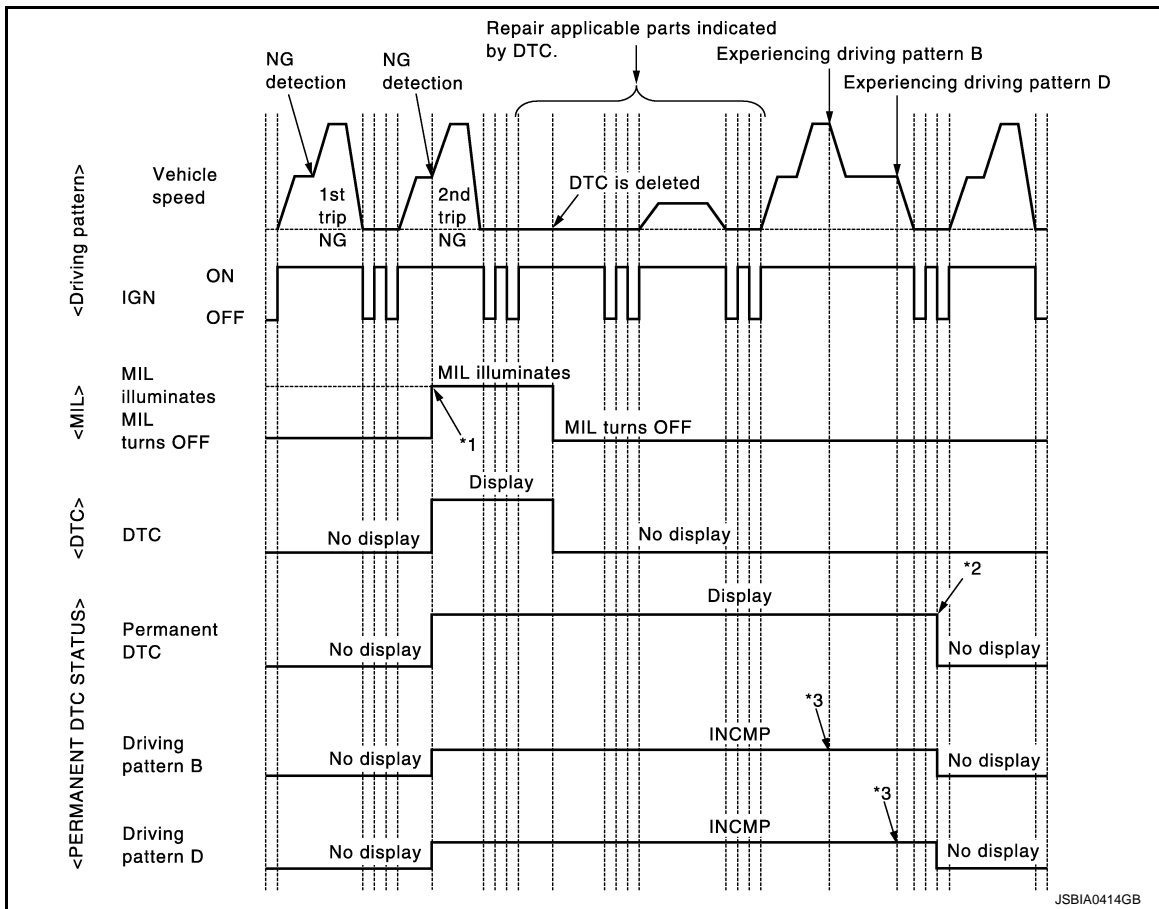
HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

[VR30DDTT FOR USA AND CANADA]

Work Procedure (Group B)

INFOID:000000013591492



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

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

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

NOTE:

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

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to [EC6-114, "On Board Diagnosis Function"](#), [EC6-115, "CONSULT Function"](#).

NO >> GO TO 2.

2.CHECK PERMANENT DTC

With CONSULT

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

With GST

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

HOW TO ERASE PERMANENT DTC

[VR30DDTT FOR USA AND CANADA]

< 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.
2. Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to driving pattern B. Refer to [EC6-115, "CONSULT Function"](#), [EC6-111, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

Ⓢ With GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle according to driving pattern B. Refer to [EC6-111, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

>> 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.

1. Drive the vehicle according to driving pattern D. Refer to [EC6-111, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

>> GO TO 6.

6.CHECK PERMANENT DTC

Ⓟ With CONSULT

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

HOW TO ERASE PERMANENT DTC

[VR30DDTT FOR USA AND CANADA]

< BASIC INSPECTION >

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

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DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000013591493

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

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

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

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1/B2 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:0000000013591494

1. PRECONDITIONING

Make sure that all of the following conditions are satisfied.

TESTING CONDITION

- 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
- After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP 1" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- 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 IN DATA MONITOR MODE

Ⓟ With CONSULT

NOTE:

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

1. Perform [EC6-262. "Work Procedure"](#).
2. Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2", "MAS A/F SE-B1" and "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode with CONSULT.
3. Make sure that monitor items are within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
 NO >> Proceed to [EC6-295. "Diagnosis Procedure"](#).

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

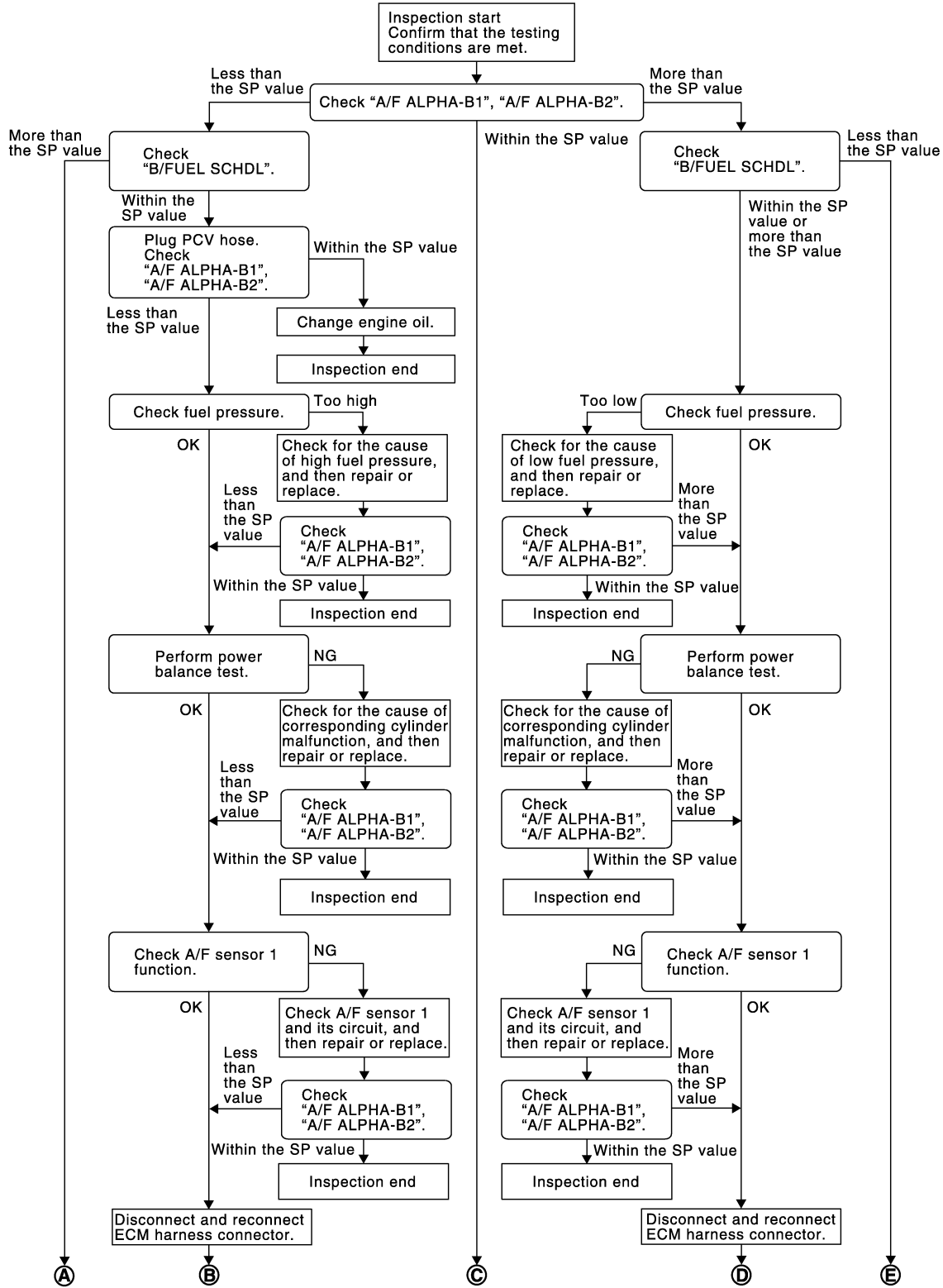
< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Diagnosis Procedure

INFOID:000000013591495

OVERALL SEQUENCE



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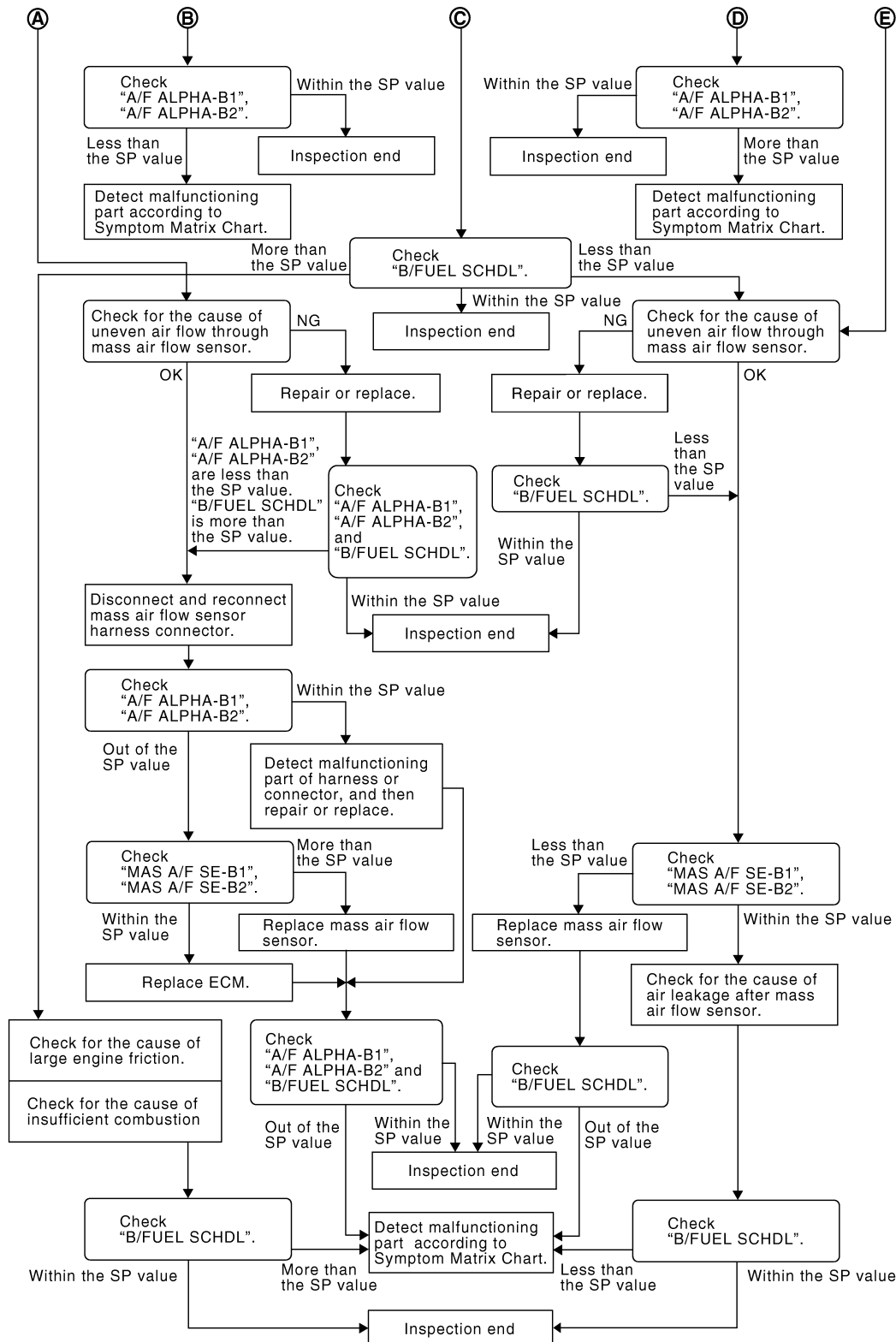
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TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]



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DETAILED PROCEDURE

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

ⓑ With CONSULT

1. Start engine.
2. Confirm that the testing conditions are met. Refer to [EC6-294, "Component Function Check"](#).
3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NOTE:

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

Is the measurement value within the SP value?

YES >> GO TO 17.

NO-1 >> Less than the SP value: GO TO 2.

NO-2 >> More than the SP value: GO TO 3.

2.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> GO TO 4.

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

3.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> GO TO 6.

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

NO-2 >> Less than the SP value: GO TO 25.

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

1. Stop the engine.

2. Disconnect PCV hose, and then plug it.

3. Start engine.

4. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> GO TO 5.

NO >> GO TO 6.

5.CHANGE ENGINE OIL

1. Stop the engine.

2. Change engine oil. Refer to [LU-27, "Inspection"](#).

NOTE:

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

>> INSPECTION END

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to [EC6-279, "Work Procedure"](#).)

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO-2 >> Fuel pressure is too low: GO TO 7.

7.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO >> Repair or replace and then GO TO 8.

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

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> GO TO 9.

9.PERFORM POWER BALANCE TEST

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

Is the inspection result normal?

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

10.DETECT MALFUNCTIONING PART

Check the following bellow.

- Ignition coil and its circuit (Refer to [EC6-983. "Component Function Check".](#))
- Fuel injector and its circuit (Refer to [EC6-971. "Component Function Check".](#))
- Intake air leakage
- Low compression pressure (Refer to [EM-150. "Inspection".](#))

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

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

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> GO TO 12.

12.CHECK A/F SENSOR 1 FUNCTION

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

- For DTC P0130, P0150, refer to [EC6-423. "DTC Description".](#)
- For DTC P0131, P0151, refer to [EC6-427. "DTC Description".](#)
- For DTC P0132, P0152, refer to [EC6-430. "DTC Description".](#)
- For DTC P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D, refer to [EC6-454. "DTC Description".](#)
- For DTC P2096, P2097, P2098, P2099, refer to [EC6-809. "DTC Description".](#)

Are any DTCs detected?

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

13.CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnosis Procedure according to corresponding DTC.

>> GO TO 14.

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

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> GO TO 15.

15.DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

>> GO TO 16.

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

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 [EC6-1002. "Symptom Table"](#).

17.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO-1 >> More than the SP value: GO TO 18.

NO-2 >> Less than the SP value: GO TO 25.

18.DETECT MALFUNCTIONING PART

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

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

19.CHECK INTAKE SYSTEM

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

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

Is the inspection result normal?

YES >> GO TO 21.

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

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

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1", "A/F ALPHA-B2" are less than the SP value: GO TO 21.

21.DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

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TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

>> GO TO 22.

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

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to [EC6-387, "Diagnosis Procedure"](#). Then GO TO 29.

NO >> GO TO 23.

23.CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"

Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace malfunctioning mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

1. Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
2. Proceed to [EC6-267, "Description"](#).

>> GO TO 29.

25.CHECK INTAKE SYSTEM

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

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

Is the inspection result normal?

YES >> GO TO 27.

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

26.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

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

27.CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"

Select "MAS A/F SE-B1", "MAS A/F SE-B2" 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 >> GO TO 28.

NO >> Less than the SP value: Replace malfunctioning mass air flow sensor, and then GO TO 30.

28.CHECK INTAKE SYSTEM

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

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

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- Malfunctioning seal in intake air system, etc.

>> GO TO 30.

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

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and 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 [EC6-1002, "Symptom Table"](#).

30.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC6-1002, "Symptom Table"](#).

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

POWER SUPPLY AND GROUND CIRCUIT

ECM

ECM : Diagnosis Procedure

INFOID:0000000013591496

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
IPDM E/R	#46	10A
	#47	10A
	#49	15A
	#64	10A

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> GO TO 2.

2.CHECK GROUND CONNECTION

Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

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

3.CHECK ECM GROUND CIRCUIT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

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 IGNITION SWITCH SIGNAL

Check the voltage between ECM harness connectors as follows.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
E152	185	204	Ignition switch: ON	Battery voltage
			Ignition switch: OFF	0 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. CHECK IGNITION SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E123	55	E152	185	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

6. CHECK ECM POWER SUPPLY

1. Reconnect ECM harness connectors.
2. Check the voltage between ECM harness connector terminals as follows.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
E152	197	204	Ignition switch: ON	Battery voltage
			<ul style="list-style-type: none"> • Ignition switch: OFF • More than a few seconds after turning ignition switch OFF 	0 V

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F142	91	E152	204	Ignition switch: ON	Battery voltage
	145			<ul style="list-style-type: none"> • Ignition switch: OFF • More than a few seconds after turning ignition switch OFF 	0 V

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 7.

7. CHECK ECM POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Disconnect IPDM E/R harness connector.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	Existed
E120	13	F142	91	
			145	
E123	59	E152	197	

5. 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.

8. CHECK ECM RELAY CONTROL SIGNAL

1. Reconnect ECM harness connectors.
2. Reconnect IPDM E/R harness connectors.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Check the voltage between ECM harness connectors as follows.

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F142	125	E152	204	<ul style="list-style-type: none"> Ignition switch: OFF A few seconds after turning ignition switch OFF 	0 – 1.0 V
				<ul style="list-style-type: none"> Ignition switch: OFF More than a few seconds after turning ignition switch OFF 	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. CHECK ECM RELAY CONTROL SIGNAL CIRCUIT

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

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	Existed
E124	72	F142	125	

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace error-detected parts.

10. CHECK POWER SUPPLY CIRCUIT

Perform trouble diagnosis for power supply circuit.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

11.CHECK ECM POWER SUPPLY (BACK-UP)

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connectors as follows.

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F142	170	E152	204	Ignition switch: OFF	Battery voltage

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).
NO >> GO TO 12.

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

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

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E123	58	F142	170	Existed

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

Is the inspection result normal?

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

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure

INFOID:000000013591497

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse (No. 49) from IPDM E/R.
3. Check that 15A fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> GO TO 2.

2.CHECK FUSIBLE LINK

1. Turn ignition switch OFF.
2. Check that the following fusible link is not blowing.

Location	Fuse No.	Capacity
Fuse and fusible link holder-1	#V	50A
	#W	50A

Is the fusible link blown (open)?

- YES >> Replace the fuse. [Check the power supply if fusible link is blown (open) again.]
NO >> GO TO 3.

3.CHECK GROUND CONNECTION

Check ground connection E138. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

POWER SUPPLY AND GROUND CIRCUIT

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC INTAKE VALVE TIMING CONTROL MODULE GROUND CIRCUIT

1. Disconnect electric intake valve timing control module harness connectors.
2. Check the continuity between electric intake valve timing control module harness connector and ground.

+		-	Continuity
Connector	Terminal		
E154	41	Ground	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 ELECTRIC INTAKE VALVE TIMING CONTROL MODULE POWER SUPPLY

1. Reconnect electric intake valve timing control module harness connectors.
2. Check the voltage between electric intake valve timing control module harness connector terminals as follows.

Electric intake valve timing control module			Voltage
Connector	+	-	
Terminal			
E154	39	41	Battery voltage
	40		

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Perform trouble diagnosis for power supply circuit.

6.CHECK IGNITION SWITCH SIGNAL

Check the voltage between electric intake valve timing control module harness connectors as follows.

Electric intake valve timing control module				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
E153	28	E154	41	Ignition switch: ON	Battery voltage
				Ignition switch: OFF	0 V

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).
NO >> GO TO 7.

7.CHECK IGNITION SWITCH SIGNAL

1. Turn ignition switch OFF.
2. Disconnect electric intake valve timing control module harness connectors.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and electric intake valve timing control module harness connector.

POWER SUPPLY AND GROUND CIRCUIT

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+		-		Continuity
IPDM E/R		Electric intake valve timing control module		
Connector	Terminal	Connector	Terminal	
E123	55	E153	28	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:000000013591498

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse (No. 52) from IPDM E/R.
3. Check that 15A fuse is not blowing.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> GO TO 2.

2.CHECK GROUND CONNECTION

Check ground connection B105. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK FPCM GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
FPCM			
Connector	Terminal		
B11	3	Ground	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 FPCM POWER SUPPLY

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

Connector	FPCM		Voltage
	+	-	
	Terminal		
B11	6	3	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> GO TO 5.

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POWER SUPPLY AND GROUND CIRCUIT

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5. CHECK FPCM POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connectors.
3. Disconnect IPDM E/R harness connectors.
4. Check the continuity between IPDM E/R harness connector and FPCM harness connector.

+		-		Continuity
IPDM E/R		FPCM		
Connector	Terminal	Connector	Terminal	
E120	15	B11	6	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK FUEL PUMP RELAY SIGNAL

1. Reconnect IPDM E/R harness connectors.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connectors.

ECM				Voltage
+		-		
Connector	Terminal	Connector	Terminal	
F142	124	E152	204	0 – 1.0 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. CHECK FUEL PUMP RELAY SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Disconnect IPDM E/R harness connectors.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E124	69	F142	124	Existed

5. 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.

8. CHECK POWER SUPPLY CIRCUIT

Perform trouble diagnosis for power supply circuit.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44. "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

U0101 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

U0101 CAN COMM CIRCUIT

DTC Description

INFOID:0000000013591499

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
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.

POSSIBLE CAUSE

CAN communication line between TCM and ECM (CAN communication line is open or shorted)

FAIL-SAFE

Not applicable

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 [EC6-309, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591500

Proceed to [LAN-41, "Trouble Diagnosis Flow Chart"](#).

U012E ENGINE COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

U012E ENGINE COMMUNICATION

DTC Description

INFOID:000000013600777

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U012E	Communication error (lost) (Lost communication with camshaft position control module)	Internal error of the electric intake valve timing control module is detected.

POSSIBLE CAUSE

- Electric intake valve timing control module
- ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

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

Is DTC U012E detected?

- YES >> Proceed to [EC6-310, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600778

1. CHECK ENGINE COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and electric intake valve timing (IVT) control module harness connector.
3. Check the continuity between ECM harness connector and electric IVT control module harness connector.

U012E ENGINE COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

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ECM		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
E152	189	E153	19	Existed
	190		12	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.REPLACE ELECTRIC IVT CONTROL MODULE

1. Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

2. Perform DTC confirmation procedure. Refer to [EC6-310, "DTC Description"](#).

Is DTC U012E detected again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

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U042F ENGINE COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

U042F ENGINE COMMUNICATION

DTC Description

INFOID:000000013600779

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U042F	Communication error (invalid) (Invalid data received from camshaft position control module)	ECM cannot receive a communication signal sent from the electric intake valve timing control module for 0.01 second or more.

POSSIBLE CAUSE

- Harness and connectors
(Engine communication circuit is open or shorted.)
- Electric intake valve timing control module

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC U042F is displayed with U1000, first perform the confirmation procedure (trouble diagnosis) for U1000.

Is DTC U1000 detected?

- YES >> Perform diagnosis for U1000. Refer to [EC6-314, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

ⓅWith CONSULT

1. Start the engine and wait at least 1 second.
2. Check DTC.

Is DTC U042F detected?

- YES >> Proceed to [EC6-312, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600780

1.CHECK DTC PRIORITY

If DTC U042F is displayed with U1000, first perform the confirmation procedure (trouble diagnosis) for U1000.

U042F ENGINE COMMUNICATION

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< DTC/CIRCUIT DIAGNOSIS >

Is DTC U1000 detected?

YES >> Perform diagnosis for U1000. Refer to [EC6-314, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK ENGINE COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and electric intake valve timing (IVT) control module harness connector.
3. Check the continuity between ECM harness connector and electric IVT control module harness connector.

ECM		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
E152	189	E153	19	Existed
	190		12	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

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U1000 CAN COMMUNICATION CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

U1000 CAN COMMUNICATION CIRCUIT

DTC Description

INFOID:000000013591503

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1000	CAN COMM CIRCUIT (CAN communication circuit)	Communication signal other than OBD (emission related diagnosis) is not received between electric intake valve timing control module and ECM for 2 seconds or more.

POSSIBLE CAUSE

- Harness or connectors (Engine communication line is open or shorted)
- ECM
- Electric intake valve timing control module

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC U1000 is displayed with DTC P0607, first perform the confirmation procedure (trouble diagnosis) for DTC P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-625, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

- YES >> Proceed to [EC6-314, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591504

1.CHECK DTC PRIORITY

If DTC U1000 is displayed with DTC P0607, first perform the confirmation procedure (trouble diagnosis) for DTC P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-625, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK ENGINE COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect electric intake valve timing control module harness connector.
4. Check the continuity between ECM harness connector and electric intake valve timing control module harness connector.

U1000 CAN COMMUNICATION CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM		Electric intake valve timing control module		Continuity
Connector	Terminal	Connector	Terminal	
E152	189	E153	19	Existed
	190		12	

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTERMITTENT INCIDENT

Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.REPLACE ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

Replace electric intake valve timing control module. Refer to [EC6-1015, "Removal and Installation"](#).

>> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Erase DTC.
4. Perform DTC Confirmation Procedure.
See [EC6-314, "DTC Description"](#).
5. Check DTC.

Is the DTC U1000 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.REPLACE ECM

Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

>> INSPECTION END

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U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

U1001 CAN COMM CIRCUIT

DTC Description

INFOID:000000013591501

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1001	CAN COMM CIRCUIT (CAN communication circuit)	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted)

FAIL-SAFE

Not applicable

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 [EC6-316, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591502

Proceed to [LAN-41, "Trouble Diagnosis Flow Chart"](#).

P0010 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0010 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:0000000013599763

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0010	A camshaft position actuator B1 ["A" camshaft position actuator control circuit/open bank 1]	The electric intake valve timing control module detects internal power stage malfunction.

POSSIBLE CAUSE

- Electric intake valve timing (IVT) control module
- Electric intake valve timing (IVT) control module power supply

FAIL-SAFE

Fail safe mode	Vehicle behavior
Combustion control mode	Stratified charge combustion control at starting or Listed below: <ul style="list-style-type: none">• Idle speed control• Recovery speed control at decelerating
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)

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 when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P0010 detected?

- YES >> Proceed to [EC6-317. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013599764

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305. "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 2.

P0010 INTAKE VALVE TIMING CONTROL

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.

2. Perform DTC confirmation procedure. Refer to [EC6-319, "DTC Description"](#).

Is DTC P0010 detected again?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P0011 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0011 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:000000013650878

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0011	INT/V TIM CONT-B1 [Intake valve timing control performance (bank 1)]	A	When the absolute difference between target angle and actual angle is more than 13 degree (camshaft angle) for 6 seconds under the following conditions. <ul style="list-style-type: none">Ignition switch: ONEngine speed: 1,200 – 3,175 rpmEngine coolant temperature: 60 – 120°C (140 – 248°F)Battery voltage: 11 – 16 V
		B	When the absolute difference between valve timing control reference position and base angle is more than 13 degree (camshaft angle) for 3 seconds under the following conditions. <ul style="list-style-type: none">Ignition switch: ONEngine speed: 500 – 2,000 rpm [when vehicle speed is less than 4 km/h (2.5 MPH)]Engine speed: 1,200 – 2,000 rpm [when vehicle speed is 4 km/h (2.5 MPH) or more]Engine coolant temperature: 60 – 120°C (140 – 248°F)Battery voltage: 11 – 16 V

POSSIBLE CAUSE

- A
- Electric intake valve timing (IVT) control actuator (bank 1)
 - Harness and connectors (Electric IVT control actuator (bank 1) motor control circuit is open or shorted.)
 - Foreign matter caught at the electric IVT control actuator (bank 1)
- B
- Timing chain installation
 - Intake camshaft sprocket (bank 1) wear

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle. When VTC mechanism sticks, camshaft position does not change from position of stuck angle.)

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.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

P0011 INTAKE VALVE TIMING CONTROL

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

ⓑ With CONSULT

1. On CONSULT screen, select "DATA MONITOR" mode.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 10 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

4. Let engine idle for 10 seconds.
5. Check DTC.

Is DTC P0011 detected?

- YES >> Proceed to [EC6-326, "Diagnosis Procedure"](#)
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

ⓑ With CONSULT

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

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

2. Check DTC.

Is DTC P0011 detected?

- YES >> Proceed to [EC6-326, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013650879

TYPE A

1. CHECK ELECTRIC IVT CONTROL ACTUATOR MOTOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control actuator (bank 1). Refer to [EM-238, "Exploded View"](#).
NO >> Repair or replace error-detected parts.

P0011 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

TYPE B

1. CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to [EM-238, "Exploded View"](#).

NO >> GO TO 2.

2. CHECK CAMSHAFT SPROCKET AND TIMING CHAIN

Check the following.

1. Visually check for chipping camshaft sprocket (bank 1) gear tooth.
2. timing chain tension and elongation.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

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P0014, P0024 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0014, P0024 EVT CONTROL

DTC Description

INFOID:0000000013591511

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0014	EXH/V TIM CONT-B1 ("B" camshaft position - timing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.
P0024	EXH/V TIM CONT-B2 ("B" camshaft position - timing over-advanced or system performance bank 2)	

POSSIBLE CAUSE

- Crankshaft position sensor
- 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

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle. When VTC mechanism sticks, camshaft position does not change from position of stuck angle.)

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0014 or P0024 is displayed with DTC P0078 or P0084, first perform the confirmation procedure (trouble diagnosis) for DTC P0078 or P0084.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0078: Refer to [EC6-351, "DTC Description"](#).
 - DTC P0084: Refer to [EC6-351, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE - 1

Ⓜ With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to the normal operating temperature.

P0014, P0024 EVT CONTROL

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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

4. Let engine idle for 10 seconds.

5. Check 1st trip DTC.

 With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-323, "Diagnosis Procedure"](#)

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE - 2

 With CONSULT

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

ENG SPEED	1,200 – 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

2. Check 1st trip DTC.

 With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-323, "Diagnosis Procedure"](#)

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591512

1.CHECK DTC PRIORITY

If DTC P0014 or P0024 is displayed with DTC P0078 or P0084, first perform the confirmation procedure (trouble diagnosis) for DTC P0078 or P0084.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC P0078: Refer to [EC6-351, "DTC Description"](#).
- DTC P0084: Refer to [EC6-351, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK OIL PRESSURE WARNING

1. Start engine.

P0014, P0024 EVT CONTROL

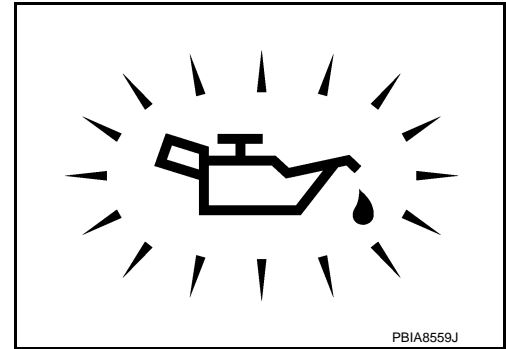
[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. Check oil pressure warning and confirm it is not displayed.

Is oil pressure warning displayed?

- YES >> Check the engine oil level. Refer to [LU-27. "Inspection"](#).
NO >> GO TO 3.



3. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to [EC6-352. "Component Inspection \(Exhaust Valve Timing Control Solenoid Valve\)"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View"](#).

4. CHECK CRANKSHAFT POSITION SENSOR

Check the crankshaft position sensor. Refer to [EC6-528. "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace crankshaft position sensor. Refer to [EM-198. "Exploded View"](#).

5. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to [EC6-537. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace malfunctioning exhaust valve timing control position sensor. Refer to [EM-250. "Exploded View"](#).

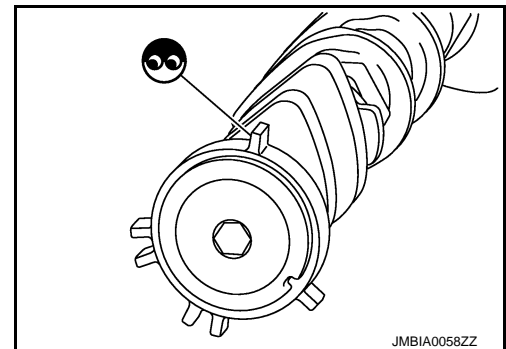
6. CHECK CAMSHAFT (EXH)

Check the following.

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

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-250. "Exploded View"](#).



7. CHECK TIMING CHAIN INSTALLATION

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

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

- YES >> Check timing chain installation. Refer to [EM-238. "Exploded View"](#).
NO >> GO TO 8.

8. CHECK LUBRICATION CIRCUIT

Refer to [EM-255. "Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END.

P0014, P0024 EVT CONTROL

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Clean lubrication line.

Component Inspection (Exhaust Valve Timing Control Solenoid Valve)

INFOID:000000013591513

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE - 1

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

Exhaust valve timing control solenoid valve		Condition		Resistance
+	-			
Terminal				
1	2			7.0 – 7.8 Ω
1	Ground	Temperature	20°C (68°F)	∞ (Continuity should not exist)
2				

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View"](#).

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE - 2

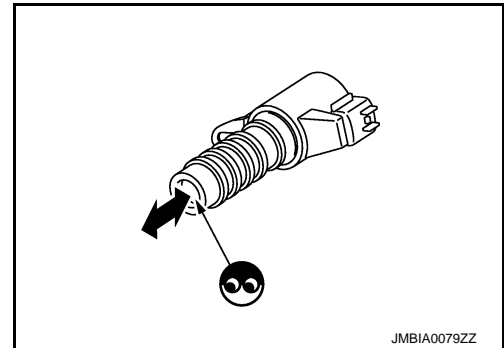
1. Remove exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View"](#).
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:

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

NOTE:

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



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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View"](#).

P0020 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0020 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:0000000013651106

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0020	A camshaft position actuator B2 ["A" camshaft position actuator control circuit/open bank 2]	The electric intake valve timing control module detects internal power stage malfunction.

POSSIBLE CAUSE

- Electric intake valve timing (IVT) control module
- Electric intake valve timing (IVT) control module power supply

FAIL-SAFE

Fail safe mode	Vehicle behavior
Combustion control mode	Stratified charge combustion control at starting or Listed below: <ul style="list-style-type: none">• Idle speed control• Recovery speed control at decelerating
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)

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 when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P0020 detected?

- YES >> Proceed to [EC6-326. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013651107

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305. "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 2.

P0020 INTAKE VALVE TIMING CONTROL

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.

2. Perform DTC confirmation procedure. Refer to [EC6-326, "DTC Description"](#).

Is DTC P0020 detected again?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

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P0021 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0021 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:000000013599765

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0021	INT/V TIM CONT-B2 [Intake valve timing control performance (bank 2)]	A	When the absolute difference between target angle and actual angle is more than 13 degree (camshaft angle) for 6 seconds under the following conditions. <ul style="list-style-type: none">• Ignition switch: ON• Engine speed: 1,200 – 3,175 rpm• Engine coolant temperature: 60 – 120°C (140 – 248°F)• Battery voltage: 11 – 16 V
		B	When the absolute difference between valve timing control reference position and base angle is more than 13 degree (camshaft angle) for 3 seconds under the following conditions. <ul style="list-style-type: none">• Ignition switch: ON• Engine speed: 500 – 2,000 rpm [when vehicle speed is less than 4 km/h (2.5 MPH)]• Engine speed: 1,200 – 2,000 rpm [when vehicle speed is 4 km/h (2.5 MPH) or more]• Engine coolant temperature: 60 – 120°C (140 – 248°F)• Battery voltage: 11 – 16 V

POSSIBLE CAUSE

A

- Electric intake valve timing (IVT) control actuator (bank 2)
- Harness and connectors [Electric IVT control actuator (bank 2) motor control circuit is open or shorted.]
- Foreign matter caught at the electric IVT control actuator (bank 2)

B

- Timing chain installation
- Intake camshaft sprocket (bank 2) wear

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle. When VTC mechanism sticks, camshaft position does not change from position of stuck angle.)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

P0021 INTAKE VALVE TIMING CONTROL

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

With CONSULT

1. On CONSULT screen, select "DATA MONITOR" mode.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 10 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

4. Let engine idle for 10 seconds.
5. Check DTC.

Is DTC P0021 detected?

- YES >> Proceed to [EC6-329, "Diagnosis Procedure"](#)
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

2. Check DTC.

Is DTC P0021 detected?

- YES >> Proceed to [EC6-329, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013599766

TYPE A

1. CHECK ELECTRIC IVT CONTROL ACTUATOR MOTOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F145	1	E153	4	Existed
	2		6	
	3		2	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control actuator (bank 2). Refer to [EM-238, "Exploded View"](#).
NO >> Repair or replace error-detected parts.

P0021 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

TYPE B

1. CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to [EM-238. "Exploded View"](#).

NO >> GO TO 2.

2. CHECK CAMSHAFT SPROCKET AND TIMING CHAIN

Check the following.

1. Visually check for chipping camshaft sprocket gear tooth.
2. timing chain tension and elongation.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P0030, P0050 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0030, P0050 A/F SENSOR 1 HEATER

DTC Description

INFOID:000000013599768

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0030	HO2S1 HTR B1 (HO2S heater control circuit bank 1 sensor 1)	Deterioration in A/F sensor 1 heater performance. (Voltage signal transmitted from A/F sensor 1 heater to ECM is higher/lower than voltage in the normal range.)
P0050	Heated O2 sensor heater B2 sensor 1 (HO2S heater control circuit bank 2 sensor 1)	Deterioration in A/F sensor 1 heater performance. (Voltage signal transmitted from A/F sensor 1 heater to ECM is higher/lower than voltage in the normal range.)

C

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POSSIBLE CAUSE

DTC P0030

- Harness or connectors [The A/F sensor 1 heater (bank 1) circuit is open or shorted.]
- A/F sensor 1 heater (bank 1)

F

DTC P0050

- Harness or connectors [The A/F sensor 1 heater (bank 2) circuit is open or shorted.]
- A/F sensor 1 heater (bank 2)

G

FAIL-SAFE

Not applicable

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.

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TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5 V and 16 V at idle.

K

L

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

M

Is 1st trip DTC detected?

N

YES >> Proceed to [EC6-335, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

O

Diagnosis Procedure

INFOID:000000013599769

1. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT - 1

P

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.

P0030, P0050 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	+			-	Voltage
	A/F sensor 1				
	Bank	Connector	Terminal		
P0030	1	F133	1	Ground	Battery voltage
P0050	2	F134	1		

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 4.

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

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

DTC	+			-		Continuity
	A/F sensor 1			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0030	1	F133	2	F142	94	Existed
P0050	2	F134	2		151	

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR 1 HEATER

Check A/F sensor 1 heater. Refer to [EC6-336. "Component Inspection \(A/F Sensor 1 Heater\)".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning A/F sensor 1. Refer to [EM-231. "Exploded View".](#)

4.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT - 2

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

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0030	E123	52	F133	1	Existed
P0050			F134	1	

4. Also check harness for short to ground.

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

Component Inspection (A/F Sensor 1 Heater)

INFOID:000000013599770

1.CHECK A/F SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as follows.

P0030, P0050 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

A/F sensor 1		Condition		Resistance
+	-			
Terminal				
1	2	Temperature	25°C (77°F)	1.80 – 2.44 Ω
	3			∞ (Continuity should not exist)
	4			
2	3			
	4			
3	4			

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning A/F sensor 1. Refer to [EM-231, "Exploded View"](#).

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

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

DTC Description

INFOID:000000013591514

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0031	A/F SEN1 HTR (B1) (HO2S heater control circuit low bank 1 sensor 1)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)
P0032	A/F SEN1 HTR (B1) (HO2S heater control circuit high bank 1 sensor 1)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)
P0051	A/F SEN1 HTR (B2) (HO2S heater control circuit low bank 2 sensor 1)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)
P0052	A/F SEN1 HTR (B2) (HO2S heater control circuit high bank 2 sensor 1)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)

POSSIBLE CAUSE

DTC P0031

- Harness or connectors [The A/F sensor 1 heater (bank 1) circuit is open or shorted.]
- A/F sensor 1 heater (bank 1)

DTC P0032

- Harness or connectors [The A/F sensor 1 heater (bank 1) circuit is shorted.]
- A/F sensor 1 heater (bank 1)

DTC P0051

- Harness or connectors [The A/F sensor 1 heater (bank 2) circuit is open or shorted.]
- A/F sensor 1 heater (bank 2)

DTC P0052

- Harness or connectors [The A/F sensor 1 heater (bank 2) circuit is shorted.]
- A/F sensor 1 heater (bank 2)

FAIL-SAFE

Not applicable

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 10.5 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

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

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-335. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

A

EC6

Diagnosis Procedure

INFOID:0000000013591515

1. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT - 1

C

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.

D

E

DTC	+			-	Voltage
	A/F sensor 1				
	Bank	Connector	Terminal		
P0031, P0032	1	F133	1	Ground	Battery voltage
P0051, P0052	2	F134	1		

F

G

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 4.

H

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

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

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DTC	+			-		Continuity
	A/F sensor 1			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0031, P0032	1	F133	2	F142	94	Existed
P0051, P0052	2	F134	2		151	

K

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

L

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

M

3. CHECK A/F SENSOR 1 HEATER

Check A/F sensor 1 heater. Refer to [EC6-336. "Component Inspection \(A/F Sensor 1 Heater\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning A/F sensor 1. Refer to [EM-231. "Exploded View"](#).

N

O

4. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT - 2

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

P

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

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0031, P0032	E123	52	F133	1	Existed
P0051, P0052			F134	1	

4. Also check harness for short to ground.

Is the inspection result normal?

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

Component Inspection (A/F Sensor 1 Heater)

INFOID:000000013591516

1. CHECK A/F SENSOR 1

- Turn ignition switch OFF.
- Disconnect A/F sensor 1 harness connector.
- Check resistance between A/F sensor 1 terminals as follows.

A/F sensor 1		Condition		Resistance		
+	-					
Terminal		Temperature	25°C (77°F)	∞ (Continuity should not exist)		
1	2				1.80 – 2.44 Ω	
	3					
	4					
2	3					
	4					
3	4					

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace malfunctioning A/F sensor 1. Refer to [EM-231. "Exploded View"](#).

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0037, P0038, P0057, P0058 HO2S2 HEATER

DTC Description

INFOID:000000013599771

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0037	HO2S2 HTR (B1) (HO2S heater control circuit low bank 1 sensor 2)	<ul style="list-style-type: none">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.)ECM detects the heated oxygen sensor 2 heater circuit is short to ground.
P0038	HO2S2 HTR (B1) (HO2S heater control circuit high bank 1 sensor 2)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)
P0057	HO2S2 HTR (B2) (HO2S heater control circuit low bank 2 sensor 2)	<ul style="list-style-type: none">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.)ECM detects the heated oxygen sensor 2 heater circuit is short to ground.
P0058	HO2S2 HTR (B2) (HO2S heater control circuit high bank 2 sensor 2)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)

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POSSIBLE CAUSE

DTC P0037

- Harness or connectors [The heated oxygen sensor 2 heater (bank 1) circuit is open or shorted.]
- Heated oxygen sensor 2 heater (bank 1)

J

DTC P0038

- Harness or connectors [The heated oxygen sensor 2 heater (bank 1) circuit is shorted.]
- Heated oxygen sensor 2 heater (bank 1)

K

DTC P0057

- Harness or connectors [The heated oxygen sensor 2 heater (bank 2) circuit is open or shorted.]
- Heated oxygen sensor 2 heater (bank 2)

L

DTC P0058

- Harness or connectors [The heated oxygen sensor 2 heater (bank 2) circuit is shorted.]
- Heated oxygen sensor 2 heater (bank 2)

M

FAIL-SAFE

Not applicable

N

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.

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TESTING CONDITION:

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

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-338, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599772

1. CHECK HEATED OXYGEN SENSOR 2 HEATER POWER SUPPLY CIRCUIT - 1

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

DTC	+			-	Voltage
	Heated oxygen sensor 2				
	Bank	Connector	Terminal		
P0037, P0038	1	F92	1	Ground	Battery voltage
P0057, P0058	2	F93	1		

Is the inspection result normal?

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

2. CHECK HEATED OXYGEN SENSOR 2 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	+			-		Continuity
	Heated oxygen sensor 2			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0037, P0038	1	F92	2	F142	166	Existed
P0057, P0058	2	F93	2		163	

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 HEATED OXYGEN SENSOR 2 HEATER

Check heated oxygen sensor 2 heater. Refer to [EC6-339, "Component Inspection \(Heated Oxygen Sensor 2 Heater\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END.
NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226, "Exploded View"](#).

4. CHECK HEATED OXYGEN SENSOR 2 HEATER POWER SUPPLY CIRCUIT - 2

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

DTC	+		-		Continuity
	IPDM E/R		Heated oxygen sensor 2		
	Connector	Terminal	Connector	Terminal	
P0037, P0038	E123	52	F92	1	Existed
P0057, P0058			F93	1	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.

Component Inspection (Heated Oxygen Sensor 2 Heater)

INFOID:000000013599773

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

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

Heated oxygen sensor 2		Condition		Resistance
+	-			
Terminal		Temperature	25°C (77°F)	∞ (Continuity should not exist)
1	2			
2	3			
	4			
3	4			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226, "Exploded View"](#).

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P0046, P004B WASTEGATE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0046, P004B WASTEGATE CONTROL ACTUATOR

DTC Description

INFOID:000000013591520

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0046	TC/SC BOOST CONTROL A (Turbocharger/supercharger boost control "A" circuit range/performance)	When engine is running and the rpm is steady, the electric wastegate actuator drive duty is 100% or more.
P004B	TC/SC BOOST CONTROL B (Turbocharger/supercharger boost control "B" circuit range/performance)	<ul style="list-style-type: none">• Motor drive duty is 100% or more for 5 consecutive seconds• The difference between target stroke and actual stroke is 1.95 mm (0.0768 in) or more for 5 consecutive seconds

POSSIBLE CAUSE

DTC P0046

- Wastegate valve stuck
- Wastegate valve caught a foreign matter

DTC P004B

- Wastegate valve stuck
- Wastegate valve caught a foreign matter

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

- If DTC P0046 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.
- If DTC P0046 is displayed with DTC P2562 and/or P2566, first perform the confirmation procedure (trouble diagnosis) for DTC P2562 and/or P2566.
- If DTC P004B is displayed with DTC P2586 and/or P2590, first perform the confirmation procedure (trouble diagnosis) for DTC P2586 and/or P2590.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC P0643: Refer to [EC6-636, "DTC Description"](#).
- DTC P2562: Refer to [EC6-847, "DTC Description"](#).
- DTC P2566: Refer to [EC6-847, "DTC Description"](#).
- DTC P2586: Refer to [EC6-861, "DTC Description"](#).
- DTC P2590: Refer to [EC6-861, "DTC Description"](#).

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.

P0046, P004B WASTEGATE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

TEST CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and warm it up to normal operating temperature.
3. Check 1st trip DTC. (If actuator motor is stuck on the valve closing side, 1st trip DTC is detected during the above procedure. If 1st trip DTC is not detected, actuator motor may be stuck on the valve opening side. In this case, follow the instruction below.)
4. Drive the vehicle and accelerate from 20km/h (13 MPH) to 80km/h (50 MPH) within 10 seconds.

CAUTION:

Always drive at safe speed.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-341, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591521

1.CHECK DTC PRIORITY

- If DTC P0046 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.
- If DTC P0046 is displayed with DTC P2562 and/or P2566, first perform the confirmation procedure (trouble diagnosis) for DTC P2562 and/or P2566.
- If DTC P004B is displayed with DTC P2586 and/or P2590, first perform the confirmation procedure (trouble diagnosis) for DTC P2586 and/or P2590.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC P0643: Refer to [EC6-636, "DTC Description"](#).
- DTC P2562: Refer to [EC6-847, "DTC Description"](#).
- DTC P2566: Refer to [EC6-847, "DTC Description"](#).
- DTC P2586: Refer to [EC6-861, "DTC Description"](#).
- DTC P2590: Refer to [EC6-861, "DTC Description"](#).

NO >> GO TO 2.

2.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
3. Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
4. Perform the test.
5. Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

P0046, P004B WASTEGATE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. CHECK INSTALLATION CONDITION OF CONTROL ROD

1. Turn ignition switch OFF.
2. Visually check that the control rod is installed normally.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning turbocharger. Refer to [EM-233, "Removal and Installation"](#).

4. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

DTC P0046

Electric wastegate control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F139	1	F143	57	Existed
	2		45	
	3		39	
	4	F142	92	
	6	93		

DTC P004B

Electric wastegate control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F138	1	F143	61	Existed
	2		66	
	3		39	
	4	F142	89	
	6	90		

5. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK CARBON DEPOSIT

1. Remove turbocharger (malfunctioning bank side). Refer to [EM-233, "Removal and Installation"](#).
2. Check waste gate valve for carbon deposit and catching a foreign matter.

Is the inspection result normal?

YES >> Replace malfunctioning turbocharger. Refer to [EM-233, "Removal and Installation"](#).

NO >> Clean the wastegate valve.

P0053 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0053 A/F SENSOR 1 HEATER

DTC Description

INFOID:000000013599774

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0053	HO2S1 HTR B1 (HO2S heater resistance bank 1 sensor 1)	During engine running, weighted average of A/F sensor internal resistance is out of the normal range.

POSSIBLE CAUSE

- A/F sensor 1 (bank 1) heater
- Harness and connectors [A/F sensor 1 (bank 1) heater circuit is open or shorted.]

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0053 is displayed with the following DTC, perform the trouble diagnosis for the applicable DTC.

- P0130
- P0031
- P0032

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- P0130: Refer to [EC6-423, "DTC Description"](#).
 - P0031: Refer to [EC6-334, "DTC Description"](#).
 - P0032: Refer to [EC6-334, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

When DTC Confirmation Procedure has been preciously 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.

TEST CONDITION:

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up until the engine coolant temperature reaches 25°C (77°F) or more.
2. Keep the engine at idle at least 35 seconds.
3. Check DTC.

Is DTC P0053 is detected?

- YES >> Proceed to [EC6-343, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599775

1. CHECK DTC PRIORITY

If DTC P0053 is displayed with the following DTC, perform the trouble diagnosis for the applicable DTC.

- P0130
- P0031

P0053 A/F SENSOR 1 HEATER

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- P0032

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- P0130: Refer to [EC6-423, "DTC Description"](#).
 - P0031: Refer to [EC6-334, "DTC Description"](#).
 - P0032: Refer to [EC6-334, "DTC Description"](#).
- NO >> GO TO 2.

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

Check the A/F sensor 1 (BANK 1) heater. Refer to [EC6-345, "Component Inspection \(A/F Sensor\)"](#).

Is the inspection result normal?

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

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

Replace malfunctioning air fuel ratio (A/F) sensor 1 (bank 1). Refer to [EM-231, "Exploded View"](#).

CAUTION:

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

>> INSPECTION END

4. CHECK A/F SENSOR 1 POWER SUPPLY-1

1. Turn ignition switch ON.
2. Check the voltage between A/F sensor 1 (bank 1) harness connector and ground.

+		-	Voltage
A/F sensor 1 (bank 1)			
Connector	Terminal		
F133	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 5.

5. CHECK A/F SENSOR 1 POWER SUPPLY-2

Check the voltage between IPDM E/R harness connector and ground.

+		-	Voltage
IPDM E/R			
Connector	Terminal		
E123	52	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 6.

6. CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #48 fuse (15 A) and check that the fuse is not blowing (open).

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Replace the fuse after repairing the applicable circuit.

P0053 A/F SENSOR 1 HEATER

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

7. CHECK IPDM E/R POWER SUPPLY AND GROUND CIRCUIT

Check IPDM E/R power supply and ground circuit. Refer to [PCS-43, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

8. CHECK A/F SENSOR 1 (BANK 1) HEATER POWER SUPPLY CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and A/F sensor 1 (bank 1) harness connector.

IPDM E/R		A/F sensor 1 (bank 1)		Continuity
Connector	Terminal	Connector	Terminal	
E123	52	F133	1	Existed

3. Check harness for short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

9. CHECK A/F SENSOR 1 (BANK 1) HEATER OUTPUT SIGNAL CIRCUIT

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

A/F sensor 1 (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F133	2	F142	94	Existed

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (A/F Sensor)

INFOID:000000013599776

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 sensor 1		Resistance
+	-	
Terminal		
1	2	1.8 - 2.44 Ω [at 20°C (68°F)]
	3	
	4	
2	3	$\infty \Omega$ (Continuity should not exist)
	4	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE A/F SENSOR 1

Replace air fuel ratio A/F sensor 1. Refer to [EM-231, "Exploded View"](#).

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P0053 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

P0059 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0059 A/F SENSOR 1 HEATER

DTC Description

INFOID:000000013599777

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0059	Heated O2 sensor heater B2 sensor 1 (HO2S heater resistance bank 2 sensor 1)	During engine running, weighted average of A/F sensor internal resistance is out of the normal range.

POSSIBLE CAUSE

- A/F sensor 1 (bank 2) heater
- Harness and connectors [A/F sensor 1 (bank 2) heater circuit is open or shorted.]

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0059 is displayed with the following DTC, perform the trouble diagnosis for the applicable DTC.

- P0150
- P0051
- P0052

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- P0150: Refer to [EC6-423, "DTC Description"](#).
 - P0051: Refer to [EC6-334, "DTC Description"](#).
 - P0052: Refer to [EC6-334, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

When DTC Confirmation Procedure has been preciously 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.

TEST CONDITION:

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up until the engine coolant temperature reaches 25°C (77°F) or more.
2. Keep the engine at idle at least 35 seconds.
3. Check DTC.

Is DTC P0059 is detected?

- YES >> Proceed to [EC6-347, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599778

1. CHECK DTC PRIORITY

If DTC P0059 is displayed with the following DTC, perform the trouble diagnosis for the applicable DTC.

- P0150
- P0051

P0059 A/F SENSOR 1 HEATER

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- P0052

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- P0150: Refer to [EC6-423, "DTC Description"](#).
 - P0051: Refer to [EC6-334, "DTC Description"](#).
 - P0052: Refer to [EC6-334, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2) HEATER

Check the A/F sensor 1 (BANK 2) heater. Refer to [EC6-349, "Component Inspection \(A/F Sensor\)"](#).

Is the inspection result normal?

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

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

Replace malfunctioning air fuel ratio (A/F) sensor 1 (bank 2). Refer to [EM-231, "Exploded View"](#).

CAUTION:

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

>> INSPECTION END

4. CHECK A/F SENSOR 1 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 (bank 2) harness connector and ground.

+		-	Voltage
A/F sensor 1 (bank 2)			
Connector	Terminal		
F134	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 5.

5. CHECK A/F SENSOR 1 POWER SUPPLY-2

Check the voltage between IPDM E/R harness connector and ground.

+		-	Voltage
IPDM E/R			
Connector	Terminal		
E123	52	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 6.

6. CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #48 fuse (15 A) and check that the fuse is not blowing (open).

Is the inspection result normal?

- YES >> GO TO 7.

P0059 A/F SENSOR 1 HEATER

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace the fuse after repairing the applicable circuit.

7. CHECK IPDM E/R POWER SUPPLY AND GROUND CIRCUIT

Check IPDM E/R power supply and ground circuit. Refer to [PCS-43, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

8. CHECK A/F SENSOR 1 (BANK 2) HEATER POWER SUPPLY CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and A/F sensor 1 (bank 2) harness connector.

IPDM E/R		A/F sensor 1 (bank 2)		Continuity
Connector	Terminal	Connector	Terminal	
E123	52	F134	1	Existed

3. Check harness for short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

9. CHECK A/F SENSOR 1 (BANK 2) HEATER OUTPUT SIGNAL CIRCUIT

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

A/F sensor 1 (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F134	2	F142	151	Existed

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (A/F Sensor)

INFOID:0000000013599779

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 sensor 1		Resistance
+	-	
Terminal		
1	2	1.8 - 2.44 Ω [at 20°C (68°F)]
	3	
	4	
2	3	$\infty \Omega$ (Continuity should not exist)
	4	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE A/F SENSOR 1

P0059 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Replace air fuel ratio A/F sensor 1. Refer to [EM-231. "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

P0078, P0084 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0078, P0084 EVT CONTROL SOLENOID VALVE

DTC Description

INFOID:0000000013591526

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve control solenoid circuit bank 1)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.
P0084	EX V/T ACT/CIRC-B2 (Exhaust valve control solenoid circuit bank 2)	

POSSIBLE CAUSE

- Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.)
- Exhaust valve timing control solenoid valve

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to [EC6-351, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591527

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing 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.

DTC	+			-	Voltage
	Exhaust valve timing control solenoid valve				
	Bank	Connector	Terminal		
P0078	1	F84	1	Ground	Battery voltage
P0084	2	F94	1		

P0078, P0084 EVT CONTROL SOLENOID VALVE

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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

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

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between exhaust valve timing control solenoid valve harness connector and IPDM E/R harness connector.

DTC	+			-		Continuity
	Exhaust valve timing control solenoid valve			IPDM E/R		
	Bank	Connector	Terminal	Connector	Terminal	
P0078	1	F84	1	E123	59	Existed
P0084	2	F94	1			

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

3. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

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

DTC	+			-		Continuity
	Exhaust valve timing control solenoid valve			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0078	1	F84	2	F142	157	Existed
P0084	2	F94	2	F142	158	

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check exhaust valve timing control solenoid valve control solenoid valve. Refer to [EC6-352. "Component Inspection \(Exhaust Valve Timing Control Solenoid Valve\)".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View".](#)

Component Inspection (Exhaust Valve Timing Control Solenoid Valve)

INFOID:000000013591528

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE - 1

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

P0078, P0084 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Exhaust valve timing control solenoid valve		Condition		Resistance
+	-			
Terminal				
1	2	Temperature	20°C (68°F)	7.0 – 7.8 Ω
1	Ground			∞ (Continuity should not exist)
2				

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238, "Exploded View"](#).

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE - 2

1. Remove exhaust valve timing control solenoid valve. Refer to [EM-238, "Exploded View"](#).

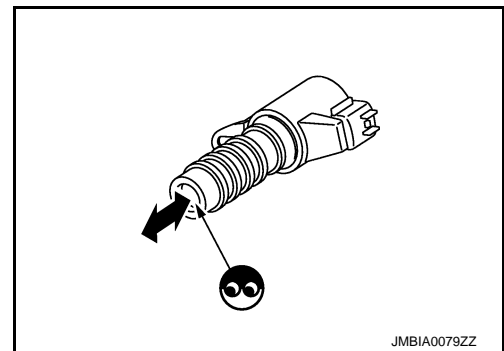
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:

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

NOTE:

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



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238, "Exploded View"](#).

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P0087 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0087 FRP CONTROL SYSTEM

DTC Description

INFOID:000000013591529

DTC DETECTION LOGIC

NOTE:

DTC P0087 may be displayed when running out of gas or air accumulation.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0087	LOW FUEL PRES (High fuel pressure too low)	<ul style="list-style-type: none"> Fuel rail pressure does not reach 4.0 MPa (40.8 kg/cm², 580 psi) at engine cold start [water temperature -12°C (10.4°F) – 40°C (104°F)]. Fuel rail pressure remains at 7.5 MPa (76.5 kg/cm², 1087.5 psi) or less for 1 second or more during engine idle condition after cold start [water temperature -12°C (10.4°F) – 40°C (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 (27.5 kg/cm², 392 psi) or less.

POSSIBLE CAUSE

- Fuel system
- Leakage in fuel line
- High pressure fuel pump
- Low pressure fuel pump
- Damage in lifter

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0087 is displayed with DTC P0090 and/or P1197, first perform the confirmation procedure (trouble diagnosis) for DTC P0090 and/or P1197.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0090: Refer to [EC6-361, "DTC Description"](#).
 - DTC P1197: Refer to [EC6-652, "DTC Description"](#).
- NO >> GO TO 2.

2.CHECK FUEL LEAKAGE

1. Turn ignition switch ON.
2. Visually check the piping between low pressure fuel pump and fuel injectors for fuel leakage.

P0087 FRP CONTROL SYSTEM

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< DTC/CIRCUIT DIAGNOSIS >

3. Start the engine.
4. Visually check the piping between low pressure fuel pump and fuel injectors for fuel leakage.

Is inspection result normal?

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

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, confirm that battery voltage is 11 V or more at idle.
- Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.

>> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-1

 WITH CONSULT

1. Turn ignition switch ON.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check the following condition;

COOLAN TEMP/S : (-12) – (+40)°C (10.4 – 104°F)

 WITH GST

Follow the above steps for "WITH CONSULT".

Is the condition satisfied?

- YES >> GO TO 5.
NO >> 1. Satisfy the condition.
2. Retry from step 1.

5. PERFORM DTC CONFIRMATION PROCEDURE-2

 WITH CONSULT

1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

 WITH GST

Follow the above steps for "WITH CONSULT".

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-356. "Diagnosis Procedure"](#).
NO >> GO TO 6.

6. PERFORM DTC CONFIRMATION PROCEDURE-3

 WITH CONSULT

1. Select "COOLAN TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Maintain the following condition for 10 seconds or more at idle.

COOLAN TEMP/S : 70°C (158°F) or more

3. Check 1st trip DTC.

 WITH GST

Follow the above steps for "WITH CONSULT".

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-356. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P0087 FRP CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000013591530

1. CHECK DTC PRIORITY

If DTC P0087 is displayed with DTC P0090 and/or P1197, first perform the confirmation procedure (trouble diagnosis) for DTC P0090 and/or P1197.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0090: Refer to [EC6-361, "DTC Description"](#).
 - DTC P1197: Refer to [EC6-652, "DTC Description"](#).
- NO >> GO TO 2.

2. BLEED THE FUEL LINE

1. Start the engine, and let the engine run at idle at least for 10 minutes.
2. Perform DTC confirmation procedure of DTC P0087.

Is 1st trip DTC detected?

- YES >> GO TO 3.
NO >> GO TO 7.

3. CHECK LOW FUEL PRESSURE

Check low fuel pressure. Refer to [EC6-279, "Work Procedure"](#).

Is inspection result normal?

- YES >> GO TO 4.
NO >> Check low fuel pressure system. Refer to [EC6-279, "Work Procedure"](#).

4. CHECK LOW PRESSURE FUEL LINE FOR INTERNAL LEAKAGE

1. Turn ignition switch OFF.
2. Turn ignition switch ON.
3. Check the following value 30 minutes after turning the ignition switch ON.

Low fuel pressure : 206 kPa (2.2 kgf/cm², 30 psi) or more

Is inspection result normal?

- YES >> GO TO 5.
NO >> Replace low pressure fuel pump. Refer to [FL-10, "Removal and Installation"](#).

5. CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to [EC6-357, "Component Inspection \(High Pressure Fuel Pump\)"](#).

Is inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace the error-detected parts.

6. CHECK HIGH PRESSURE FUEL PUMP LIFTER

Check high pressure fuel pump lifter. Refer to [EM-178, "Removal and Installation"](#).

Does the lifter top surface have scratches and/or dents?

- YES >> Replace the error-detected parts.
NO >> INSPECTION END

7. CHECK LOW PRESSURE FUEL LINE FOR INTERNAL LEAKAGE

1. Turn ignition switch OFF.
2. Connect fuel pressure gauge. Refer to [EC6-279, "Work Procedure"](#).
3. Turn ignition switch ON.
4. Check the following value 30 minutes after turning the ignition switch ON.

Low fuel pressure : 206 kPa (2.2 kgf/cm², 30 psi) or more

Is inspection result normal?

- YES >> INSPECTION END
NO >> Replace low pressure fuel pump. Refer to [FL-10, "Removal and Installation"](#).

P0087 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Component Inspection (High Pressure Fuel Pump)

INFOID:000000013591531

1. CHECK HIGH PRESSURE FUEL PUMP-1

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

+	-	Condition		Resistance
High pressure fuel pump Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 – 86)	0.47 – 0.53 Ω

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to [EM-178, "Removal and Installation"](#).

2. CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT

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

Monitor item	Condition	Value
FUEL PRES SEN V	Engine speed: idle	0.73 – 1.0 V
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

Connector	ECM		Condition	Value
	+	-		
F143	Terminal		Engine speed: idle	0.73 – 1.0 V
	10	9	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to [EM-178, "Removal and Installation"](#).

P0088 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0088 FRP CONTROL SYSTEM

DTC Description

INFOID:000000013591532

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0088	HIGH FUEL PRES (High fuel pressure too high)	<ul style="list-style-type: none">Fuel rail pressure remains at more than 16.5 MPa (168.3 kg/cm², 2392.5 psi) for 1 second or more during engine idle condition after cold start [water temperature -12°C (10.4°F) – 40°C (104°F)].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 (27.5 kg/cm², 392 psi) or more.

POSSIBLE CAUSE

- Harness or connectors (The high pressure fuel pump circuit is open or shorted.)
- High pressure fuel pump

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0088 is displayed with DTC P0090, first perform the confirmation procedure (trouble diagnosis) for DTC P0090.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-361, "DTC Description"](#).
NO >> GO TO 2.

2. 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.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.
- Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.

>> GO TO 3.

P0088 FRP CONTROL SYSTEM

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< DTC/CIRCUIT DIAGNOSIS >

3.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Warm up the engine to the normal operating temperature and keep the engine speed at idle for 15 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).

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-362, "Diagnosis Procedure"](#).
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

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 [EC6-362, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591533

1.CHECK DTC PRIORITY

If DTC P0088 is displayed with DTC P0090, first perform the confirmation procedure (trouble diagnosis) for DTC P0090.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-361, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK LOW FUEL PRESSURE

Check low fuel pressure. Refer to [EC6-279, "Work Procedure"](#).

Is inspection result normal?

- YES >> GO TO 3.
NO >> Check low fuel pressure system. Refer to [EC6-976, "Diagnosis Procedure"](#).

3.CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to [EC6-359, "Component Inspection \(High Pressure Fuel Pump\)"](#).

Is inspection result normal?

- YES >> GO TO 4.
NO >> Replace error-detected parts.

4.CHECK FUEL LEAKAGE

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

Is inspection result normal?

- YES >> Check that the fuel system has no breakage, bend, and crush. Refer to [FL-7, "Inspection"](#).
NO >> Replace or replace the error-detected parts.

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000013591534

1.CHECK HIGH PRESSURE FUEL PUMP-1

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

P0088 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

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+	-	Condition		Resistance (Approx.)
High pressure fuel pump				
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.47 – 0.53 Ω

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to [EM-178. "Removal and Installation"](#).

2. CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT

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

Monitor item	Condition	Value (Approx.)
FUEL PRES SEN V	Engine speed: idle	0.73 – 1.0 V
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	-		
	Terminal			
F143	10	9	Engine speed: idle	0.73 – 1.0 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to [EM-178. "Removal and Installation"](#).

P0090 HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0090 HIGH PRESSURE FUEL PUMP

DTC Description

INFOID:000000013591535

DTC DETECTION LOGIC

NOTE:

DTC P0090 may be displayed when running out of gas.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0090	FUEL PUMP (High pressure fuel pump circuit)	<ul style="list-style-type: none">Fuel rail pressure remains at 1.1 MPa (11.2 kg/cm², 159.5 psi) or less for 5 seconds or more during engine rev.Fuel rail pressure remains at 27.0 MPa (275.4 kg/cm², 3915.0 psi) or more for 0.3 seconds or more during engine rev.

POSSIBLE CAUSE

- Harness or connectors (The high pressure fuel pump circuit is open or shorted.)
- High pressure fuel pump

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0090 is displayed with DTC P1197, first perform the confirmation procedure (trouble diagnosis) for DTC P1197.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-652, "DTC Description"](#).

NO >> GO TO 2.

2. 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.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.
- Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT

- Start engine.
- Select "COOLAN TEMP/S" in "DATA MONITOR" mode of "ENGNE" using CONSULT.
- Maintain the following condition for 5 seconds or more at idle.

COOLAN TEMP/S : 70°C (158°F) or more

P0090 HIGH PRESSURE FUEL PUMP

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< DTC/CIRCUIT DIAGNOSIS >

4. Check 1st trip DTC.

 WITH GST

Follow the above steps for "WITH CONSULT".

Is 1st trip DTC detected?

YES >> Proceed to [EC6-362, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591536

1.CHECK DTC PRIORITY

If DTC P0090 is displayed with DTC P1197, first perform the confirmation procedure (trouble diagnosis) for DTC P1197.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-652, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

1. Turn ignition switch ON.
2. Disconnect ECM harness connector and high pressure fuel pump harness connector.
3. Check the continuity between ECM harness connector and high pressure fuel pump harness connector.

+		-		Continuity
ECM		High pressure fuel pump		
Connector	Terminal	Connector	Terminal	
F143	9	F120	2	Existed
	10		1	

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

Is inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the error-detected parts.

3.CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to [EC6-362, "Component Inspection \(High Pressure Fuel Pump\)"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Replace the error-detected parts.

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000013591537

1.CHECK HIGH PRESSURE FUEL PUMP-1

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

+	-	Condition		Resistance (Approx.)
High pressure fuel pump				
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.47 – 0.53 Ω

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to [EM-178, "Removal and Installation"](#).

2.CHECK HIGH PRESSURE FUEL PUMP-2

P0090 HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

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WITH CONSULT

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

Monitor item	Condition	Value (Approx.)
FUEL PRES SEN V	Engine speed: idle	0.73 – 1.0 V
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	-		
	Terminal			
F143	10	9	Engine speed: idle	0.73 – 1.0 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to [EM-178. "Removal and Installation"](#).

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P0096 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0096 IAT SENSOR 2

DTC Description

INFOID:000000013636750

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0096	IAT SENSOR 2 B1 [Intake air temperature (IAT) sensor 2 circuit range/performance]	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 voltage signal of the IAT sensor 2 is higher/lower than that of other temperature sensors when the engine is started with its cold state.

POSSIBLE CAUSE

- Harness or connectors (High or low resistance in the IAT sensor 2 circuit)
- Turbocharger boost sensor (bank 1) (IAT sensor 2)

FAIL-SAFE

Not applicable

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

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.

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor (bank 1) harness connector.
3. Check resistance between turbocharger boost sensor (bank 1) terminals as follows.

Turbocharger boost sensor (bank 1)		Condition	Resistance (kΩ)
+	-		
Terminal		Temperature [°C (°F)]	25 (77)
3	4		1.80 – 2.20

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC6-365, "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.

P0096 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

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>> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Move the vehicle to a cool place.

NOTE:

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

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

CAUTION:

Never turn ignition switch ON during this procedure.

NOTE:

The vehicle must be cooled with the hood open.

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

CAUTION:

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-365, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013636752

1. CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 2

Check intake air temperature sensor 2. Refer to [EC6-365, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor (bank 1) (with intake temperature sensor 2). Refer to [EC6-365, "Component Inspection"](#).

Component Inspection

INFOID:0000000013636753

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.

Turbocharger boost sensor		Condition		Resistance (k Ω)
+	-			
Terminals		Temperature [$^{\circ}\text{C}$ ($^{\circ}\text{F}$)]	25 (77)	1.80 – 2.20
3	4			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to [EM-167, "Exploded View"](#).

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0097, P0098 IAT SENSOR 2

DTC Description

INFOID:000000013591538

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0097	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit low input)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 0.085 V or less.
P0098	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit high input)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 4.84 V or more.

POSSIBLE CAUSE

- Harness or connectors (The intake air temperature sensor 2 circuit is open or shorted.)
- Intake air temperature sensor 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0097 or P0098 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).
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.

TEST CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-366. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591539

1.CHECK DTC PRIORITY

If DTC P0097 or P0098 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).
NO >> GO TO 2.

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

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

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost sensor harness connector terminals.

Turbocharger boost sensor (bank 1)			Voltage (Approx.)
Connector	+	-	
		Terminal	
F90	2	4	5 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPLY - 2

Check the voltage between turbocharger boost sensor harness connector terminal and ground.

+		-	Voltage (Approx.)
Turbocharger boost sensor (bank 1)			
Connector	Terminal		
F90	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPL CIRCUIT FOR OPEN AND SHORT

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

+		-		Continuity
Turbocharger boost sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F90	2	F143	38	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

5.CHECK INTAKE AIR TEMPERATURE SENSOR 2 GROUND CIRCUIT FOR OPEN OR SHORT

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

+		-		Continuity
Turbocharger boost sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F90	4	F143	23	Existed

4. Also check harness for short to power.

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ECM GROUND CIRCUIT FOR OPEN OR SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

7. CHECK INTAKE AIR TEMPERATURE SENSOR 2 SIGNAL CIRCUIT FOR OPEN OR SHORT

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

+		-		Continuity
Turbocharger boost sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F90	3	F143	62	Existed

4. 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.

8. CHECK INTAKE AIR TEMPERATURE SENSOR 2

Check intake air temperature sensor 2. Refer to [EC6-368, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning turbocharger boost sensor (with intake air temperature sensor 2). Refer to [EM-167, "Exploded View"](#).

Component Inspection

INFOID:000000013591540

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.

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

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Turbocharger boost sensor (bank 1)		Condition		Resistance (kΩ)
+	-			
Terminals				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor (bank 1) (with intake air temperature sensor 2). Refer to [EM-167. "Exploded View"](#).

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P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

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P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

DTC Description

INFOID:000000013591541

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P00B3	RADIATOR COOLANT TEMP SEN (Radiator coolant temperature sensor circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the engine coolant temperature sensor 2 is 0.04 V or less.
P00B4	RADIATOR COOLANT TEMP SEN (Radiator coolant temperature sensor circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the engine coolant temperature sensor 2 is 4.84 V or more.

POSSIBLE CAUSE

- Harness or connectors (Engine coolant temperature sensor 2 circuit is open or shorted.)
- Engine coolant temperature sensor 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-370, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591542

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 POWER SUPPLY

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

+		-	Voltage (Approx.)
ECT sensor 2			
Connector	Terminal		
F86	1	Ground	5 V

Is the inspection result normal?

P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

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

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT

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

+		-		Continuity
ECT sensor 2		ECM		
Connector	Terminal	Connector	Terminal	
F86	1	F143	56	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 GROUND CIRCUIT

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

+		-		Continuity
ECT sensor 2		ECM		
Connector	Terminal	Connector	Terminal	
F86	2	F142	100	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2

Check the engine coolant temperature sensor 2. Refer to [EC6-371. "Component Inspection \(Engine Coolant Temperature Sensor 2\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor 2. Refer to [CO-63. "Exploded View"](#).

Component Inspection (Engine Coolant Temperature Sensor 2)

INFOID:0000000013591543

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 2 harness connector.
3. Remove engine coolant temperature sensor 2. Refer to [CO-63. "Exploded View"](#).

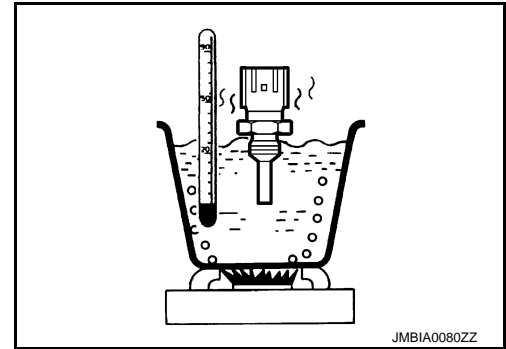
P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

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4. Check resistance between engine coolant temperature sensor 2 terminals by heating with hot water as shown in the figure.

ECT sensor 2		Condition	Resistance
+	-		
Terminal			
1	2	Temperature [°C (°F)]	
			20 (68) 2.10 – 2.90 kΩ
			50 (122) 0.68 – 1.00 kΩ
		90 (194) 0.236 – 0.260 kΩ	



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor 2. Refer to [CO-63, "Exploded View"](#).

P00E0 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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P00E0 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:000000013599789

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P00E0	Charge air cooler coolant temp sensor (Charge air cooler coolant temperature sensor circuit low)	A CAC coolant temperature sensor signal voltage is less than 0.04 V.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) coolant temperature sensor circuit is shorted.]
- CAC coolant temperature sensor

FAIL-SAFE

Not applicable

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 10 seconds.
2. Check DTC.

Is DTC P00E0 detected?

- YES >> Proceed to [EC6-373. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599790

1. CHECK CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC coolant temperature sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC coolant temperature sensor harness connector terminals.

CAC coolant temperature sensor			Voltage (Approx.)
Connector	+	-	
	Terminal		
E160	1	2	5 V

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 2.

2. CHECK CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR POWER SUPPLY-2

Check the voltage between CAC coolant temperature sensor harness connector and ground.

P00E0 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage (Approx.)
Connector	Terminal		
E160	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK CAC COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CAC coolant temperature sensor harness connector and ECM harness connector.

CAC coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E160	1	F143	59	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK CAC COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CAC coolant temperature sensor harness connector and ECM harness connector.

CAC coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E160	2	F142	97	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

5. CHECK CAC COOLANT TEMPERATURE SENSOR

Check the CAC coolant temperature sensor. Refer to [EC6-374, "Component Inspection \(Charge Air Cooler Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CAC coolant temperature sensor. Refer to [EM-167, "Exploded View"](#).

Component Inspection (Charge Air Cooler Temperature Sensor)

INFOID:0000000013599791

1. CHECK CHARGE AIR COOLER (CAC) TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove CAC coolant temperature sensor. Refer to [CO-49, "Exploded View"](#).
3. Check the resistance between CAC coolant temperature sensor terminals under the following conditions.

P00E0 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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Terminal	Condition	Resistance
1 and 2	20°C (68°F)	2.37 – 2.63 kΩ
	50°C (122°F)	0.68 – 1.00 kΩ
	90°C (194°F)	0.236 – 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CAC coolant temperature sensor. Refe to [EM-167. "Exploded View"](#).

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P00E1 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P00E1 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:000000013599792

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P00E1	Charge air cooler coolant temp sensor (Charge air cooler coolant temperature sensor circuit high)	A CAC coolant temperature sensor signal voltage is more than 4.84 V.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) coolant temperature sensor circuit is open or shorted.]
- CAC coolant temperature sensor

FAIL-SAFE

Not applicable

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 10 seconds.
2. Check DTC.

Is DTC P00E1 detected?

YES >> Proceed to [EC6-376. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599793

1.CHECK CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC coolant temperature sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC coolant temperature sensor harness connector terminals.

CAC coolant temperature sensor			Voltage (Approx.)
Connector	+	-	
	Terminal		
E160	1	2	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2.CHECK CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR POWER SUPPLY-2

Check the voltage between CAC coolant temperature sensor harness connector and ground.

P00E1 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage (Approx.)
CAC coolant temperature sensor			
Connector	Terminal		
E160	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK CAC COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CAC coolant temperature sensor harness connector and ECM harness connector.

CAC coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E160	1	F143	59	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK CAC COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CAC coolant temperature sensor harness connector and ECM harness connector.

CAC coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E160	2	F142	97	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

5. CHECK CAC COOLANT TEMPERATURE SENSOR

Check the CAC coolant temperature sensor. Refer to [EC6-374, "Component Inspection \(Charge Air Cooler Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CAC coolant temperature sensor. Refer to [EM-167, "Exploded View"](#).

Component Inspection (Charge Air Cooler Temperature Sensor)

INFOID:0000000013599794

1. CHECK CHARGE AIR COOLER (CAC) TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove CAC coolant temperature sensor. Refer to [CO-49, "Exploded View"](#).
3. Check the resistance between CAC coolant temperature sensor terminals under the following conditions.

P00E1 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Terminal	Condition	Resistance
1 and 2	20°C (68°F)	2.37 – 2.63 kΩ
	50°C (122°F)	0.68 – 1.00 kΩ
	90°C (194°F)	0.236 – 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CAC coolant temperature sensor. Refe to [EM-167, "Exploded View"](#).

P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0101, P010B MAF SENSOR

DTC Description

INFOID:000000013591544

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0101	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit range/ performance)	<ul style="list-style-type: none"> A low frequency from the sensor is sent to ECM under light load driving condition. A high frequency from the sensor is sent to ECM under heavy load driving condition.
P010B	MAF SEN/CIRCUIT-B2 (Mass or volume air flow "B" circuit range/ performance)	

POSSIBLE CAUSE

DTC P0101

- Harness or connectors [The mass air flow sensor (bank 1) circuit is open or shorted.]
- Mass air flow sensor (bank 1)
- EVAP control system pressure sensor
- Intake air leaks
- Intake air temperature sensor

DTC P010B

- Harness or connectors [The mass air flow sensor (bank 2) circuit is open or shorted.]
- Mass air flow sensor (bank 2)
- EVAP control system pressure sensor
- Intake air leaks

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none"> Partially controls ignition timing control. Controls ignition timing delay control in the intermediate water temperature range.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0101 or P010B is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

P0101, P010B MAF SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3.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 at a safe speed.

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

NOTE:

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

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-380, "Diagnosis Procedure"](#).
- NO >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591545

1.CHECK DTC PRIORITY

If DTC P0101 or P010B is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- NO >> GO TO 2.

2.CHECK INTAKE SYSTEM

Check the following items to see the installation condition and the connection condition of the joint.

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

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR POWER SUPPLY

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

P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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DTC	+			-	Voltage (Approx.)
	Mass air flow sensor				
	Bank	Connector	Terminal		
P0101	1	F99	1	Ground	5 V
P010B	2	F98	2		

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 4.

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

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

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0101	1	F99	1	F143	37	Existed
P010B	2	F98	2		76	

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

Is the inspection result normal?

YES-1 (P0101 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

YES-2 (P010B is detected)>>GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

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

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

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0101	1	F99	3	F143	42	Existed
P010B	2	F98	3		79	

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0101	1	F99	2	F143	41	Existed
P010B	2	F98	1		46	

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor. Refer to [EC6-405, "Component Inspection \(Intake Air Temperature Sensor 1\)"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor). Refer to [EM-165, "Exploded View"](#).

10.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC6-572, "Component Inspection"](#).

Is the inspection result normal?

YES-1 (DTC P0101 is detected)>>GO TO 11.

YES-2 (DTC P010B is detected)>>GO TO 12.

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

11.CHECK MASS AIR FLOW SENSOR (BANK 1)

Check mass air flow sensor (bank 1). Refer to [EC6-383, "Component Inspection \(Mass Air Flow Sensor\)"](#).

Is the inspection result normal?

YES >> Check intermittent Incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Replace mass air flow sensor (bank 1). Refer to [EM-165, "Exploded View"](#).

12.CHECK MASS AIR FLOW SENSOR (BANK 2)

Check mass air flow sensor (bank 2). Refer to [EC6-383, "Component Inspection \(Mass Air Flow Sensor\)"](#).

P0101, P010B MAF SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (bank 2). Refer to [EM-165. "Exploded View"](#).

Component Inspection (Mass Air Flow Sensor)

INFOID:0000000013591546

EC6

1. CHECK MASS AIR FLOW SENSOR-I

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode.
5. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

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 frequency between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Frequency
	+ Terminal	- Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Intake valve deposits

P0101, P010B MAF SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

- Improper specification of intake air system parts

Is the inspection result normal?

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

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select "DATA MONITOR" mode.
4. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Without CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the frequency between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Frequency
	+ Terminal	- Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode.
5. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

⊗ 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 frequency between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Frequency
	+	-		
	Terminal	Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Clean or replace malfunctioning mass air flow sensor.

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P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0102, P0103, P010C, P010D MAF SENSOR

DTC Description

INFOID:000000013591547

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0102	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit low input)	An excessively low frequency from the sensor is sent to ECM.
P0103	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit high input)	An excessively high frequency from the sensor is sent to ECM.
P010C	MAF SEN/CIRCUIT-B2 (Mass or volume air flow "B" circuit low input)	An excessively low frequency from the sensor is sent to ECM.
P010D	MAF SEN/CIRCUIT-B2 (Mass or volume air flow "B" circuit high input)	An excessively high frequency from the sensor is sent to ECM.

POSSIBLE CAUSE

DTC P0102

- Harness or connectors [The mass air flow sensor (bank 1) circuit is open or shorted.]
- Mass air flow sensor (bank 1)

DTC P0103

- Harness or connectors [The mass air flow sensor (bank 1) circuit is open or shorted.]
- Intake air leaks
- Mass air flow sensor (bank 1)

DTC P010C

- Harness or connectors [The mass air flow sensor (bank 2) circuit is open or shorted.]
- Mass air flow sensor (bank 2)

DTC P010D

- Harness or connectors [The mass air flow sensor (bank 2) circuit is open or shorted.]
- Intake air leaks
- Mass air flow sensor (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Partially controls ignition timing control.• Controls ignition timing delay control in the intermediate water temperature range.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0102 or P0103 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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.

Which DTC is detected?

- P0102, P010C>>GO TO 3.
- P0103, P010D>>GO TO 4.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102 AND P010C

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

Is DTC detected?

- YES >> Proceed to [EC6-387. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

4. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-I

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

Is DTC detected?

- YES >> Proceed to [EC6-387. "Diagnosis Procedure"](#).
- NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-II

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

Is DTC detected?

- YES >> Proceed to [EC6-387. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591548

1. CHECK DTC PRIORITY

If DTC P0102 or P0103 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).
- NO >> GO TO 2.

2. INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

- P0102, P010C>>GO TO 3.
- P0103, P010D>>GO TO 4.

3. 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 4.
- NO >> Reconnect the parts.

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P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

4. CHECK MASS AIR FLOW SENSOR POWER SUPPLY

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

DTC	+			-	Voltage (Approx.)
	Mass air flow sensor				
	Bank	Connector	Terminal		
P0102, P0103	1	F99	1	Ground	5 V
P010C, P010D	2	F98	2		

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 5.

5. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0102, P0103	1	F99	1	F143	37	Existed
P010C, P010D	2	F98	2		76	

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

Is the inspection result normal?

- YES-1 (P0102 or P0103 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).
YES-2 (P010C or P010D is detected)>>GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).
NO >> Repair or replace error-detected parts.

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

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

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0102, P0103	1	F99	3	F143	42	Existed
P010C, P010D	2	F98	3		79	

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

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

8. CHECK ECM GROUND CIRCUIT

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0102, P0103	1	F99	2	F143	41	Existed
P010C, P010D	2	F98	1		46	

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

Is the inspection result normal?

YES >> GO TO 10.

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

10. CHECK MASS AIR FLOW SENSOR

Refer to [EC6-389, "Component Inspection \(Mass Air Flow Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning mass air flow sensor. Refer to [EM-165, "Exploded View"](#).

Component Inspection (Mass Air Flow Sensor)

INFOID:000000013591549

1. CHECK MASS AIR FLOW SENSOR-I

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode.
5. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

⊗ 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 frequency between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Frequency
	+	-		
	Terminal	Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

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

2. CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

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

Is the inspection result normal?

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

3. CHECK MASS AIR FLOW SENSOR-II

Ⓟ With CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select "DATA MONITOR" mode.
4. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

⊗ Without CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the frequency between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Frequency
	+	-		
	Terminal	Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

Ⓜ With CONSULT

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode.
5. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

⊗ 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 frequency between ECM harness connector terminals under the following conditions.

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EC6

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P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM			Condition	Frequency
Connector	+	-		
	Terminal	Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace malfunctioning mass air flow sensor.

P0106 MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0106 MANIFOLD ABSOLUTE PRESSURE SENSOR

DTC Description

INFOID:000000013599795

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0106	ABSL PRES SEN/CIRC (Manifold absolute pressure/barometric pressure sensor circuit range/performance)	Difference between intake manifold air pressure and estimated intake manifold air pressure.

POSSIBLE CAUSE

- Harness and connectors
(Manifold absolute pressure (MAP) sensor circuit is open or shorted.)
- MAP sensor

FAIL-SAFE

Not applicable

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. Accelerate the vehicle from 40 km/h (25MPH) to 70 km/h (44 MPH) or more within 7 seconds.

CAUTION:

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

NOTE:

Keeping the accelerator pedal as steady as possible at approximately 3/8 during the acceleration allows easy diagnosis.

2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-393, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599796

1. CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR FITTING CONDITION

Check MAP sensor fitting condition.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Adjust parts fitting condition.

2. CHECK FOR CHARGE AIR LEAK

1. Start the engine and let it idle.
2. Listen for an charge air leak.

Is intake air leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 3.

P0106 MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. CHECK MAP SENSOR HARNESS CONNECTOR CONNECTION

Check MAP sensor harness connector connection condition.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK MAP SENSOR

Check MAP sensor. Refer to [EC6-395, "Component Inspection \(Manifold Absolute Pressure Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace MAP sensor. Refer to [EM-173, "Exploded View"](#).

5. CHECK MAP SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect MAP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between MAP sensor harness connector and ground.

+		-	Voltage (Approx.)
MAP sensor			
Connector	Terminal		
F102	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. CHECK MAP SENSOR POWER SUPPLY CIRCUIT

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

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F143	80	F102	1	Existed

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

7. CHECK MAP SENSOR GROUND CIRCUIT

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

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F142	114	F102	3	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK MAP SENSOR CIRCUIT

Check MAP sensor circuit for open and short.

P0106 MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F142	113	F102	2	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Manifold Absolute Pressure Sensor)

INFOID:0000000013665257

1. CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR-1

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

Connector	ECM	
	+	-
	Terminal	
F142	113	114

NOTE:

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

5. Measure the atmospheric pressure.

NOTE:

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

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

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

Atmospheric pressure (hPa)	Voltage (V)
800	1.4 – 1.9
850	1.5 – 2.0
900	1.6 – 2.1
950	1.7 – 2.2
1000	1.75 – 2.3
1050	1.8 – 2.4

Is the inspection result normal?

YES >> GO TO 2.

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EC6
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P0106 MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> Replace MAP sensor.

2. CHECK MAP SENSOR-2

1. Start engine and let it idle.
2. Check intake manifold vacuum.
3. Check the voltage between ECM harness connector terminals as follows.

ECM		
Connector	+	-
	Terminal	
F142	113	114

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

Intake manifold vacuum [kPa (mmHg)]	Voltage difference (V)
-40 (-300)	0.8 – 1.3
-53.3 (-400)	1.0 – 1.5
-66.7 (-500)	1.2 – 1.7
-80 (-600)	1.4 – 1.9

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace MAP sensor. Refer to [EM-173. "Exploded View"](#).

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

DTC Description

INFOID:000000013636754

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms	DTC detecting condition
P010A	ABSL PRES SEN/CIRC	<ul style="list-style-type: none">An excessively low voltage from the sensor is sent to ECM.An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Manifold absolute pressure (MAP) sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2.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.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to [EC6-397, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013636755

1.CHECK DTC PRIORITY

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK MAP SENSOR

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Check MAP sensor. Refer to [EC6-399. "Component Inspection \(Manifold Absolute Pressure Sensor\)".](#)

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace MAP sensor. Refer to [EM-173. "Exploded View".](#)

4.CHECK MAP SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect MAP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between MAP sensor harness connector and ground.

+		-	Voltage (Approx.)
MAP sensor			
Connector	Terminal		
F102	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK MAP SENSOR POWER SUPPLY CIRCUIT

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

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F143	80	F102	1	Existed

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure".](#)

NO >> Repair or replace error-detected parts.

6.CHECK MAP SENSOR GROUND CIRCUIT

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

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F142	114	F102	3	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 MAP SENSOR CIRCUIT

Check MAP sensor circuit for open and short.

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F142	113	F102	2	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Component Inspection (Manifold Absolute Pressure Sensor)

INFOID:000000013636756

1. CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR-1

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

Connector	ECM	
	+	-
	Terminal	
F142	113	114

NOTE:

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

5. Measure the atmospheric pressure.

NOTE:

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

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

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

Atmospheric pressure (hPa)	Voltage (V)
800	1.4 – 1.9
850	1.5 – 2.0
900	1.6 – 2.1
950	1.7 – 2.2
1000	1.75 – 2.3
1050	1.8 – 2.4

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace MAP sensor.

2. CHECK MAP SENSOR-2

1. Start engine and let it idle.
2. Check intake manifold vacuum.
3. Check the voltage between ECM harness connector terminals as follows.

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM		
Connector	+	-
	Terminal	
F142	113	114

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

Intake manifold vacuum [kPa (mmHg)]	Voltage difference (V)
-40 (-300)	0.8 – 1.3
-53.3 (-400)	1.0 – 1.5
-66.7 (-500)	1.2 – 1.7
-80 (-600)	1.4 – 1.9

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace MAP sensor. Refer to [EM-173. "Exploded View"](#).

P0111 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0111 IAT SENSOR

DTC Description

INFOID:000000013591550

DTC DETECTION LOGIC

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

POSSIBLE CAUSE

- Harness or connectors (High or low resistance in the IAT sensor circuit)
- Mass air flow sensor (bank 1) (IAT sensor 1)

FAIL-SAFE

Not applicable

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

NOTE:

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

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor (bank 1) harness connector.
3. Check resistance between mass air flow sensor (bank 1) terminals as follows.

Terminals	Condition	Resistance (kΩ)
3 and 4	Temperature [°C (°F)] 25 (77)	1.800 – 2.200

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-402, "Diagnosis Procedure"](#).

3.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Move the vehicle to a cool place.

NOTE:

P0111 IAT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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

- Turn ignition switch OFF and leave the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during this procedure.

NOTE:

The vehicle must be cooled with the hood open.

- Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-402, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591551

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check intake air temperature sensor 1. Refer to [EC6-402, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor 1). Refer to [EM-165, "Exploded View"](#).

Component Inspection

INFOID:0000000013591552

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1

- Turn ignition switch OFF.
- Disconnect mass air flow sensor (bank 1) harness connector.
- Check resistance between mass air flow sensor (bank 1) terminals as follows.

Terminals	Condition	Resistance (k Ω)
3 and 4	Temperature [$^{\circ}\text{C}$ ($^{\circ}\text{F}$)]	25 (77) 1.800 – 2.200

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor 1). Refer to [EM-165, "Exploded View"](#).

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0112, P0113 IAT SENSOR

DTC Description

INFOID:000000013591553

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0112	IAT SEN/CIRCUIT-B1 (Intake air temperature sensor 1 circuit low bank 1)	An excessively low voltage from the sensor is sent to ECM.
P0113	IAT SEN/CIRCUIT-B1 (Intake air temperature sensor 1 circuit high bank 1)	An excessively high voltage from the sensor is sent to ECM.

C
D
E

POSSIBLE CAUSE

DTC P0112

- Harness or connectors (The intake air temperature sensor 1 circuit is open or shorted.)
- Intake air temperature sensor 1

F

DTC P0113

- Harness or connectors (The intake air temperature sensor 1 circuit is open or shorted.)
- Intake air temperature sensor 1

G

FAIL-SAFE

Not applicable

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.

I

J

>> 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?

K

L

YES >> Proceed to [EC6-403, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

M

N

Diagnosis Procedure

INFOID:000000013591554

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY

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

O

P

MAF sensor (bank 1)		Ground	Voltage (Approx.)
Connector	Terminal		
F99	4	Ground	5 V

Is the inspection result normal?

P0112, P0113 IAT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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

2.CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

MAF sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	4	F143	40	Existed

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

Is the inspection result normal?

- YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	3	F143	42	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

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

+		-	Continuity
ECM			
Connector	Terminal	Ground	Existed
F143	2		
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 INTAKE AIR TEMPERATURE SENSOR 1

P0112, P0113 IAT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Refer to [EC6-405. "Component Inspection \(Intake Air Temperature Sensor 1\)".](#)

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor 1). Refer to [EM-165. "Exploded View".](#)

Component Inspection (Intake Air Temperature Sensor 1)

INFOID:000000013591555

1. CHECK INTAKE AIR TEMPERATURE SENSOR

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to [EM-165. "Exploded View".](#)

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P0116 ENGINE COOLANT TEMPERATURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0116 ENGINE COOLANT TEMPERATURE SENSOR 1

DTC Description

INFOID:000000013591556

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0116	ECT SENSOR (Engine coolant temperature sensor 1 circuit range/performance)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, ECT sensor 1, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor 1 is higher/lower than that of other temperature sensors when the engine is started with its cold state.

POSSIBLE CAUSE

- Harness or connectors (High or low resistance in the ECT sensor 1 circuit)
- ECT sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0116 is displayed with DTC P0117, or P0118, first perform the confirmation procedure for DTC P0117, or P0118.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0117: Refer to [EC6-409, "DTC Description"](#).
 - DTC P0118: Refer to [EC6-409, "DTC Description"](#).
- NO >> GO TO 2.

2. INSPECTION START

Is it necessary to erase permanent DTC?

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

3. PERFORM COMPONENT FUNCTION CHECK

NOTE:

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

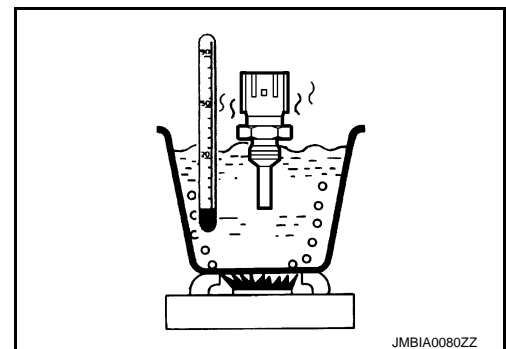
1. Turn ignition switch OFF.
2. Disconnect ECT sensor 1 harness connector.
3. Remove ECT sensor 1. Refer to [CO-39, "Exploded View"](#).
4. Check resistance between ECT sensor 1 terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> Proceed to [EC6-407, "Diagnosis Procedure"](#).

4. PRECONDITIONING



P0116 ENGINE COOLANT TEMPERATURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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, 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 5.

5. PERFORM DTC CONFIRMATION PROCEDURE

1. Move the vehicle to a cool place.

NOTE:

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

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

CAUTION:

Never turn ignition switch ON during this procedure.

NOTE:

The vehicle must be cooled with the hood open.

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

CAUTION:

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-407, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591557

1. CHECK DTC PRIORITY

If DTC P0116 is displayed with DTC P0117, or P0118, first perform the confirmation procedure for DTC P0117, or P0118.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC P0117: Refer to [EC6-409, "DTC Description"](#).
- DTC P0118: Refer to [EC6-409, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1

Check ECT sensor 1. Refer to [EC6-407, "Component Inspection \(Engine Coolant Temperature Sensor 1\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ECT sensor 1. Refer to [CO-39, "Exploded View"](#).

Component Inspection (Engine Coolant Temperature Sensor 1)

INFOID:000000013684190

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 1 harness connector.
3. Remove engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).

P0116 ENGINE COOLANT TEMPERATURE SENSOR 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

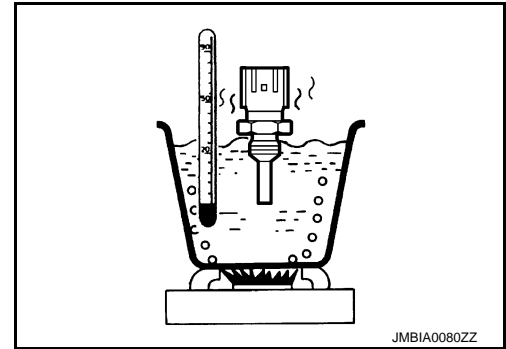
4. Check resistance between engine coolant temperature sensor 1 terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90 kΩ
		50 (122)	0.68 – 1.00 kΩ
		90 (194)	0.236 – 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).



P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

DTC Description

INFOID:000000013591559

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0117	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0118	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit high)	An excessively high voltage from the sensor is sent to ECM.

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POSSIBLE CAUSE

DTC P0117

- Harness or connectors (The engine coolant temperature sensor 1 circuit is open or shorted.)
- Engine coolant temperature sensor 1

F

DTC P0118

- Harness or connectors (The engine coolant temperature sensor 1 circuit is open or shorted.)
- Engine coolant temperature sensor 1

G

FAIL-SAFE

H

Fail safe mode	Vehicle behavior
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

I

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

J

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.

K

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>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

M

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

Is DTC detected?

N

YES >> Proceed to [EC6-409, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

O

Diagnosis Procedure

INFOID:000000013591560

1. CHECK ECT SENSOR 1 POWER SUPPLY

P

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

P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECT sensor 1		Ground	Voltage (Approx.)
Connector	Terminal		
E142	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK ECT SENSOR 1 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

ECT sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E142	1	F143	71	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

3.CHECK ECT SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E142	2	F142	97	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

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

+		-	Continuity
ECM			
Connector	Terminal	Ground	Existed
F143	2		
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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

5.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Refer to [EC6-411. "Component Inspection \(Engine Coolant Temperature Sensor 1\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor 1. Refer to [CO-39. "Exploded View"](#).

Component Inspection (Engine Coolant Temperature Sensor 1)

INFOID:000000013591561

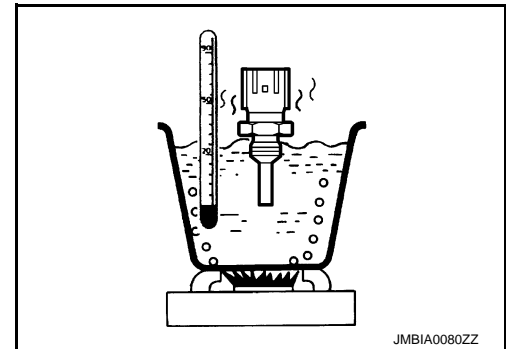
1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 1 harness connector.
3. Remove engine coolant temperature sensor 1. Refer to [CO-39. "Exploded View"](#).
4. Check resistance between engine coolant temperature sensor 1 terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90 kΩ
		50 (122)	0.68 – 1.00 kΩ
		90 (194)	0.236 – 0.260 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor 1. Refer to [CO-39. "Exploded View"](#).



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P011C IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P011C IAT SENSOR

DTC Description

INFOID:000000013591562

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P011C	CAT/IAT CRRLTN B1 (Charge air temperature/Intake air temperature correlation)	<ul style="list-style-type: none">ECM detects a state that the temperature difference between intake air temperature sensor 1 and 2 remains 20°C (68°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 (223°F) or more continuously for 5 seconds or more.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Not applicable

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 [EC6-412, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591563

1. CHECK INTAKE AIR TEMPERATURE SENSOR 2

Check intake air temperature sensor 2. Refer to [EC6-413, "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 [EM-167, "Exploded View"](#).

2. CHECK INTAKE AIR TEMPERATURE SENSOR 1

P011C IAT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Check intake air temperature sensor 1. Refer to [EC6-405. "Component Inspection \(Intake Air Temperature Sensor 1\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor 1). Refer to [EM-165. "Exploded View"](#).

EC6

Component Inspection (Intake Air Temperature Sensor 1)

INFOID:000000013591564

1.CHECK INTAKE AIR TEMPERATURE SENSOR

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to [EM-165. "Exploded View"](#).

Component Inspection (Intake Air Temperature Sensor 2)

INFOID:000000013591565

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.

Turbocharger boost sensor		Condition	Resistance (kΩ)
+	-		
Terminal			
3	4	Temperature [°C (°F)] 25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to [EM-167. "Exploded View"](#).

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0122, P0123, P0227, P0228 TP SENSOR

DTC Description

INFOID:000000013591566

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0122	TP SEN 2/CIRC-B1 (Throttle/Pedal position sensor/switch "A" circuit low)	An excessively low voltage from the TP sensor 2 is sent to ECM.
P0123	TP SEN 2/CIRC-B1 (Throttle/Pedal position sensor/switch "A" circuit high)	An excessively high voltage from the TP sensor 2 is sent to ECM.
P0227	TP SEN 2/CIRC-B2 (Throttle/Pedal position sensor/switch "C" circuit low)	An excessively low voltage from the TP sensor 2 is sent to ECM.
P0228	TP SEN 2/CIRC-B2 (Throttle/Pedal position sensor/switch "C" circuit high)	An excessively high voltage from the TP sensor 2 is sent to ECM.

POSSIBLE CAUSE

DTC P0122 and P0123

- Harness or connectors [TP sensor 2 (bank 1) circuit is open or shorted.]
- Electric throttle control actuator (TP sensor 2) (bank 1)

DTC P0227 and P0228

- Harness or connectors [TP sensor 2 (bank 2) circuit is open or shorted.]
- Electric throttle control actuator (TP sensor 2) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	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.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).
NO >> GO TO 2.

2. PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

- YES >> Proceed to [EC6-415, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591567

1.CHECK DTC PRIORITY

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY

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

DTC	+			-	Voltage (Approx.)
	Electric throttle control actuator				
	Bank	Connector	Terminal		
P0122, P0123	1	F118	5	Ground	5 V
P0227, P0228	2	F119	5		

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0122, P0123	1	F118	5	F143	35	Existed
P0227, P0228	2	F119	5	F142	105	

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

Is the inspection result normal?

- YES-1 (P0122 or P0123 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).
YES-2 (P0227 or P0228 is detected)>>GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0122, P0123	1	F118	4	F143	44	Existed
P0227, P0228	2	F119	4	F142	104	

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0122, P0123	1	F118	3	F143	48	Existed
P0227, P0228	2	F119	3	F142	112	

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

Is the inspection result normal?

YES >> GO TO 8.

P0122, P0123, P0227, P0228 TP SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

8.CHECK THROTTLE POSITION SENSOR

Refer to [EC6-417, "Component Inspection \(Throttle Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection (Throttle Position Sensor)

INFOID:0000000013591568

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC6-272, "Description"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
F143	43 [TP sensor 1 (bank 1)]	44	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F142	106 [TP sensor 1 (bank 2)]	104	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F143	48 [TP sensor 2 (bank 1)]	44	Fully released	Less than 4.75
			Fully depressed	More than 0.36
F142	112 [TP sensor 2 (bank 2)]	104	Fully released	Less than 4.75
			Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Proceed to [EC6-272, "Description"](#).

>> INSPECTION END

P0125 ECT SENSOR

DTC Description

INFOID:000000013591569

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0125	ECT SENSOR (Insufficient coolant temperature for closed loop fuel control)	<ul style="list-style-type: none"> • 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.

POSSIBLE CAUSE

- Harness or connectors (High resistance in the circuit)
- Engine coolant temperature sensor 1
- Multi-way control valve

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0125 is displayed with DTC P0117 or P0118, first perform the confirmation procedure for DTC P0117 or P0118.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0117: Refer to [EC6-409. "DTC Description"](#).
 - DTC P0118: Refer to [EC6-409. "DTC Description"](#).
- 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.CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

ⓅWith CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT.
3. Check that "COOLAN TEMP/S" is above -10°C (14°F).

Is the temperature above -10°C (14°F)?

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

4.PERFORM DTC CONFIRMATION PROCEDURE

ⓅWith CONSULT

1. Start engine and run it for 65 minutes at idle speed.
If "COOLAN TEMP/S" increases to more than -10°C (14°F) within 65 minutes, stop engine because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-419. "Diagnosis Procedure"](#)

P0125 ECT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591570

1. CHECK DTC PRIORITY

If DTC P0125 is displayed with DTC P0117 or P0118, first perform the confirmation procedure for DTC P0117 or P0118.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
 - DTC P0117: Refer to [EC6-409, "DTC Description"](#).
 - DTC P0118: Refer to [EC6-409, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Refer to [EC6-419, "Component Inspection \(Engine Coolant Temperature Sensor 1\)"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).

3. CHECK MULTI-WAY CONTROL VALVE

Check multi-way control valve. Refer to [EC6-419, "Component Inspection \(Multi-way Control Valve\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace water outlet (MCV). Refer to [CO-63, "Removal and Installation"](#).

Component Inspection (Engine Coolant Temperature Sensor 1)

INFOID:000000013591571

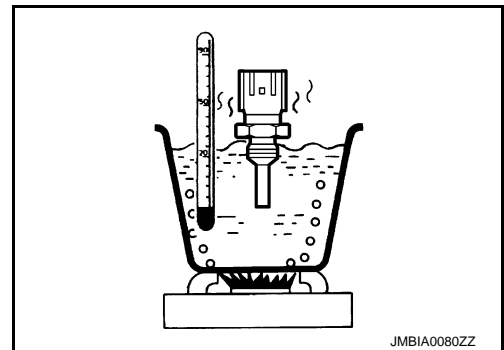
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 1 harness connector.
3. Remove engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).
4. Check resistance between engine coolant temperature sensor 1 terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90 kΩ
		50 (122)	0.68 – 1.00 kΩ
		90 (194)	0.236 – 0.260 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).



Component Inspection (Multi-way Control Valve)

INFOID:000000013673619

1. CHECK MULTI-WAY CONTROL VALVE-1

Ⓜ With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "ENGINE COOLANT BYPASS VALVE".
3. Check that indication of "ENGINE COOLANT B/V POSI".

Is "205°" or more displayed on CONSULT screen?

- YES >> GO TO 2.
- NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. CHECK MULTI-WAY CONTROL VALVE-2

④ With CONSULT

1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check "ENGINE COOLANT B/V POSI" approximately 2 seconds after engine start.

Is "40°" or less displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

P0127 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0127 IAT SENSOR

DTC Description

INFOID:0000000013591572

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0127	IAT SENSOR-B1 (Intake air temperature too high)	When the amount of intake air is sufficient, the temperature sent from IAT 1 is more than 90°C (194°F).

C

POSSIBLE CAUSE

- Harness or connectors (The Intake air temperature sensor 1 circuit is open or shorted)
- Intake air temperature sensor 1

D

FAIL-SAFE

Not applicable

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

G

H

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

J

 With CONSULT

1. Wait until engine coolant temperature is less than 96°C (205°F)
 - Turn ignition switch ON.
 - Select "DATA MONITOR" mode with CONSULT.
 - Check the engine coolant temperature.
 - If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.

K

L

NOTE:

Perform the following steps before engine coolant temperature is above 96°C (205°F).

2. Turn ignition switch ON.
3. Select "DATA MONITOR" mode with CONSULT.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.

M

N

CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

O

Is 1st trip DTC detected?

YES >> Proceed to [EC6-421, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P

Diagnosis Procedure

INFOID:0000000013591573

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1

Refer to [EC6-422, "Component Inspection \(Intake Air Temperature Sensor 1\)"](#).

Is the inspection result normal?

P0127 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

YES >> INSPECTION END

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor 1). Refer to [EM-165](#),
["Exploded View"](#).

Component Inspection (Intake Air Temperature Sensor 1)

INFOID:0000000013591574

1. CHECK INTAKE AIR TEMPERATURE SENSOR

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to [EM-165](#),
["Exploded View"](#).

P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0130, P0150 A/F SENSOR 1

DTC Description

INFOID:000000013591578

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0130	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit]	A	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.
		B	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.
P0150	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit]	A	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.
		B	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.

POSSIBLE CAUSE

DTC P0130 - A

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0130 - B

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0150 - A

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0150 - B

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

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

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

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-425, "Diagnosis Procedure"](#).
NO-1 >> With CONSULT: GO TO 3.

P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

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NO-2 >> Without CONSULT: GO TO 7.

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

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

Does the indication fluctuate around 2.2 V?

YES >> GO TO 4.

NO >> Proceed to [EC6-425. "Diagnosis Procedure"](#).

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

1. Select "A/F SEN1 (B1) P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT.
2. Touch "START".
3. When the following conditions are met, "TESTING" will be displayed on the CONSULT screen.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position

If "TESTING" is not displayed after 20 seconds, retry from step 2.

CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake when releasing the accelerator pedal.

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

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to [EC6-425. "Diagnosis Procedure"](#).

7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

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.

 **With GST**

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Shift the selector lever to D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

Never apply brake when releasing the accelerator pedal.

4. Repeat steps 2 and 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Turn ignition switch ON.

P0130, P0150 A/F SENSOR 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine.
- Repeat steps 2 and 3 for five times.
- Stop the vehicle and connect GST to the vehicle.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-425, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591579

1.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

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

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

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

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0130	1	F133	1	Ground	Battery voltage
P0150	2	F134	1		

Is the inspection result normal?

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

3.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

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

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0130	E123	52	F133	1	Existed
P0150			F134	1	

- 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 A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

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DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0130	1	F133	3	F142	102	Existed
			4		101	
P0150	2	F134	3		111	
			4		107	

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

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0130	1	F133	3	Ground	Not existed
			4		
P0150	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0130	1	F142	102	Ground	Not existed
			101		
P0150	2		111		
			107		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).

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

P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0131, P0151 A/F SENSOR 1

DTC Description

INFOID:0000000013591580

DTC DETECTION LOGIC

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

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0131	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit low voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.
P0151	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit low voltage]	

POSSIBLE CAUSE

DTC P0131

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0151

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

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

Is the indication constantly approx. 0 V?

YES >> Proceed to [EC6-428, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

CAUTION:

Always drive vehicle at a safe speed.

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

P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

NOTE:

- Keep the accelerator pedal as steady as possible during cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 1.

7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-428. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591581

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E191. Refer to Ground Inspection in [GI-48. "Circuit Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

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

1. Disconnect A/F sensor 1 harness connector.

2. Turn ignition switch ON.

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

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0131	1	F133	1	Ground	Battery voltage
P0151	2	F134	1		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. 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 IPDM E/R harness connector and A/F sensor 1 harness connector.

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0131	E123	52	F133	1	Existed
P0151			F134	1	

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 A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

P0131, P0151 A/F SENSOR 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0131	1	F133	3	F142	102	Existed
			4		101	
P0151	2	F134	3		111	
			4		107	

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

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0131	1	F133	3	Ground	Not existed
			4		
P0151	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0131	1	F142	102	Ground	Not existed
			101		
P0151	2		111		
			107		

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

A
EC6
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P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0132, P0152 A/F SENSOR 1

DTC Description

INFOID:000000013591582

DTC DETECTION LOGIC

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

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0132	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit high voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.
P0152	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit high voltage]	

POSSIBLE CAUSE

DTC P0132

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0152

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

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

Is the indication constantly approx. 5V?

YES >> Proceed to [EC6-431, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

CAUTION:

Always drive vehicle at a safe speed.

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

P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

NOTE:

- Keep the accelerator pedal as steady as possible during cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 1.

7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-431, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591583

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

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

1. Disconnect A/F sensor 1 harness connector.

2. Turn ignition switch ON.

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

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0132	1	F133	1	Ground	Battery voltage
P0152	2	F134	1		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. 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 IPDM E/R harness connector and A/F sensor 1 harness connector.

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0132	E123	52	F133	1	Existed
P0152			F134	1	

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 A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

P0132, P0152 A/F SENSOR 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0132	1	F133	3	F142	102	Existed
			4		101	
P0152	2	F134	3		111	
			4		107	

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

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0132	1	F133	3	Ground	Not existed
			4		
P0152	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0132	1	F142	102	Ground	Not existed
			101		
P0152	2		111		
			107		

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

P0137, P0157 HO2S2

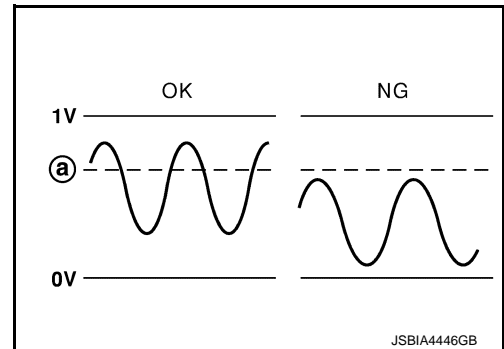
DTC Description

INFOID:000000013599780

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 malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

Ⓐ : 0.74 V



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0137	HO2S2 (B1) (O2 sensor circuit low voltage bank 1 sensor 2)	<ul style="list-style-type: none"> The maximum voltage from the sensor does not reach the specified voltage. ECM detects the heated oxygen sensor 2 circuit is short to ground.
P0157	HO2S2 (B2) (O2 sensor circuit low voltage bank 2 sensor 2)	

POSSIBLE CAUSE

DTC P0137

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector
- Intake air leaks

DTC P0157

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector
- Intake air leaks

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2.PRECONDITIONING

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

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

TESTING CONDITION:

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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 with 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).
If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches 70°C (158°F).
9. Open engine hood.
10. Select “HO2S2 (B1) P1147” (for DTC P0137) or “HO2S2 (B2) P1167” (for DTC P0157) of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT.
11. Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until “COMPLETED” is displayed.

12. Touch “SELF-DIAG RESULTS”.

Which is displayed on CONSULT screen?

- OK >> INSPECTION END
- NG >> Proceed to [EC6-435, "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-1

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.

Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0137	F142	110	99	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure.
P0157		98			

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> GO TO 6.

6. PERFORM COMPONENT FUNCTION CHECK-2

Check the voltage between ECM harness connector terminals under the following condition.

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0137	F142	110	99	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure.
P0157		98			

A
EC6

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> GO TO 7.

C
D

7.PERFORM COMPONENT FUNCTION CHECK-3

Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0137	F142	110	99	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.74 V at least once during this procedure.
P0157		98			

E
F
G

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> Proceed to [EC6-435, "Diagnosis Procedure"](#).

H
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Diagnosis Procedure

INFOID:000000013599781

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

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

J
K

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC6-275, "Description"](#).
2. Run engine for at least 10 minutes at idle speed.

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

- YES >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to [EC6-461, "DTC Description"](#).
- NO >> GO TO 3.

L
M

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

N
O

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0137	1	F92	4	F142	99	Existed
P0157	2	F93	4			

P

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

Is the inspection result normal?

P0137, P0157 HO2S2

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 4.

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0137	1	F92	3	F142	110	Existed
P0157	2	F93	3		98	

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC	HO2S2			Ground	Continuity
	Bank	Connector	Terminal		
P0137	1	F92	3	Ground	Not existed
P0157	2	F93	3		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0137	1	F142	110	Ground	Not existed
P0157	2		98		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC6-436. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226. "Exploded View"](#).

Component Inspection

INFOID:000000013599782

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

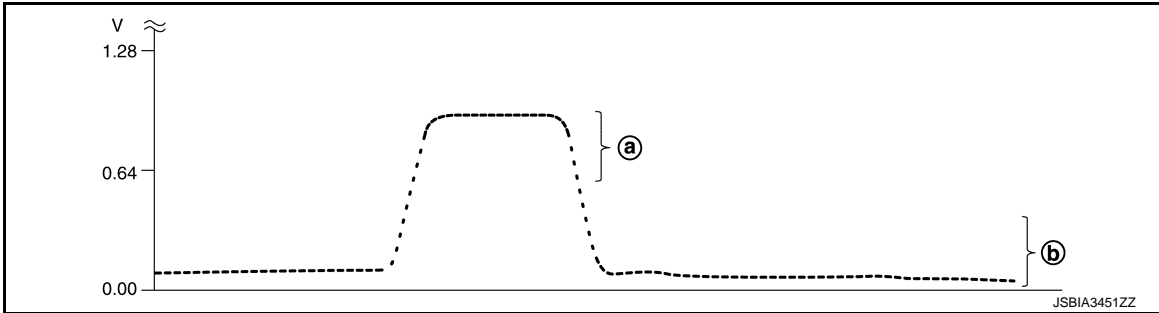
1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above (a) 0.74 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)/(B2)" should be below (b) 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Reving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
F142	110 [HO2S2 (bank 1)]	99	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]			

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

P0138, P0158 HO2S2

DTC Description

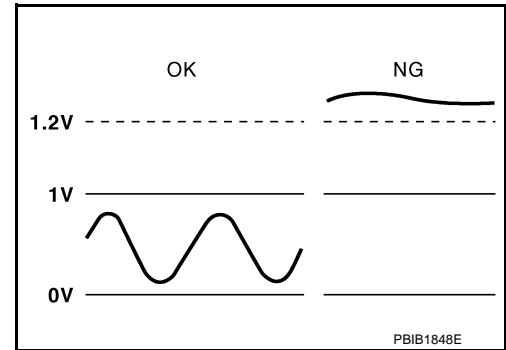
INFOID:000000013599783

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time.

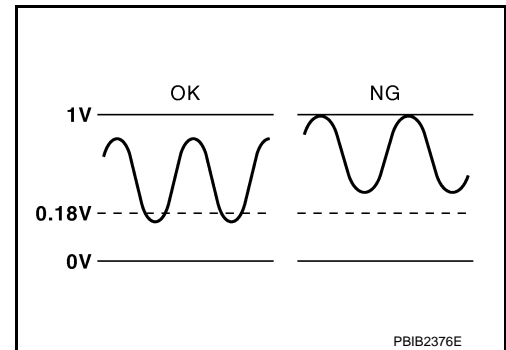
MALFUNCTION A

To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during various driving conditions such as fuel cut.



MALFUNCTION B

To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during various driving conditions such as fuel cut.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0138	HO2S2 (B1) (O2 sensor circuit high voltage bank 1 sensor 2)	A	An excessively high voltage from the sensor is sent to ECM.
		B	The minimum voltage from the sensor is not reached to the specified voltage.
P0158	HO2S2 (B2) (O2 sensor circuit high voltage bank 2 sensor2)	A	An excessively high voltage from the sensor is sent to ECM.
		B	The minimum voltage from the sensor is not reached to the specified voltage.

POSSIBLE CAUSE

DTC P0138 - A

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2

DTC P0138 - B

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector

DTC P0158 - A

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2

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< DTC/CIRCUIT DIAGNOSIS >

DTC P0158 - B

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 2 minutes.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-441, "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. Select "DATA MONITOR" mode with 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).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
9. Open engine hood.
10. Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
11. Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to [EC6-441, "Diagnosis Procedure"](#).

CON NOT BE DIAGNOSED>>GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC confirmation procedure again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION-1

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.

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0138	F142	110	99	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be below 0.18 V at least once during this procedure.
P0158		98			

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION-2

Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0138	F142	110	99	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at least once during this procedure.
P0158		98			

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 7.

7.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION-3

Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0138	F142	110	99	Coasting from 80 km/h (50 MPH) in D position	The voltage should be below 0.18 V at least once during this procedure.
P0158		98			

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-441, "Diagnosis Procedure"](#).

Diagnosis Procedure

1.INSPECTION START

P0138, P0158 HO2S2

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Confirm the detected malfunction (A or B). Refer to [EC6-439. "DTC Description"](#).

Which malfunction is detected?

- A >> GO TO 2
- B >> GO TO 9.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48. "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace ground connection.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F92	4	F142	99	Existed
P0158	2	F93	4			

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

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F92	3	F142	110	Existed
P0158	2	F93	3		98	

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC	HO2S2			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F92	3	Ground	Not existed
P0158	2	F93	3		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F142	110	Ground	Not existed
P0158	2		98		

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC6-444. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to [GI-45. "Intermittent Incident"](#).

>> INSPECTION END

9.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48. "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace ground connection.

10.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC6-275. "Description"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0172, P0175. Refer to [EC6-466. "DTC Description"](#).
- NO >> GO TO 11.

11.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F92	4	F142	99	Existed
P0158	2	F93	4			

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

Is the inspection result normal?

- YES >> GO TO 12.

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P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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

12.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F92	3	F142	110	Existed
P0158	2	F93	3		98	

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC	HO2S2			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F92	3	Ground	Not existed
P0158	2	F93	3		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F142	110	Ground	Not existed
P0158	2		98		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

13.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC6-444, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226, "Exploded View"](#).

Component Inspection

INFOID:000000013599785

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

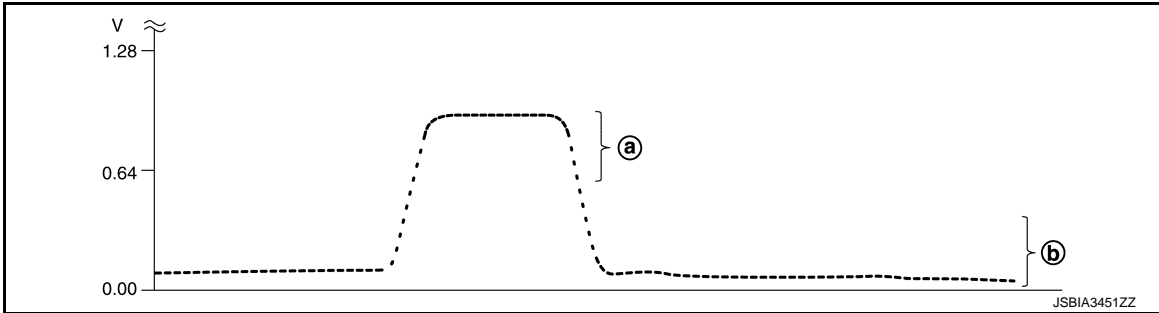
1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above (a) 0.74 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)/(B2)" should be below (b) 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Reving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM		Condition	Voltage
Connector	+ Terminal		
F142	110 [HO2S2 (bank 1)]	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

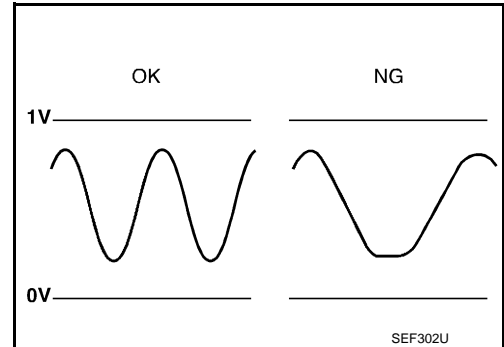
P0139, P0159 HO2S2

DTC Description

INFOID:000000013599786

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0139	HO2S2 (B1) (O2 sensor circuit slow response bank 1 sensor 2)	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.
P0159	HO2S2 (B2) (O2 sensor circuit slow response bank 2 sensor2)	

POSSIBLE CAUSE

DTC P0139

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel system
- EVAP system
- Intake air system

DTC P0159

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel system
- EVAP system
- Intake air system

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. DTC PRIORITY

If DTC P0139 or P0159 is detected with DTC P0137, P0138, P0157 or P0158, perform trouble diagnosis for DTC P0137, P0138, P0157 or P0158.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- P0137: Refer to [EC6-433, "DTC Description"](#).
 - P0138: Refer to [EC6-439, "DTC Description"](#).
 - P0157: Refer to [EC6-433, "DTC Description"](#).
 - P0158: Refer to [EC6-439, "DTC Description"](#).

NO >> GO TO 2.

2. INSPECTION START

< DTC/CIRCUIT DIAGNOSIS >

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 3.

NO >> GO TO 8.

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:

For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE**With CONSULT**

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. 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 gear at 60 km/h (38MPH) and maintain the speed.

CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- Enable the engine brake.
- Always drive carefully.
- Never apply brake when releasing the accelerator pedal.

11. Repeat step 9 and 10 at least 8 times.
12. Check the following item of “DATA MONITOR”.

DTC	Data monitor item	Status
P0139	HO2 S2 DIAG1 (B1)	CMPLT
	HO2 S2 DIAG2 (B1)	
P0159	HO2 S2 DIAG1 (B2)	
	HO2 S2 DIAG2 (B2)	

Is “CMPLT” displayed on CONSULT screen?

YES >> GO TO 6.

NO-1: “CMPLT” is not displayed on DIAG 1>>Perform DTC confirmation procedure again.

NO-2: “CMPLT” is not displayed on DIAG 2>>GO TO 5.

5.PERFORM DTC WORK SUPPORT

1. Open engine hood.
2. Select “HO2S2 (B1) P0139” or “HO2S2 (B2) P0159” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT.
3. Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until “COMPLETED” is displayed.

Is “COMPLETED” displayed on CONSULT screen?

YES >> GO TO 7.

NO >> GO TO 6.

6. 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 4.

7. PERFORM SELF-DIAGNOSIS

Ⓜ With CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" or "P0159" detected?

- YES >> Proceed to [EC6-450, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

8. PERFORM COMPONENT FUNCTION CHECK-1

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.

Ⓧ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM		Condition	Voltage	
	Connector	Terminal			
		+			-
P0139	F142	110	99	Revving up to 4,000 rpm under no load at least 10 times	
P0159		98			A change of voltage should be more than 0.56 V for 1 second during this procedure.

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> GO TO 9.

9. PERFORM COMPONENT FUNCTION CHECK-2

Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM		Condition	Voltage	
	Connector	Terminal			
		+			-
P0139	F142	110	99	Keeping engine at idle for 10 minutes	
P0159		98			A change of voltage should be more than 0.56 V for 1 second during this procedure.

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> GO TO 10.

10. PERFORM COMPONENT FUNCTION CHECK-3

Check the voltage between ECM harness connector terminals under the following condition.

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P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0139	F142	110	99	Coasting from 80 km/h (50 MPH) on the suitable gear position	A change of voltage should be more than 0.56 V for 1 second during this procedure.
P0159		98			

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-450, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013599787

1. DTC PRIORITY

If DTC P0139 or P0159 is detected with DTC P0137, P0138, P0157 or P0158, perform trouble diagnosis for DTC P0137, P0138, P0157 or P0158.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- P0137: Refer to [EC6-433, "DTC Description"](#).
- P0138: Refer to [EC6-439, "DTC Description"](#).
- P0157: Refer to [EC6-433, "DTC Description"](#).
- P0158: Refer to [EC6-439, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC6-275, "Description"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC6-461, "DTC Description"](#) or [EC6-466, "DTC Description"](#).

NO >> GO TO 4.

4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0139	1	F92	4	F142	99	Existed
P0159	2	F93	4			

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

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0139	1	F92	3	F142	110	Existed
P0159	2	F93	3		98	

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC	HO2S2			Ground	Continuity
	Bank	Connector	Terminal		
P0139	1	F92	3	Ground	Not existed
P0159	2	F93	3		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0139	1	F142	110	Ground	Not existed
P0159	2		98		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

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

6.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC6-451, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226, "Exploded View"](#).

Component Inspection

INFOID:000000013682785

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

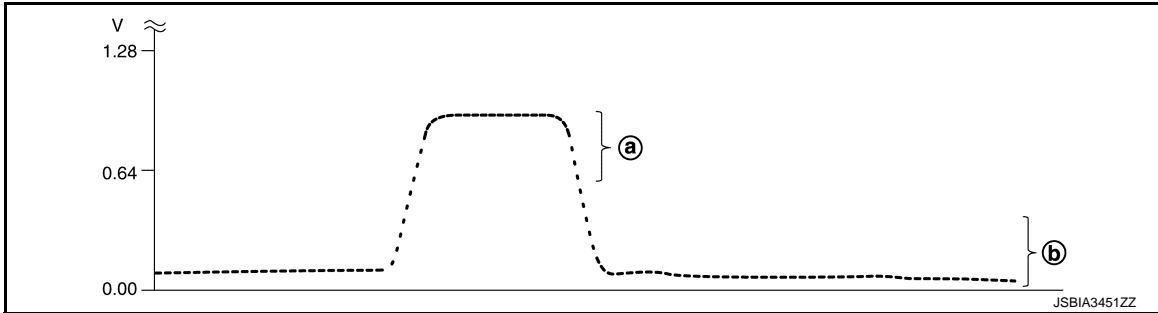
1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.

P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above ① 0.74 V at least once when the "FUEL INJECTION" is +25%.

"HO2S2 (B1)/(B2)" should be below ② 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Revsing up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
F142	110 [HO2S2 (bank 1)]	99	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]			

A

EC6

C

D

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

E

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

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

F

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>> INSPECTION END

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P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

DTC Description

INFOID:000000013591593

DTC DETECTION LOGIC

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

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P014C	A/F SENSOR1 (B1) (O2 sensor slow response - rich to lean bank 1 sensor 1)	The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.
P014D	A/F SENSOR1 (B1) (O2 sensor slow response - lean to rich bank 1 sensor 1)	
P015A	A/F SENSOR1 (B1) (O2 sensor delayed response - rich to lean bank 1 sensor 1)	
P015B	A/F SENSOR1 (B1) (O2 sensor delayed response - lean to rich bank 1 sensor 1)	
P014E	A/F SENSOR1 (B2) (O2 sensor slow response - rich to lean bank 2 sensor 1)	
P014F	A/F SENSOR1 (B2) (O2 sensor slow response - lean to rich bank 2 sensor 1)	
P015C	A/F SENSOR1 (B2) (O2 sensor delayed response - rich to lean bank 2 sensor 1)	
P015D	A/F SENSOR1 (B2) (O2 sensor delayed response - lean to rich bank 2 sensor 1)	

POSSIBLE CAUSE

DTC P014C

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P014D

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P015A

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P015B

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P014E

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P014F

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P015C

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P015D

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

Do you have CONSULT?

- YES >> GO TO 2.
- NO >> GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

 With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle at least 10 minutes.
6. On CONSULT screen, select the following items in "DATA MONITOR" of "ENGINE".
 - ENG SPEED
 - VHCL SPEED SE
 - COOLAN TEMP/S
 - B/FUEL SCHDL
 - A/F SEN1 DIAG3 (B1)
 - A/F SEN1 DIAG3 (B2)
7. Drive the vehicle under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

Item	Condition
ENG SPEED	1,000 – 1,400 rpm
VHCL SPEED SE	More than 58 km/h (37 MPH) constant speed
COOLAN TEMP/S	More than 80°C (176°F)
B/FUEL SCHDL	3 – 8 msec
Gear position	D position

8. Keep the driving condition and check the items status of "DATA MONITOR" as follows.

CAUTION:

This procedure must be performed by two or more persons.

NOTE:

If “PRCNT” changed to “ABSN”, proceed to [EC6-294, "Component Function Check"](#).

DTC	Data monitor item	Status
<ul style="list-style-type: none"> • P014C • P014D • P015A • P015B 	A/F SEN1 DIAG3 (B1)	PRCNT
<ul style="list-style-type: none"> • P014E • P014F • P015C • P015D 	A/F SEN1 DIAG3 (B2)	

Is “PRCNT” displayed on CONSULT screen?

YES >> GO TO 3.

NO >> Refer to [EC6-294, "Component Function Check"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Keep the driving for 10 seconds or more.
2. Check the items status of “DATA MONITOR” as follows.

NOTE:

If “CMPLT” changed to “INCM”, proceed to [EC6-294, "Component Function Check"](#).

DTC	Data monitor item	Status
<ul style="list-style-type: none"> • P014C • P014D • P015A • P015B 	A/F SEN1 DIAG1 (B1)	CMPLT
	A/F SEN1 DIAG2 (B1)	
<ul style="list-style-type: none"> • P014E • P014F 	A/F SEN1 DIAG1 (B2)	
<ul style="list-style-type: none"> • P015C • P015D 	A/F SEN1 DIAG2 (B2)	

Is “CMPLT” displayed on CONSULT screen?

YES >> GO TO 4.

NO >> Proceed to [EC6-457, "Diagnosis Procedure"](#).

4. PERFORM SELF-DIAGNOSIS

With CONSULT

Check the “SELF-DIAG RESULT”.

Is any DTC detected?

YES >> Proceed to [EC6-457, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

5. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.

Is the total percentage within $\pm 15\%$?

YES >> GO TO 7.

NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

A

EC6

>> Repair or replace malfunctioning part.

7. PERFORM DTC CONFIRMATION PROCEDURE

C

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and let it idle at least 10 minutes.
5. Check that the engine coolant temperature reaches normal operating temperature.
6. Drive the vehicle for 10 seconds or more under the following conditions.

D

CAUTION:

Never turn ignition switch to OFF during this step.

E

CAUTION:

Always drive vehicle at a safe speed.

F

Item	Condition
Engine speed	1,000 – 1,400 rpm
Vehicle speed	More than 58 km/h (37 MPH) constant speed
Gear position	D position

G

H

7. Check 1st trip DTC.

Is 1st trip DTC detected?

I

YES >> Proceed to [EC6-457, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

J

Diagnosis Procedure

INFOID:000000013591594

1. CHECK GROUND CONNECTION

K

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

L

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

M

2. RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to [EM-231, "Exploded View"](#).

N

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

O

1. Start engine and run it at idle.

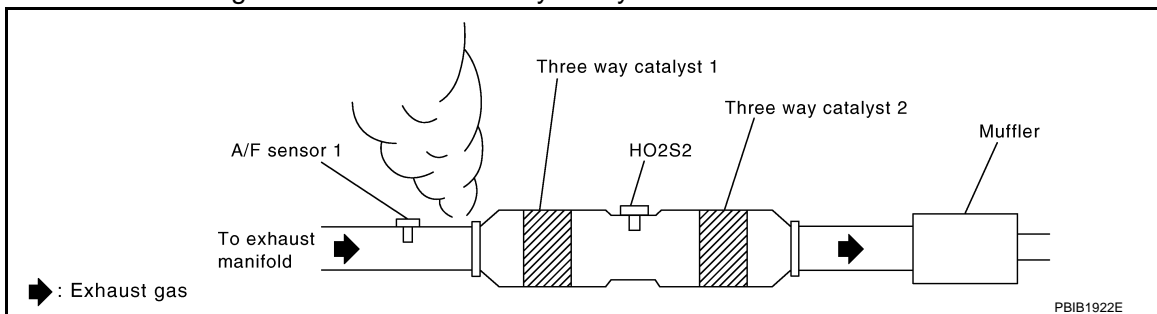
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P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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



Is exhaust gas leak detected?

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

4.CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

- YES >> Repair or replace.
- NO >> GO TO 5.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC6-275, "Description"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC6-461, "DTC Description"](#) or [EC6-466, "DTC Description"](#).
- NO >> GO TO 6.

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

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

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
<ul style="list-style-type: none"> • P014C • P014D • P015A • P015B 	1	F133	1	Ground	Battery voltage
<ul style="list-style-type: none"> • P014E • P014F • P015C • P015D 	2	F134	1		

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F12
- IPDM E/R harness connector E123
- 15 A fuse (No. 48)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
<ul style="list-style-type: none"> • P014C • P014D • P015A • P015B 	1	F133	3	F142	102	Existed
			4		101	
<ul style="list-style-type: none"> • P014E • P014F • P015C • P015D 	2	F134	3		111	
			4		107	

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

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
<ul style="list-style-type: none"> • P014C • P014D • P015A • P015B 	1	F133	3	Ground	Not existed
			4		
<ul style="list-style-type: none"> • P014E • P014F • P015C • P015D 	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
<ul style="list-style-type: none"> • P014C • P014D • P015A • P015B 	1	F142	102	Ground	Not existed
			101		
			<ul style="list-style-type: none"> • P014E • P014F • P015C • P015D 		
107					

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

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

Refer to [EC6-336. "Component Inspection \(A/F Sensor 1 Heater\)".](#)

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231. "Exploded View".](#)

10. CHECK MASS AIR FLOW SENSOR

Check both mass air flow sensor (bank 1 and bank 2).

Refer to [EC6-383. "Component Inspection \(Mass Air Flow Sensor\)".](#)

Is the inspection result normal?

YES >> GO TO 11.

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> Replace malfunctioning mass air flow sensor. Refer to [EM-165, "Exploded View"](#).

11.CHECK PCV VALVE

Refer to [EC6-1013, "Inspection"](#).

Is the inspection result normal?

YES >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).

NO >> Repair or replace PCV valve. Refer to [EM-193, "Exploded View"](#).

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Description

INFOID:000000013591595

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too lean), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0171	FUEL SYS-LEAN-B1 (System too lean bank 1)	<ul style="list-style-type: none">Fuel injection system does not operate properly.The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)
P0174	FUEL SYS-LEAN-B2 (System too lean bank 2)	

POSSIBLE CAUSE

DTC P0171

- 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 P0174

- 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

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition 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 [EC6-275, "Description"](#).
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 [EC6-462, "Diagnosis Procedure"](#).
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 5 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-462, "Diagnosis Procedure"](#).
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)
---------------	-----------------------------

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-462, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591596

1.CHECK EXHAUST GAS LEAK

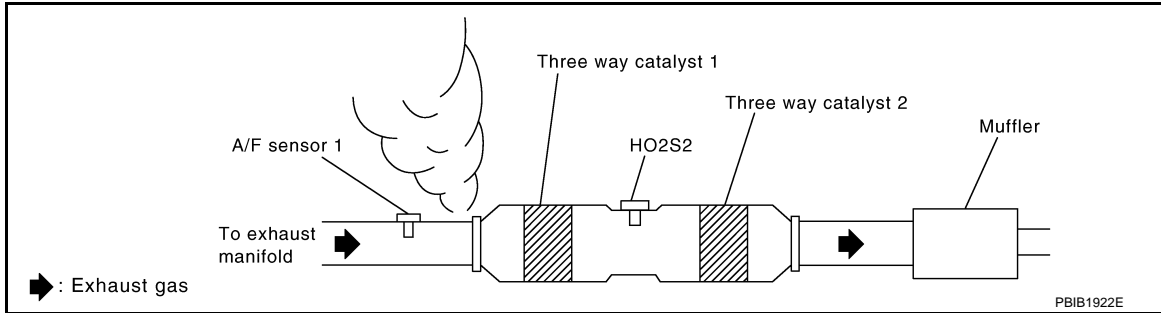
1. Start engine and run it at idle.

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

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



Is exhaust gas leak detected?

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

2.CHECK FOR INTAKE AIR LEAK

- Listen for an intake air leak after the mass air flow sensor.
- Check PCV hose connection.

Is intake air leak detected?

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

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

DTC	+			-		Continuity
	A/F sensor 1			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0171	1	F133	3	F142	102	Existed
			4		101	
P0174	2	F134	3		111	
			4		107	

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

DTC	+			-	Continuity
	A/F sensor 1				
	Bank	Connector	Terminal		
P0171	1	F133	3	Ground	Not existed
			4		
P0174	2	F134	3		
			4		

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	+			-	Continuity
	ECM				
	Bank	Connector	Terminal		
P0171	1	F142	101	Ground	Not existed
			102		
P0174	2		107		
			111		

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

1. Release fuel pressure to zero. Refer to [EC6-279, "Work Procedure"](#).

2. Install fuel pressure gauge and check fuel pressure. Refer to [EC6-279, "Work Procedure"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to [FL-10, "Removal and Installation"](#).

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 SENSOR (Hz)" in "DATA MONITOR" mode with CONSULT.

For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

With GST

1. Install all removed parts.

2. Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

Is the measurement value within the specification?

YES >> GO TO 7.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC6-387, "Diagnosis Procedure"](#).

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

1. Start engine.

2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Start engine and let it idle.

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

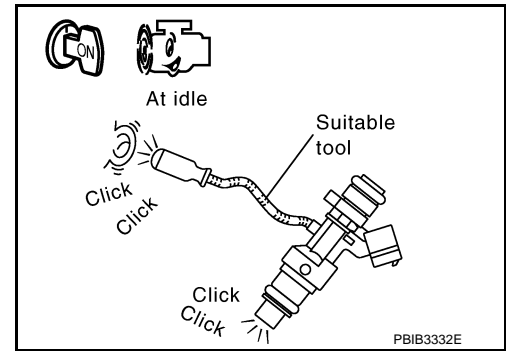
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC6-971. "Diagnosis Procedure"](#).



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P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Description

INFOID:000000013591597

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too rich), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0172	FUEL SYS-RICH-B1 (System too rich bank 1)	<ul style="list-style-type: none">Fuel injection system does not operate properly.The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)
P0175	FUEL SYS-RICH-B2 (System too rich bank 2)	

POSSIBLE CAUSE

DTC P0172

- A/F sensor 1
- Fuel injector
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

DTC P0175

- A/F sensor 1
- Fuel injector
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	Stops feedback control of idle speed and controls with specified speed.
	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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.

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to [EC6-275. "Description"](#).
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 [EC6-467. "Diagnosis Procedure"](#).
NO >> Remove spark plugs and check for fouling, etc.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 10 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-467. "Diagnosis Procedure"](#).
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)
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CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

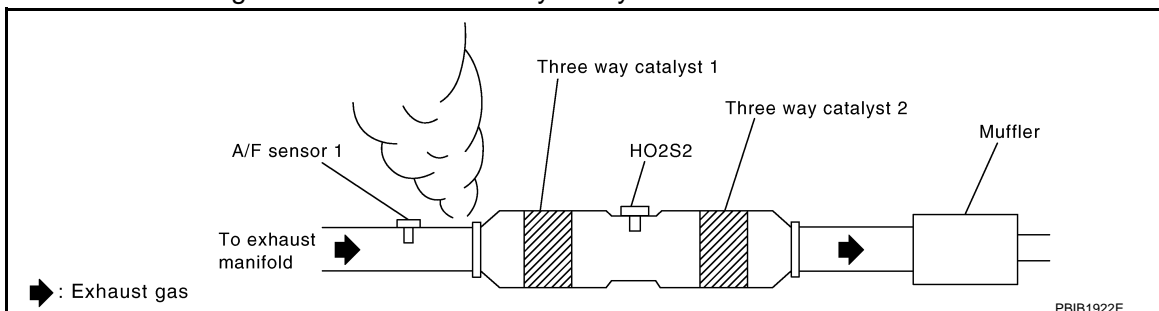
- YES >> Proceed to [EC6-467. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591598

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

- YES >> Repair or replace.

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> GO TO 2.

2. CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

DTC	+			-		Continuity
	A/F sensor 1			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0171	1	F133	3	F142	102	Existed
			4		101	
P0174	2	F134	3		111	
			4		107	

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

DTC	+			-	Continuity
	A/F sensor 1				
	Bank	Connector	Terminal		
P0171	1	F133	3	Ground	Not existed
			4		
P0174	2	F134	3		
			4		

DTC	+			-	Continuity
	ECM				
	Bank	Connector	Terminal		
P0171	1	F142	101	Ground	Not existed
			102		
			107		
P0174	2	F142	111		

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

1. Release fuel pressure to zero. Refer to [EC6-279, "Work Procedure"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC6-279, "Work Procedure"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace "fuel filter and fuel pump assembly". Refer to [FL-10, "Removal and Installation"](#).

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

5. CHECK MASS AIR FLOW SENSOR

With CONSULT

1. Install all removed parts.
2. Check "MASS AIR FLOW SENSOR (Hz)" in "DATA MONITOR" mode with CONSULT.
For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in "Service \$01" with GST.
For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

Is the measurement value within the specification?

YES >> GO TO 6.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC6-387, "Diagnosis Procedure"](#).

6. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

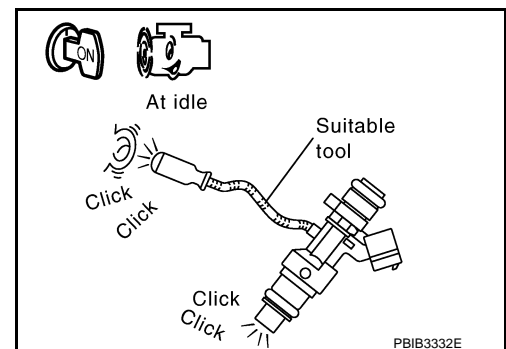
1. Start engine and let it idle.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC6-971, "Diagnosis Procedure"](#).



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P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0181 FTT SENSOR

DTC Description

INFOID:000000013591599

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0181	FTT SENSOR (Fuel temperature sensor a circuit range/ performance)	A	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor 1 and intake air temperature sensor 1.
		B	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, ECT sensor 1, 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.

POSSIBLE CAUSE

DTC P0181 - A

- Harness or connectors (The FTT sensor circuit is open or shorted)
- FTT sensor

DTC P0181 - B

- Harness or connectors (High or low resistance in the FTT sensor circuit)
- FTT sensor

FAIL-SAFE

Not applicable

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-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 [EC6-472, "Diagnosis Procedure"](#).

NO >> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE

1. Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT.
2. Check "COOLAN TEMP/S" value.

"COOLAN TEMP/S" less than 60°C (140°F)?

YES >> INSPECTION END

P0181 FTT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
2. Wait at least 10 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-472, "Diagnosis Procedure"](#).

NO >> GO TO 6.

6. PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

NOTE:

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

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Remove fuel level sensor unit. Refer to [FL-10, "Removal and Installation"](#).
4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

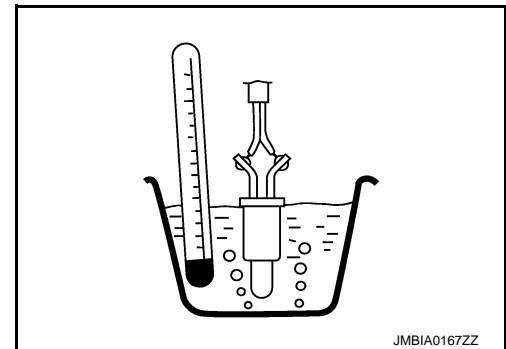
Terminals	Condition		Resistance (kΩ)
7 and 8	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
		50 (122)	0.79 – 0.90

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-472, "Diagnosis Procedure"](#).



7. PRECONDITIONING

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

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

TEST CONDITION:

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

>> GO TO 8.

8. PERFORM DTC CONFIRMATION PROCEDURE B

1. Move the vehicle to a cool place.

NOTE:

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

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

CAUTION:

Never turn ignition switch ON during this procedure.

NOTE:

The vehicle must be cooled with the hood open.

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

CAUTION:

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-472, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

P0181 FTT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591600

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to [EC6-470, "DTC Description"](#).

Which malfunction is detected?

- A >> GO TO 2.
- B >> GO TO 6.

2.CHECK FUEL TANK TEMPERATURE 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.

+		-	Voltage (V)
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B101	8	Ground	Approx. 5

Is the inspection result normal?

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

3.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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.

+		-		Continuity
Fuel level sensor unit and fuel pump		ECM		
Connector	Terminal	Connector	Terminal	
B101	8	E152	180	Existed

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

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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.

+		-		Continuity
Fuel level sensor unit and fuel pump		ECM		
Connector	Terminal	Connector	Terminal	
B101	7	E152	200	Existed

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

Is the inspection result normal?

- YES >> GO TO 5.

P0181 FTT SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC6-473, "Component Inspection \(Fuel Tank Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to [FL-10, "Removal and Installation"](#).

Component Inspection (Fuel Tank Temperature Sensor)

INFOID:000000013591601

1. CHECK FUEL TANK TEMPERATURE SENSOR

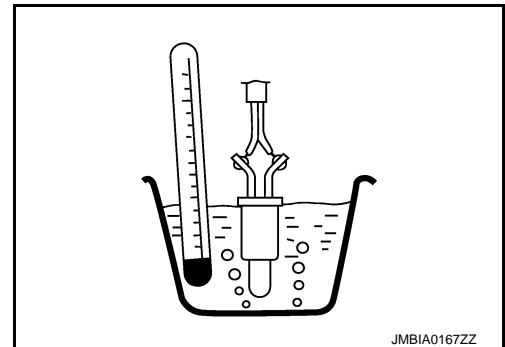
1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Remove fuel level sensor unit. Refer to [FL-10, "Removal and Installation"](#).
4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)
7 and 8	Temperature [°C (°F)]	
	20 (68)	2.3 – 2.7
	50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to [FL-10, "Removal and Installation"](#).



P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0182, P0183 FTT SENSOR

DTC Description

INFOID:000000013591602

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0182	FTT_SEN/CIRCUIT (Fuel temperature sensor "A" circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0183	FTT_SEN/CIRCUIT (Fuel temperature sensor "A" circuit high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

DTC P0182

- Harness or connectors (The fuel tank temperature sensor circuit is open or shorted.)
- Fuel tank temperature sensor

DTC P0183

- Harness or connectors (The fuel tank temperature sensor circuit is open or shorted.)
- Fuel tank temperature sensor

FAIL-SAFE

Not applicable

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 [EC6-474, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591603

1. CHECK FUEL TANK TEMPERATURE 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.

+		-	Voltage (V)
Connector	Terminal		
B101	8	Ground	Approx. 5

Is the inspection result normal?

P0182, P0183 FTT SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

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

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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.

+		-		Continuity
Fuel level sensor unit and fuel pump		ECM		
Connector	Terminal	Connector	Terminal	
B101	8	E152	180	Existed

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

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

3.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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.

+		-		Continuity
Fuel level sensor unit and fuel pump		ECM		
Connector	Terminal	Connector	Terminal	
B101	7	E152	200	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.

P0182, P0183 FTT SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

5. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC6-476, "Component Inspection \(Fuel Tank Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to [FL-10, "Removal and Installation"](#).

Component Inspection (Fuel Tank Temperature Sensor)

INFOID:000000013591604

1. CHECK FUEL TANK TEMPERATURE SENSOR

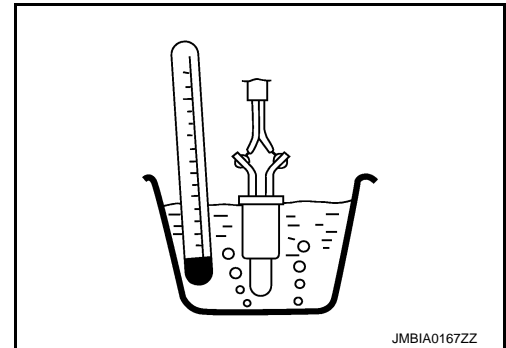
1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Remove fuel level sensor unit. Refer to [FL-10, "Removal and Installation"](#).
4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
7 and 8	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
		50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to [FL-10, "Removal and Installation"](#).



P0190, P0192, P0193 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0190, P0192, P0193 FRP SENSOR

DTC Description

INFOID:000000013591605

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0190	FUEL PRES SEN/CIRC (Fuel rail pressure sensor "A" circuit)	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.
P0192	FRP SEN/CIRC (Fuel rail pressure sensor "A" circuit low)	Signal voltage from the fuel rail pressure sensor remains at less than 0.37 V for 5 seconds or more.
P0193	FRP SEN/CIRC (Fuel rail pressure sensor "A" circuit high)	Signal voltage from the fuel rail pressure sensor remains at more than 3.7 V for 5 seconds or more.

POSSIBLE CAUSE

- Harness or connectors
 - The fuel rail pressure sensor circuit is open or shorted.
 - Sensor power supply 2 is shorted.
- Fuel rail pressure sensor
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

DTC P0190

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC P0192 and DTC P0193

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0193 is displayed with DTC P0088 or P0090, first perform the confirmation procedure (trouble diagnosis) for DTC P0088 or P0090.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0088: Refer to [EC6-358, "DTC Description"](#).
 - DTC P0090: Refer to [EC6-361, "DTC Description"](#).

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.

P0190, P0192, P0193 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

TESTING CONDITION:

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC or 1st trip DTC detected?

- YES >> Proceed to [EC6-478, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591606

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 DTC PRIORITY

If DTC P0193 is displayed with DTC P0088 or P0090, first perform the confirmation procedure (trouble diagnosis) for DTC P0088 or P0090.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
• DTC P0088: Refer to [EC6-358, "DTC Description"](#).
• DTC P0090: Refer to [EC6-361, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-1

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			Voltage (Approx.)
Connector	+	-	
F137	3	1	5 V

Inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and the ground.

+		-	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F137	3	Ground	5 V

Is inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK FRP SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

P0190, P0192, P0193 FRP SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	3	F143	80	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 SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC6-995. "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

6.CHECK FRP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	1	F143	83	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

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EC6

P0190, P0192, P0193 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

8. CHECK FRP SENSOR SIGNAL CIRCUIT FOR OPEN AND SHORT

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

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	2	F143	53	Existed

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

Is inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. CHECK FRP SENSOR

Check the FRP sensor. Refer to [EC6-480. "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000013591607

1. CHECK FRP SENSOR

WITH CONSULT

1. Turn ignition switch OFF.
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
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	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.

Connector	ECM		Condition	Value (Approx.)
	+	-		
Terminal				
F143	53	83	[Engine is running] • Warm-up condition • Idle speed	1.14 – 1.46 V
			[Engine is running] • Warm-up condition • Revving 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-182. "Exploded View"](#).

P0191 FRP SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

P0191 FRP SENSOR

DTC Description

INFOID:0000000013591608

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0191	FRP SENSOR A (Fuel rail pressure sensor "A" circuit range/ performance)	Fuel rail pressure remains at more than 14.5 MPa (147.9 kg/cm ² , 21025 psi) for 0.2 seconds or more during ignition ON.

POSSIBLE CAUSE

- Harness or connectors
 - The fuel rail pressure sensor circuit is open or shorted.
 - Sensor power supply 2 is shorted.
- Fuel rail pressure sensor
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

NOTE:

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

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 less.
- Do not turn ignition switch ON.

3. Turn ignition switch ON and wait at least 60 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-482, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P0191 FRP SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000013591609

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 - 1

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			Voltage (Approx.)
Connector	+	-	
	terminal		
F137	3	1	5 V

Inspection result normal?

YES >> GO TO 7.

NO >> GO TO 2.

2. CHECK FRP SENSOR POWER SUPPLY - 2

Check the voltage between FRP sensor harness connector and the ground.

+		-	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F137	3	Ground	5 V

Is inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3. CHECK FRP SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	3	F143	80	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC6-995, "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

5. CHECK FRP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

P0191 FRP SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

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

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	1	F143	83	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 FOR OPEN AND SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Repair or replace error-detected parts.

7.CHECK FRP SENSOR SIGNAL CIRCUIT FOR OPEN AND SHORT

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

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	2	F143	53	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 FRP SENSOR

Check the FRP sensor. Refer to [EC6-480. "Component Inspection \(Fuel Rail Pressure Sensor\)".](#)

Is inspection result normal?

- YES >> INSPECTION END
 NO >> Repair or replace error-detected parts.

P0191 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000013591610

1. CHECK FRP SENSOR

WITH CONSULT

1. Turn ignition switch OFF.
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
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	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.

Connector	ECM		Condition	Value (Approx.)
	+	-		
	Terminal			
F143	53	83	[Engine is running] • Warm-up condition • Idle speed	1.14 – 1.46 V
			[Engine is running] • Warm-up condition • Revving 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-182. "Exploded View"](#).

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0196 EOT SENSOR

DTC Description

INFOID:0000000013591611

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0196	EOT SENSOR (Engine oil temperature sensor range/performance)	A	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.
		B	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the EOT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.

C

D

E

POSSIBLE CAUSE

DTC P0196 - A

- Harness or connectors (The EOT sensor circuit is open or shorted)
- EOT sensor

F

DTC P0196 - B

- Harness or connectors (High or low resistance in the EOT sensor circuit)
- EOT sensor

G

H

FAIL-SAFE

Not applicable

I

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0196 is displayed with DTC P0197 or P0198, first perform the confirmation procedure for DTC P0197 or P0198.

Is applicable DTC detected?

J

K

L

M

N

O

P

YES >> Perform diagnosis of applicable.

- DTC P0197: Refer to [EC6-489, "DTC Description"](#).
- DTC P0198: Refer to [EC6-489, "DTC Description"](#).

NO >> GO TO 2.

2. INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.

NO >> GO TO 3.

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, confirm that battery voltage is more than 11 V at idle.

>> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-I

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

P0196 EOT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for 5 minutes and 10 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> [EC6-487. "Diagnosis Procedure"](#).
 NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Select "DATA MONITOR" mode with CONSULT.
2. Check that "COOLAN TEMP/S" indicates above 80°C (176°F).
 If it is above 80°C (176°F), go to the following steps.
 If it is below 80°C (176°F), warm engine up until "COOLAN TEMP/S" indicates more than 80°C (176°F).
 Then perform the following steps.
3. Turn ignition switch OFF and soak the vehicle in a cool place.
4. Turn ignition switch ON.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON.

NOTE:

Do not turn ignition switch OFF until step 10.

7. Select "DATA MONITOR" mode with CONSULT.
8. 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.

9. Start engine and let it idle for 5 minutes.
10. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> [EC6-487. "Diagnosis Procedure"](#).
 NO >> GO TO 6.

6. PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

NOTE:

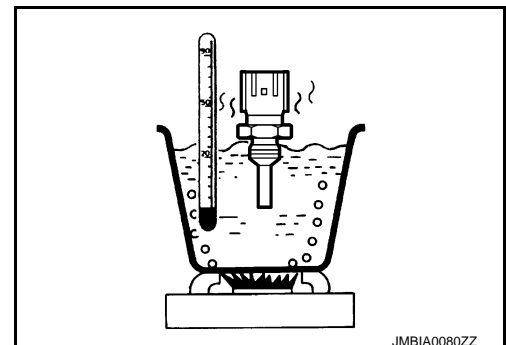
Use the component function check to check the overall function of the EOT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

1. Turn ignition switch OFF.
2. Disconnect EOT sensor harness connector.
3. Remove EOT sensor. Refer to [EM-238. "Exploded View"](#).
4. Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).



P0196 EOT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-487, "Diagnosis Procedure"](#).

7. PRECONDITIONING

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

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

TEST CONDITION:

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

>> GO TO 8.

8. PERFORM DTC CONFIRMATION PROCEDURE B

1. Move the vehicle to a cool place.

NOTE:

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

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

CAUTION:

Never turn ignition switch ON during this procedure.

NOTE:

The vehicle must be cooled with the hood open.

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

CAUTION:

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-487, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591612

1. CHECK DTC PRIORITY

If DTC P0196 is displayed with DTC P0197 or P0198, first perform the confirmation procedure for DTC P0197 or P0198.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC P0197: Refer to [EC6-489, "DTC Description"](#).
- DTC P0198: Refer to [EC6-489, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3. CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to [EC6-488, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to [EM-238, "Exploded View"](#).

P0196 EOT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

INFOID:000000013591613

1. CHECK ENGINE OIL TEMPERATURE SENSOR

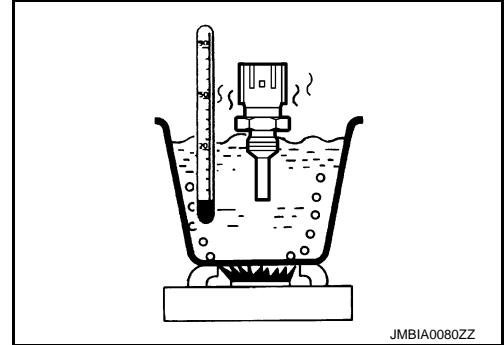
1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor. Refer to [EM-238. "Exploded View"](#).
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to [EM-238. "Exploded View"](#).



P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0197, P0198 EOT SENSOR

DTC Description

INFOID:000000013591614

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The engine oil temperature sensor circuit is open or shorted.)
- Engine oil temperature sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Others	Exhaust valve timing control does not function.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-489, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591615

1. CHECK EOT SENSOR POWER SUPPLY

1. Disconnect engine oil temperature (EOT) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EOT sensor harness connector and ground.

+		-	Voltage (V)
EOT sensor			
Connector	Terminal		
F87	1	Ground	Approx. 5

Is the inspection result normal?

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

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. CHECK EOT SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

+		-		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F87	1	F143	50	Existed

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

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

3. CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F87	2	F142	100	Existed

4. Also check harness for short to ground and 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

Refer to [EC6-490, "Component Inspection \(Engine Oil Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to [EM-238, "Exploded View"](#).

Component Inspection (Engine Oil Temperature Sensor)

INFOID:000000013591616

1. CHECK ENGINE OIL TEMPERATURE SENSOR

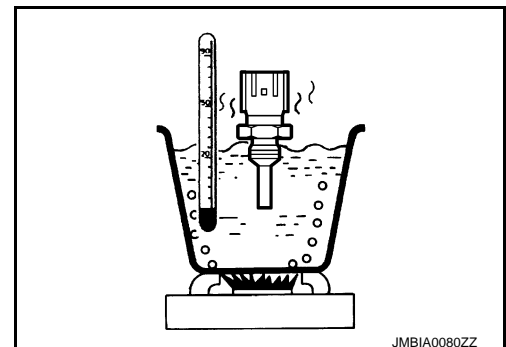
1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor. Refer to [EM-238, "Exploded View"](#).
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90
		50 (122)	0.68 – 1.00
		90 (194)	0.236 – 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to [EM-238, "Exploded View"](#).



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P0201, P0202, P0203, P0204, P0205, P0206 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0201, P0202, P0203, P0204, P0205, P0206 FUEL INJECTOR

DTC Description

INFOID:000000013591617

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0201	INJECTOR CIRC-CYL1 (Injector circuit/open - cylinder 1)	ECM detects No. 1 injector circuit is open or shorted.
P0202	INJECTOR CIRC-CYL2 (Injector circuit/open - cylinder 2)	ECM detects No. 2 injector circuit is open or shorted.
P0203	INJECTOR CIRC-CYL3 (Injector circuit/open - cylinder 3)	ECM detects No. 3 injector circuit is open or shorted.
P0204	INJECTOR CIRC-CYL4 (Injector circuit/open - cylinder 4)	ECM detects No. 4 injector circuit is open or shorted.
P0205	INJECTOR CIRC-CYL5 (Injector circuit/open - cylinder 5)	ECM detects No. 5 injector circuit is open or shorted.
P0206	INJECTOR CIRC-CYL6 (Injector circuit/open - cylinder 6)	ECM detects No. 6 injector circuit is open or shorted.

C

D

E

F

G

POSSIBLE CAUSE

- Harness or connectors (The fuel injector circuit is open or shorted.)
- Fuel injector
- ECM

H

FAIL-SAFE

Not applicable

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.

J

K

TESTING CONDITION:

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

L

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

M

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.

N

Is 1st trip DTC detected?

O

YES >> Proceed to [EC6-491, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591618

1. CHECK FUEL INJECTOR

P

Refer to [EC6-971, "Component Function Check"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0222, P0223, P2132, P2133 TP SENSOR

DTC Description

INFOID:000000013591619

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0222	TP SEN 1/CIRC-B1 (Throttle/Pedal position sensor/switch "B" circuit low)	An excessively low voltage from the TP sensor 1 is sent to ECM.
P0223	TP SEN 1/CIRC-B1 (Throttle/Pedal position sensor/switch "B" circuit high)	An excessively high voltage from the TP sensor 1 is sent to ECM.
P2132	TP SEN 1/CIRC-B2 (Throttle/Pedal position sensor/switch "F" circuit low)	An excessively low voltage from the TP sensor 1 is sent to ECM.
P2133	TP SEN 1/CIRC-B2 (Throttle/Pedal position sensor/switch "F" circuit high)	An excessively high voltage from the TP sensor 1 is sent to ECM.

POSSIBLE CAUSE

DTC P0222 and P0223

- Harness or connectors [TP sensor 1 (bank 1) circuit is open or shorted.]
- Electric throttle control actuator (TP sensor 1) (bank 1)

DTC P2132 and P2133

- Harness or connectors [TP sensor 1 (bank 2) circuit is open or shorted.]
- Electric throttle control actuator (TP sensor 1) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	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.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0222, P0223, P2132 or P2133 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

- YES >> Proceed to [EC6-493, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591620

1. CHECK DTC PRIORITY

If DTC P0222, P0223, P2132 or P2133 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY

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

DTC	+			-	Voltage (Approx.)
	Electric throttle control actuator				
	Bank	Connector	Terminal		
P0222, P0223	1	F118	5	Ground	5 V
P2132, P2133	2	F119	5		

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

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

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0222, P0223	1	F118	5	F143	35	Existed
P2132, P2133	2	F119	5	F142	105	

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

Is the inspection result normal?

- YES-1 (P0222 or P0223 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).
YES-2 (P2132 or P2133 is detected)>>GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).
 NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0222, P0223	1	F118	4	F143	44	Existed
P2132, P2133	2	F119	4	F142	104	

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

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair or replace error-detected parts.

6. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0222, P0223	1	F118	6	F143	43	Existed
P2132, P2133	2	F119	6	F142	106	

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

Is the inspection result normal?

- YES >> GO TO 8.

P0222, P0223, P2132, P2133 TP SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

8.CHECK THROTTLE POSITION SENSOR

Refer to [EC6-417, "Component Inspection \(Throttle Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection (Throttle Position Sensor)

INFOID:0000000013591621

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC6-272, "Description"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
F143	43 [TP sensor 1 (bank 1)]	44	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F142	106 [TP sensor 1 (bank 2)]	104	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F143	48 [TP sensor 2 (bank 1)]	44	Fully released	Less than 4.75
			Fully depressed	More than 0.36
F142	112 [TP sensor 2 (bank 2)]	104	Fully released	Less than 4.75
			Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Proceed to [EC6-272, "Description"](#).

>> INSPECTION END

P0234 TC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0234 TC SYSTEM

DTC Description

INFOID:000000013665248

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0234	TC SYSTEM-B1 (Turbocharger/supercharger "A" overboost condition)	Turbocharger boost is excessively high.

POSSIBLE CAUSE

- Harness or connectors
[Electric wastegate control actuator (bank 1) circuit.]
[Turbocharger boost sensor (bank 1) circuit]
- Electric wastegate control actuator (bank 1)
- Turbocharger boost sensor (bank 1)
- Turbocharger (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0234 is displayed with DTC P0237 or P0238, first perform the trouble diagnosis for DTC P0237 or P0238.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-504, "DTC Description"](#).
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of turbocharger system circuit.

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "WASTEGATE ACTUATOR".
3. Operate "Up" or "Down", set "W/G ACTUATOR POSITION B1" to 0.002 m, and make a quick short note of value "V1" of "W/G ACTUATOR POSI SEN B1".
4. Operate "Up" or "Down", set "W/G ACTUATOR POSITION B1" to 0.006 m, and make a quick short note of value "V2" of "W/G ACTUATOR POSI SEN B1".

Do the values of "V1" and "V2" change (visually. ACTUATOR SHAFT operates) and "V2" minus "V1" becomes equal to or more than 1.3 V?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC6-496, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013665249

1.CHECK DTC PRIORITY

P0234 TC SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P0234 is displayed with DTC P0237 or P0238, first perform the trouble diagnosis for DTC P0237 or P0238.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-504, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK TURBOCHARGER BOOST SENSOR

Perform diagnosis procedure for turbocharger boost sensor. Refer to [EC6-505, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Perform trouble diagnosis for electric wastegate control actuator. Refer to [EC6-341, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.PERFORM ELECTRIC WASTEGATE CONTROL ACTUATOR INITIALIZATION

1. Perform electric wastegate control actuator initialization. Refer to [EC6-277, "Description"](#).

2. Perform drive test.

3. Check DTC.

Is DTC P0234 detected again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

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P0235, P0239 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0235, P0239 TC BOOST SENSOR

DTC Description

INFOID:000000013591622

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0235	TURBO BOOST SENSOR (Turbocharger/supercharger boost sensor "A" circuit)	An excessively low voltage from the turbocharger boost sensor is sent to ECM.
P0239	TC/SC boost sensor B (Turbocharger/supercharger boost sensor "B" circuit)	

POSSIBLE CAUSE

- Harness or connectors (Turbocharger boost sensor circuit is open or shorted.)
- Turbocharger boost sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0235 or P0239 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).

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

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

Is 1st trip DTC detected?

YES >> Proceed to [EC6-499. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P0235, P0239 TC BOOST SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000013591623

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P0235 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).

NO >> GO TO 2.

2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

+			-	Voltage (Approx.)
Turbocharger boost sensor				
DTC	Connector	Terminal		
P0235	F90	2	Ground	5 V
P0239	F91			

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC6-995. "Diagnosis Procedure"](#).

Is inspection result normal?

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

NO >> Repair or replace error-detected parts.

4. 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.

+			-		Continuity
Turbocharger boost sensor			ECM		
DTC	Connector	Terminal	Connector	Terminal	
P0235	F90	4	F143	23	Existed
P0239	F91	4		68	

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 TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+			-		Continuity
Turbocharger boost sensor			ECM		
DTC	Connector	Terminal	Connector	Terminal	
P0235	F90	1	F143	58	Existed
P0239	F91	1		63	

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

P0235, P0239 TC BOOST SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6. CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to [EC6-500, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

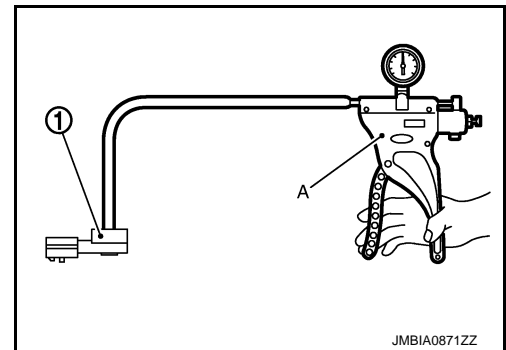
- YES >> INSPECTION END
- NO >> Replace malfunctioning turbocharger boost sensor. Refer to [EM-167, "Exploded View"](#).

Component Inspection (Turbocharger Boost Sensor)

INFOID:000000013591624

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				Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Bank	Connector	+	-		
		Terminal			
1	F143	58	23	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
2		63	68		
1		58	23	40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V
2		63	68		

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning turbocharger boost sensor. Refer to [EM-167, "Exploded View"](#).

P0236, P0240 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0236, P0240 TC BOOST SENSOR

DTC Description

INFOID:000000013665240

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0236	TC BOOST SEN/CIRC-B1 (Turbocharger/supercharger boost sensor "A" circuit range/performance)	A boost pressure signal sent from the sensor is out of specified range.
P0240	TC BOOST SEN/CIRC-B2 (Turbocharger/supercharger boost sensor "B" circuit range/performance)	

C

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POSSIBLE CAUSE

- Harness or connectors (Turbocharger boost sensor circuit is open or shorted.)
- Turbocharger boost sensor

F

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0236 or P0240 is displayed with DTC P0237, P0238, P0241 or P0242, first perform the trouble diagnosis for DTC P0237, P0238, P0241 or P0242.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

H

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2.PERFORM DIAGNOSIS PROCEDURE

NOTE:

This DTC is difficult to duplicate. Perform Diagnosis Procedure to check the overall function to turbocharger boost pressure sensor.

J

- >> To check malfunction symptom before repair: Proceed to [EC6-501, "Diagnosis Procedure"](#).
>> Confirmation after repair: INSPECTION END

K

L

Diagnosis Procedure

INFOID:000000013665241

1.CHECK DTC PRIORITY

If DTC P0236 or P0239 is displayed with DTC P0237, P0238, P0241 or P0242, first perform the trouble diagnosis for DTC P0237, P0238, P0241 or P0242.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

M

N

2.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

O

P

P0236, P0240 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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+			-	Voltage (Approx.)
Turbocharger boost sensor				
Bank	Connector	Terminal		
1	F90	2	Ground	5 V
2	F91			

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC6-995. "Diagnosis Procedure"](#).

Is inspection result normal?

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

4.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.

+			-		Continuity
Turbocharger boost sensor			ECM		
Bank	Connector	Terminal	Connector	Terminal	
1	F90	4	F143	23	Existed
2	F91	4		68	

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 TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+			-		Continuity
Turbocharger boost sensor			ECM		
Bank	Connector	Terminal	Connector	Terminal	
1	F90	1	F143	58	Existed
2	F91	1		63	

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 TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to [EC6-503. "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning turbocharger boost sensor. Refer to [EM-167. "Exploded View"](#).

P0236, P0240 TC BOOST SENSOR

[VR30DDTT FOR USA AND CANADA]

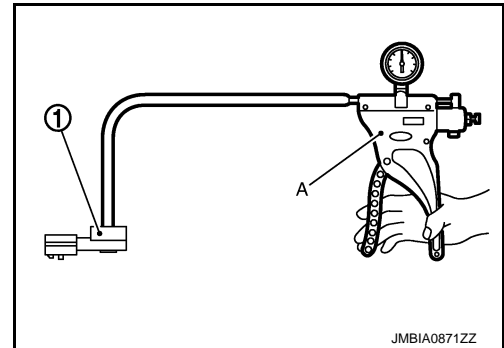
< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000013665242

Component Inspection (Turbocharger Boost Sensor)

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)].

Bank	Connector	ECM		Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
		+	-		
		Terminal			
1	F143	58	23	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
2		63	68		
1		58	23	40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V
2		63	68		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning turbocharger boost sensor. Refer to [EM-167, "Exploded View"](#).

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P0237, P0238, P0241, P0242 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0237, P0238, P0241, P0242 TC BOOST SENSOR

DTC Description

INFOID:000000013591625

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0237	TC BOOST SEN/CIRC-B1 (Turbocharger boost sensor A circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0238	TC BOOST SEN/CIRC-B1 (Turbocharger boost sensor A circuit high)	An excessively high voltage from the sensor is sent to ECM.
P0241	TC BOOST SEN/CIRC-B2 (Turbocharger boost sensor B circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0242	TC BOOST SEN/CIRC-B2 (Turbocharger boost sensor B circuit high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

DTC P0237 and P0238

- Harness or connectors [The turbocharger boost sensor (bank 1) circuit is open or shorted.]
- Turbocharger boost sensor (bank 1)

DTC P0241 and P0242

- Harness or connectors [The turbocharger boost sensor (bank 2) circuit is open or shorted.]
- Turbocharger boost sensor (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0237, P0238, P0241, or P0242 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).

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

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

P0237, P0238, P0241, P0242 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-505. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

A

EC6

Diagnosis Procedure

INFOID:0000000013591626

1. CHECK DTC PRIORITY

C

If DTC P0237, P0238, P0241, or P0242 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

D

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).

NO >> GO TO 2.

E

2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

F

DTC	+		-	Voltage (Approx.)
	Turbocharger boost sensor			
	Connector	Terminal		
P0237, P0238	F90	2	Ground	5 V
P0241, P0242	F91	2		

G

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Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

I

3. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

J

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

K

DTC	+		-		Continuity
	Turbocharger boost sensor		ECM		
	Connector	Terminal	Connector	Terminal	
P0237, P0238	F90	2	F143	38	Existed
P0241, P0242	F91	2			

L

M

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

N

4. CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

O

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

P

P0237, P0238, P0241, P0242 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	+		-		Continuity
	Turbocharger boost sensor		ECM		
	Connector	Terminal	Connector	Terminal	
P0237, P0238	F90	4	F143	23	Existed
P0241, P0242	F91	4		68	

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 ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

DTC	+		-		Continuity
	Turbocharger boost sensor		ECM		
	Connector	Terminal	Connector	Terminal	
P0237, P0238	F90	1	F143	58	Existed
P0241, P0242	F91	1		63	

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to [EC6-507, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning turbocharger boost sensor. Refer to [EM-167, "Exploded View"](#).

P0237, P0238, P0241, P0242 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Component Inspection

INFOID:000000013591627

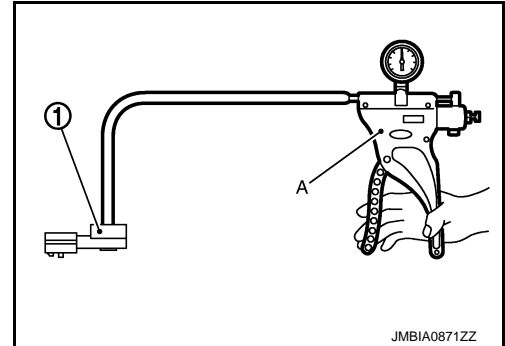
1. CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector. Refer to [EM-167, "Exploded View"](#).
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)].

Sensor	ECM		Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)	
	Connector	Terminal			
Turbocharger boost sensor (bank 1)	F143	58	23	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
				40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V
Turbocharger boost sensor (bank 2)	F143	63	68	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
				40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning turbocharger boost sensor. Refer to [EM-167, "Exploded View"](#).

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P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013599797

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P023B	Charged air cooler coolant pump (Charge air cooler coolant pump control circuit low)	A signal duty of the CAC coolant pump operation command sent from ECM is less than 2% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been precisely conducted, always perform the following before conducting the next test.

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P023B is detected?

- YES >> Proceed to [EC6-508. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599798

1. COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
• Electric water pump 1 duty • Electric water pump 2 duty*	Normal mode	20 – 80

*: Turbo high pressure model

Is the inspection result normal?

P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

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+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	

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

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check CAC cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4		

Is the inspection result normal?

P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

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

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599800

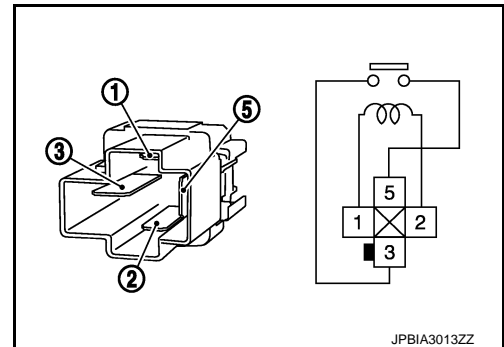
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

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P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013599801

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P023C	Charged air cooler coolant pump (Charge air cooler coolant pump control circuit high)	A signal duty of the CAC coolant pump operation command sent from ECM is more than 98% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P023C is detected?

- YES >> Proceed to [EC6-512, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599802

1.COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
• Electric water pump 1 duty • Electric water pump 2 duty*	Normal mode	20 – 80

*: Turbo high pressure model

Is the inspection result normal?

P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

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< DTC/CIRCUIT DIAGNOSIS >

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

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

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

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

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

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

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

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	

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

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check CAC cooling relay. Refer to [EC6-515. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4		

Is the inspection result normal?

P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

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

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599804

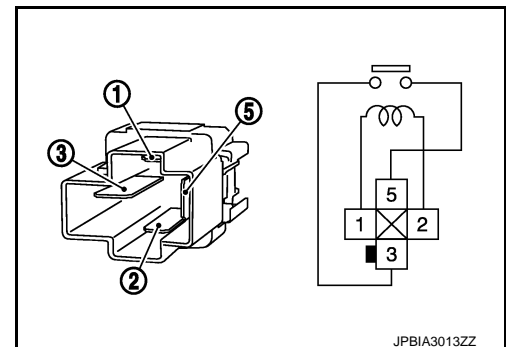
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

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P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

DTC Description

INFOID:000000013591628

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

- 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 illuminating.
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 illuminate when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
A misfire malfunction can be detected in any one cylinder or in multiple cylinders.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0300	MULTI CYL MISFIRE (Random/Multiple cylinder misfire detected)	Multiple cylinders misfire.
P0301	CYL 1 MISFIRE (Cylinder 1 misfire detected)	No. 1 cylinder misfires.
P0302	CYL 2 MISFIRE (Cylinder 2 misfire detected)	No. 2 cylinder misfires.
P0303	CYL 3 MISFIRE (Cylinder 3 misfire detected)	No. 3 cylinder misfires.
P0304	CYL 4 MISFIRE (Cylinder 4 misfire detected)	No. 4 cylinder misfires.
P0305	CYL 5 MISFIRE (Cylinder 5 misfire detected)	No. 5 cylinder misfires.
P0306	CYL 6 MISFIRE (Cylinder 6 misfire detected)	No. 6 cylinder misfires.

POSSIBLE CAUSE

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The fuel injector circuit is open or shorted
- Fuel injector
- Intake air leak
- The ignition signal circuit is open or shorted
- Lack of fuel
- Signal plate
- A/F sensor 1
- Incorrect PCV hose connection

FAIL-SAFE

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

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Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	<ul style="list-style-type: none"> Stops feedback control of idle speed and controls with specified speed. Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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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.

D

E

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and let it idle for about 15 minutes.
- Check 1st trip DTC.

F

G

H

Is 1st trip DTC detected?

YES >> Proceed to [EC6-518, "Diagnosis Procedure"](#).

NO >> GO TO 3.

I

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and drive the vehicle under similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

J

K

Hold the accelerator pedal as steady as possible.

Similar conditions to (1st trip) Freeze Frame Data mean that the following conditions should be satisfied at the same time.

L

CAUTION:

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

M

Engine speed	Engine speed in the freeze frame data \pm 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)
Base fuel schedule	Base fuel schedule in the freeze frame data \times (1 \pm 0.1)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

N

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Driving time varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

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Engine speed	Time
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-518, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591629

1.CHECK GROUND CONNECTION

Check the following.

- Connection condition of the ground F52
- Connection condition of the ground harness between engine assembly and vehicle body (If equipped)

Is the inspection result normal?

YES >> GO TO 2

NO >> Repair or replace error-detected parts.

2.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 3.

3.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 4.

YES-2 >> Without CONSULT: GO TO 5.

NO >> Repair or replace it.

4.PERFORM POWER BALANCE TEST

 **With CONSULT**

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 5.

5.CHECK FUNCTION OF FUEL INJECTOR-I

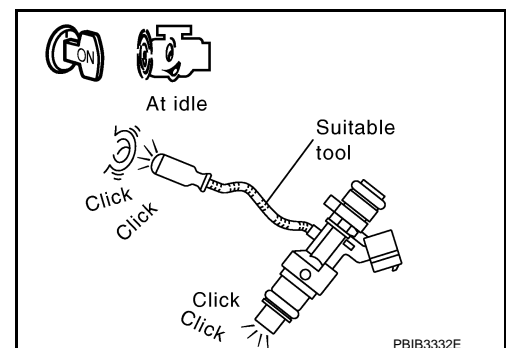
1. Start engine and let it idle.
2. Listen to each fuel injector operation sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC6-971, "Diagnosis Procedure"](#).



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6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

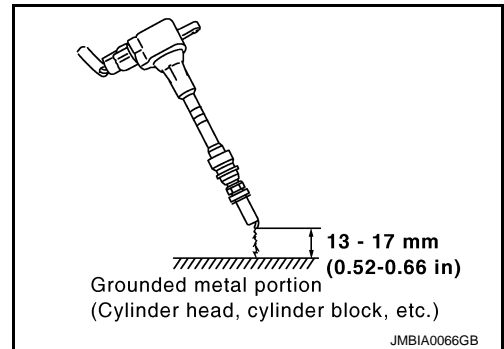
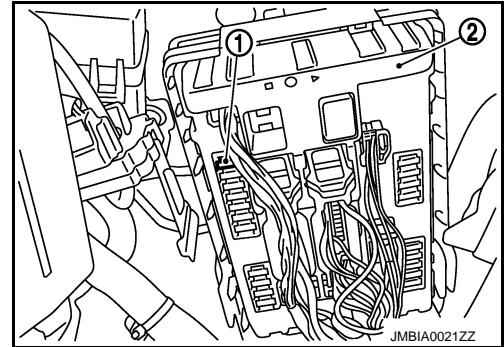
Perform the following procedure in a place where with no combustible objects and good ventilation.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse ① in IPDM E/R ② 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:

- Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.

NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a non-malfunctioning spark plug.
3. Crank engine for 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 [EC6-983. "Diagnosis Procedure"](#).

8. CHECK SPARK PLUG

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P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

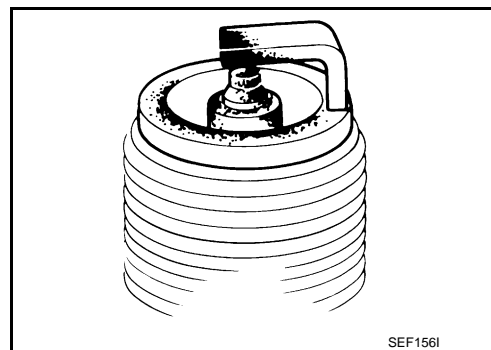
< DTC/CIRCUIT DIAGNOSIS >

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Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160. "Removal and Installation"](#).
- NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160. "Removal and Installation"](#).

10. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-150. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

11. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to [EC6-279. "Work Procedure"](#).
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC6-279. "Work Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 13.
- NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly".
- NO >> Repair or replace.

13. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to [EC6-262. "Work Procedure"](#).

For specification, refer to [EC6-1017. "Idle Speed"](#) and [EC6-1017. "Ignition Timing"](#).

Is the inspection result normal?

- YES >> GO TO 14.
- NO >> Follow the [EC6-262. "Work Procedure"](#).

14. 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.

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< DTC/CIRCUIT DIAGNOSIS >

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Bank	+		-		Continuity
	A/F sensor 1		ECM		
	Connector	Terminal	Connector	Terminal	
1	F133	3	F142	102	Existed
		4		101	
2	F134	3		111	
		4		107	

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

Bank	+		-	Continuity
	A/F sensor 1			
	Connector	Terminal		
1	F133	3	Ground	Not existed
		4		
2	F134	3		
		4		

Bank	+		-	Continuity
	ECM			
	Connector	Terminal		
1	F142	101	Ground	Not existed
		102		
		107		
2	111			

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 15.

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

15.CHECK A/F SENSOR 1 HEATER

Refer to [EC6-336. "Component Inspection \(A/F Sensor 1 Heater\)".](#)

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace (malfunctioning) A/F sensor 1. Refer to [EM-231. "Exploded View".](#)

16.CHECK MASS AIR FLOW SENSOR

With CONSULT

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.

For specification, refer to [EC6-1017. "Mass Air Flow Sensor".](#)

With GST

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to [EC6-1017. "Mass Air Flow Sensor".](#)

Is the measurement value within the specification?

YES >> GO TO 17.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC6-387. "Diagnosis Procedure".](#)

17.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in [EC6-1002. "Symptom Table".](#)

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

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Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace.

18.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 [EC6-114, "On Board Diagnosis Function"](#) (Without CONSULT) or [EC6-115, "CONSULT Function"](#) (With CONSULT).

>> INSPECTION END

P0327, P0328, P0332, P0333 KS

DTC Description

INFOID:000000013591630

DTC DETECTION LOGIC

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0327	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit low bank 1)	An excessively low voltage from the sensor is sent to ECM.
P0328	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit high bank 1)	An excessively high voltage from the sensor is sent to ECM.
P0332	KNOCK SEN/CIRC-B2 (Knock sensor 2 circuit low bank 2)	An excessively low voltage from the sensor is sent to ECM.
P0333	KNOCK SEN/CIRC-B2 (Knock sensor 2 circuit high bank 2)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

DTC P0327 and P0328

- Harness or connectors [The knock sensor (bank 1) circuit is open or shorted.]
- Knock sensor (bank 1)

DTC P0332 and P0333

- Harness or connectors [The knock sensor (bank 2) circuit is open or shorted.]
- Knock sensor (bank 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-523. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591631

1. CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

P0327, P0328, P0332, P0333 KS

< DTC/CIRCUIT DIAGNOSIS >

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DTC	Knock sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0327, P0328	1	F201	2	F143	84	Existed
P0332, P0333	2	F202	2			

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Knock sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0327, P0328	1	F201	1	F143	8	Existed
P0332, P0333	2	F202	1		86	

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK KNOCK SENSOR

Refer to [EC6-524. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor. Refer to [EM-270. "Exploded View"](#).

Component Inspection

INFOID:0000000013591632

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.

P0327, P0328, P0332, P0333 KS

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< DTC/CIRCUIT DIAGNOSIS >

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 MΩ.

Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature	20°C (68°F)	532 – 588

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor. Refer to [EM-270. "Exploded View"](#).

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P0335 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0335 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:000000013599805

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor "A" circuit)	Crankshaft position sensor signal is not input to ECM for approximately 1 consecutive second or more while all of the following conditions are satisfied: <ul style="list-style-type: none">• Engine is running or at the start of engine.• Camshaft position sensor signal is inputted.
		Crankshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second or more while all of the following conditions are satisfied: <ul style="list-style-type: none">• Engine is running or at the start of engine.• Camshaft position sensor signal is inputted.

POSSIBLE CAUSE

- Harness or connectors
(Crankshaft position sensor circuit is open or shorted.)
- Crankshaft position sensor
- Signal plate

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• No stratified charge combustion at starting (cold start).• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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:

Before performing the following procedure, check that battery voltage as the following.

- Ignition switch ON: More than 11 V

P0335 CRANKSHAFT POSITION SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

- Engine cranking: More than 7 V

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Shift the selector lever in N range.
3. Start the engine and let it idle at least 5 seconds.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-527. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013599806

1. CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector and ground.

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F88	1	Ground	5 V

Is the inspection result normal?

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

2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

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

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F143	34	Existed

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

Is the inspection result normal?

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

3. CHECK CKP SENSOR GROUND CIRCUIT

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

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F143	28	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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P0335 CRANKSHAFT POSITION SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR INPUT SIGNAL CIRCUIT

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

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	F143	31	Existed

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

Is the inspection result normal?

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

5.CHECK CKP SENSOR

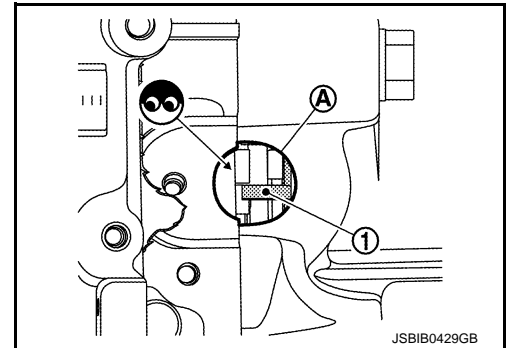
Check CKP sensor. Refer to [EC6-528, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

6.CHECK GEAR TOOTH

1. Remove CKP sensor. Refer to [EM-198, "Exploded View"](#).
2. Look into the mounting hole (A) of the CKP sensor to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace the signal plate. Refer to [EM-198, "Exploded View"](#).

Component Inspection (Crankshaft Position Sensor)

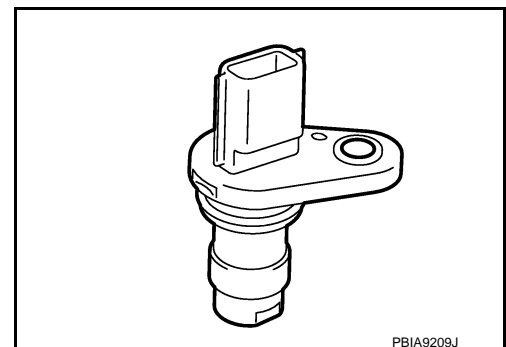
INFOID:000000013599807

1.CHECK CRANKSHAFT POSITION (CKP) SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect CKP sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).



P0335 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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2.CHECK CKP SENSOR-2

Check the resistance between CKP sensor terminals as per the following.

CKP sensor		Resistance [at 25°C (77°F)]
+	-	
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

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P0340, P0345 CMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0340, P0345 CMP SENSOR

DTC Description

INFOID:000000013591636

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0340	CMP SEN/CIRC-B1 (Camshaft position sensor "A" circuit bank 1)	<ul style="list-style-type: none">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.
P0345	CMP SEN/CIRC-B2 (Camshaft position sensor "A" circuit bank 2)	

POSSIBLE CAUSE

DTC P0340

- Harness or connectors [CMP sensor (bank 1) circuit is open or shorted.]
- Camshaft position sensor (bank 1)
- Camshaft (INT)
- Starter motor
- Starting system circuit
- Dead (Weak) battery

DTC P0345

- Harness or connectors
 - CMP sensor (bank 2) circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Camshaft position sensor (bank 2)
- Camshaft (INT)
- Starter motor
- Starting system circuit
- Dead (Weak) battery
- Each sensor, connector with sensor power supply 2 circuit

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">Stops feedback control of idle speed and controls with specified speed.Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0340 or P0345 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).
- NO >> GO TO 2.

2. PRECONDITIONING

P0340, P0345 CMP SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

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 3.

3.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 [EC6-531, "Diagnosis Procedure"](#).
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-531, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591637

1.CHECK DTC PRIORITY

If DTC P0340 or P0345 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

- YES >> GO TO 3.
NO >> Check starting system. (Refer to [STR-12, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-15, "Work Flow \(Without GR8-1200 NI\)"](#). For details, Refer to [STR-5, "Special Service Tools"](#).)

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY

1. Disconnect intake camshaft position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between intake camshaft position sensor harness connector and ground.

P0340, P0345 CMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	Intake camshaft position sensor			Ground	Voltage (V)
	Bank	Connector	Terminal		
P0340	1	F135	1	Ground	Approx. 5
P0345	2	F97	1		

Is the inspection result normal?

YES >> GO TO 6.

NO-1 >> P0340: Repair open circuit, short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 5.

5. CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake camshaft position sensor harness connector and ECM harness connector.

Intake camshaft position sensor			ECM		Continuity
Bank	Connector	Terminal	Connector	Terminal	
2	F97	1	F143	85	Existed

Is the inspection result normal?

YES >> Check sensor power supply 2 circuit. Refer to [EC6-995, "Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

6. CHECK INTAKE CAMSHAFT POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake camshaft position sensor harness connector and ECM harness connector.

DTC	Intake camshaft position sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0340	1	F135	2	F143	29	Existed
P0345	2	F97	2		82	

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

Is the inspection result normal?

YES >> GO TO 7.

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

7. CHECK INTAKE CAMSHAFT POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between intake camshaft position sensor harness connector and ECM harness connector.

DTC	Intake camshaft position sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0340	1	F135	3	F143	26	Existed
P0345	2	F97	3		77	

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

Is the inspection result normal?

YES >> GO TO 8.

P0340, P0345 CMP SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

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

8. CHECK CAMSHAFT POSITION SENSOR

Refer to [EC6-533, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

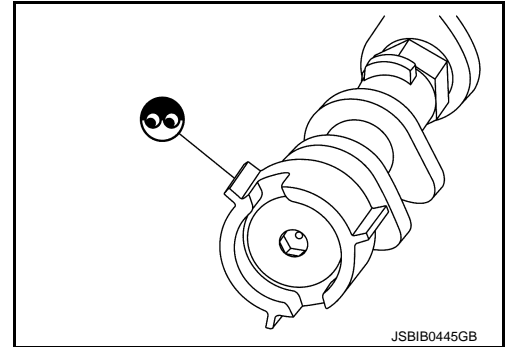
NO >> Replace malfunctioning camshaft position sensor. Refer to [EM-250, "Exploded View"](#).

9. CHECK CAMSHAFT (INTAKE)

Check the following.

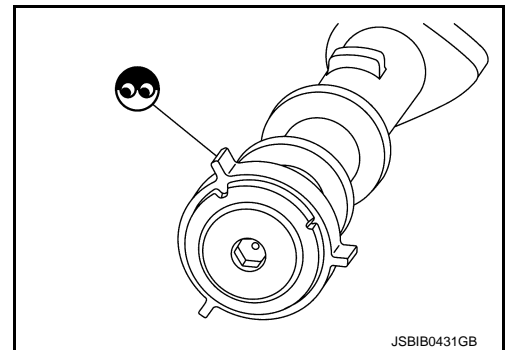
BANK 1

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



BANK 2

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



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection

INFOID:000000013591638

1. CHECK CAMSHAFT POSITION SENSOR-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor harness connector.
4. Remove the sensor. Refer to [EM-250, "Exploded View"](#).

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P0340, P0345 CMP SENSOR

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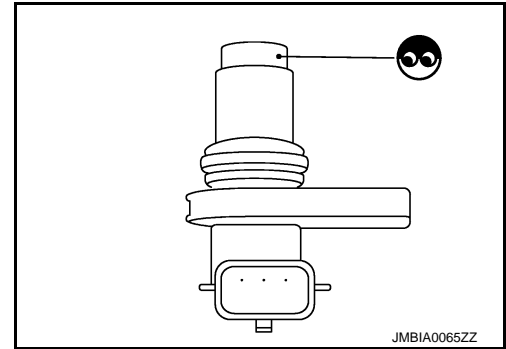
< DTC/CIRCUIT DIAGNOSIS >

5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning camshaft position sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CAMSHAFT POSITION SENSOR-II

Check resistance camshaft position sensor terminals as follows.

Terminals (Polarity)	Resistance (Ω)
1 (+) - 2 (-)	Except 0 or ∞ [at 25°C (77°F)]
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning camshaft position sensor. Refer to [EM-250, "Exploded View"](#).

P0365 EXHAUST CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0365 EXHAUST CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013599808

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0365	CAMSHAFT POSITION SENSOR B B1 (Camshaft position sensor "B" circuit bank 1)	Exhaust camshaft position sensor signal is not inputted to ECM for approximately 1 consecutive second or more during engine run (600 rpm or more) or at an engine start.
		Exhaust camshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second or more during engine run (400 rpm or more) or at an engine start.

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POSSIBLE CAUSE

- Harness or connectors
(Exhaust camshaft position sensor (bank 1) circuit is open or shorted.)
- Exhaust camshaft position sensor (bank 1)
- Exhaust camshaft (bank 1) (sensor rotor)

F

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

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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:

Before performing the following procedure, check that battery voltage as the following.

- Ignition switch ON: More than 11 V
- Engine cranking: More than 7 V

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>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Shift the selector lever in N range.
3. Start the engine and let it idle at least 5 seconds.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-535, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

N

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P

Diagnosis Procedure

INFOID:0000000013599809

1. CHECK CAMSHAFT POSITION (EXHAUST CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect camshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust CMP sensor harness connector and ground.

P0365 EXHAUST CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage (Approx.)
Exhaust CMP sensor			
Connector	Terminal		
F101	1	Ground	5 V

Is the inspection result normal?

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

2. CHECK EXHAUST CMP SENSOR POWER SUPPLY CIRCUIT

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

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F101	1	F143	36	Existed

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

Is the inspection result normal?

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

3. CHECK EXHAUST CMP SENSOR GROUND CIRCUIT

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

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F101	2	F143	29	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 EXHAUST CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between exhaust CMP sensor harness connector and ECM harness connector.

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F101	3	F143	33	Existed

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

Is the inspection result normal?

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

5. CHECK EXHAUST CMP SENSOR

Check exhaust CMP sensor. Refer to [EC6-528, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace exhaust CMP sensor. Refer to [EM-250, "Exploded View"](#).

P0365 EXHAUST CAMSHAFT POSITION SENSOR

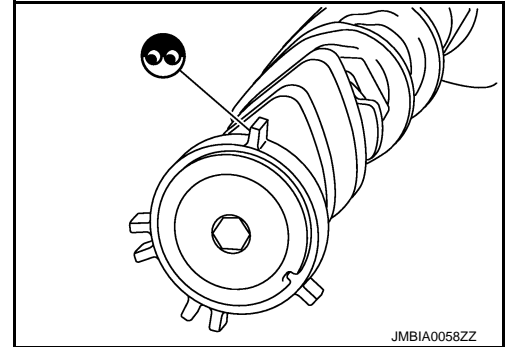
< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

6.CHECK EXHAUST CAMSHAFT (BANK 1)

Check the following items:

- Accumulation of debris to the signal plate exhaust camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection

INFOID:0000000013599810

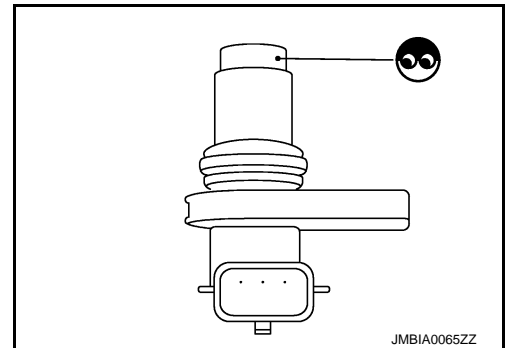
1.CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2.CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P0390 EXHAUST CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0390 EXHAUST CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013599811

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0390	Camshaft position sensor B bank 2 (Camshaft position sensor "B" circuit bank 2)	Exhaust camshaft position sensor signal is not inputted to ECM for approximately 1 consecutive second or more during engine run (600 rpm or more) or at an engine start.
		Exhaust camshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second or more during engine run (400 rpm or more) or at an engine start.

POSSIBLE CAUSE

- Harness or connectors
(Exhaust camshaft position sensor (bank 2) circuit is open or shorted.)
- Exhaust camshaft position sensor (bank 2)
- Exhaust camshaft (bank 2) (sensor rotor)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

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:

Before performing the following procedure, check that battery voltage as the following.

- Ignition switch ON: More than 11 V
- Engine cranking: More than 7 V

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Shift the selector lever in N range.
3. Start the engine and let it idle at least 5 seconds.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-538, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599812

1. CHECK EXHAUST CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect camshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust CMP sensor harness connector and ground.

P0390 EXHAUST CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage (Approx.)
Exhaust CMP sensor			
Connector	Terminal		
F104	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK EXHAUST CMP SENSOR POWER SUPPLY CIRCUIT

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

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F104	1	F143	85	Existed

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

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

3. CHECK EXHAUST CMP SENSOR GROUND CIRCUIT

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

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F104	2	F143	82	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 EXHAUST CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between exhaust CMP sensor harness connector and ECM harness connector.

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F104	3	F143	75	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK EXHAUST CMP SENSOR

Check exhaust CMP sensor . Refer to [EC6-528, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace exhaust CMP sensor . Refer to [EM-250, "Exploded View"](#).

P0390 EXHAUST CAMSHAFT POSITION SENSOR

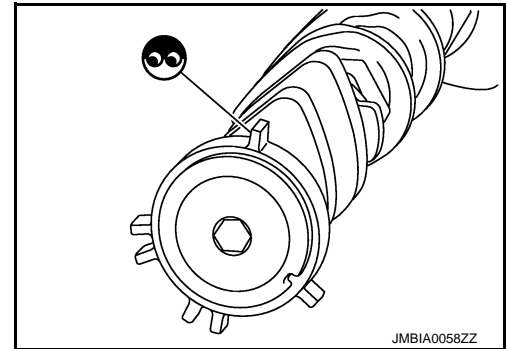
< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

6. CHECK EXHAUST CAMSHAFT (BANK 2)

Check the following items:

- Accumulation of debris to the signal plate exhaust camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection

INFOID:0000000013599813

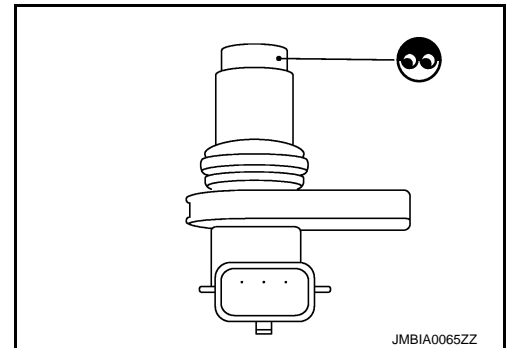
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0420, P0430 THREE WAY CATALYST FUNCTION

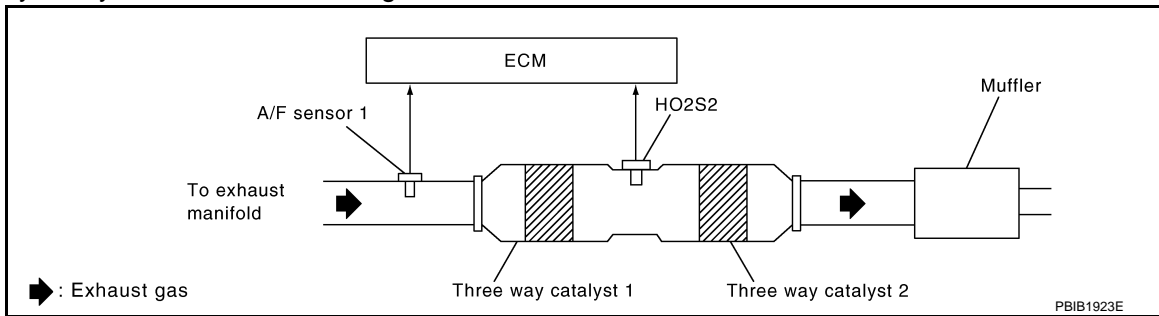
DTC Description

INFOID:000000013591639

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 1 with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst 1 malfunction is diagnosed.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold bank 1)	<ul style="list-style-type: none"> • Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.
P0430	TW CATALYST SYS-B2 (Catalyst system efficiency below threshold bank 2)	

POSSIBLE CAUSE

- Three way catalyst (manifold)
- Exhaust tube
- Intake air leaks
- Fuel injector
- Fuel injector leaks
- Spark plug
- Improper ignition timing

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 7.

2.PRECONDITIONING

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

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

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. 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).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
9. Open engine hood.
10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT.
11. Rev engine up to about 2,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
12. Check the indication of "CATALYST".

Which is displayed on CONSULT screen?

CMPLT >> GO TO 6.

INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to about 2,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 6.

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-543, "Diagnosis Procedure"](#).

NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Check the voltage between ECM harness connector terminals under the following condition.

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	ECM		Condition	Voltage	
	Connector	+			-
		Terminal			Terminal
P0420	F142	110 [HO2S2 (bank 1)]	99	Keeping engine speed at 2,500 rpm constant under no load	
P0430		98 [HO2S2 (bank 2)]			

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EC6
C

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-543, "Diagnosis Procedure"](#).

D

Diagnosis Procedure

INFOID:000000013591640

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dents.

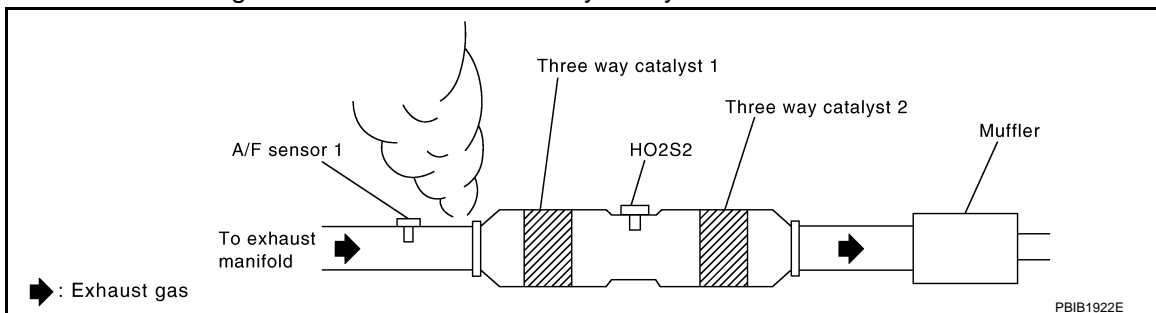
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3. CHECK INTAKE AIR LEAK

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

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to [EC6-262, "Work Procedure"](#).

For specification, refer to [EC6-1017, "Idle Speed"](#) and [EC6-1017, "Ignition Timing"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the [EC6-262, "Work Procedure"](#).

5. CHECK FUEL INJECTORS

Check the fuel injector. Refer to [EC6-971, "Component Function Check"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform [EC6-971, "Diagnosis Procedure"](#).

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P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

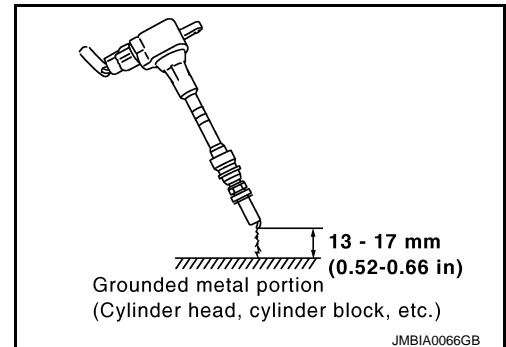
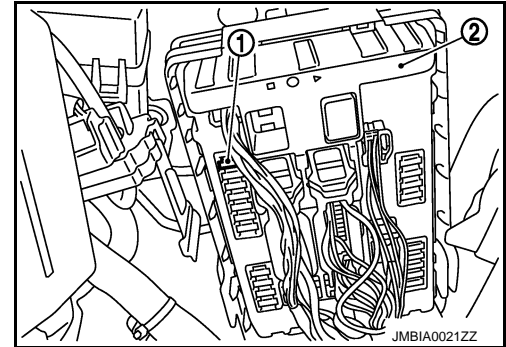
Perform the following procedure in a place where with no combustible objects and good ventilation.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse ① in IPDM E/R ② 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:

- Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.

NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a non-malfunctioning spark plug.
3. Crank engine for 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 [EC6-983. "Diagnosis Procedure"](#).

8. CHECK SPARK PLUG

P0420, P0430 THREE WAY CATALYST FUNCTION

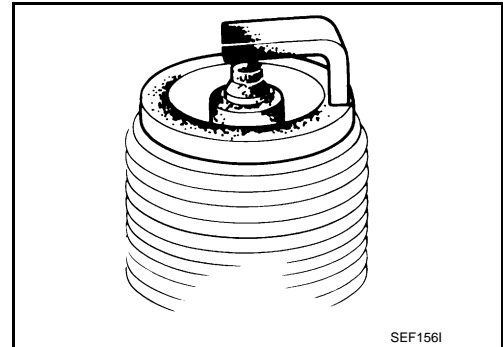
[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160. "Exploded View"](#).
NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160. "Exploded View"](#).

10. PERFORM DTC CONFIRMATION PROCEDURE

1. Replace three way catalyst. Refer to [EM-227. "Removal and Installation"](#).
2. Perform DTC confirmation procedure. Refer to [EC6-541. "DTC Description"](#).

Is DTC "P0420" or "P0430" detected?

- YES >> Replace all fuel injector. Refer to [EM-182. "Removal and Installation"](#)
NO >> INSPECTION END

P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

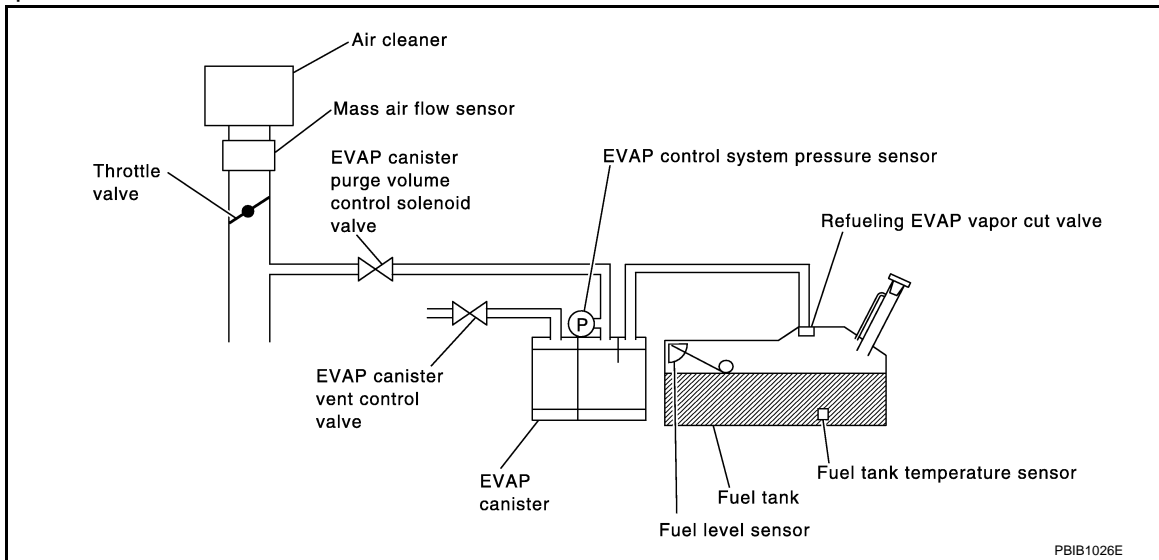
P0441 EVAP CONTROL SYSTEM

DTC Description

INFOID:000000013591641

DTC DETECTION LOGIC

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum. Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0441	EVAP PURG FLOW/MON (Evaporative emission system incorrect purge flow)	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

P0441 EVAP CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 3.

NO >> GO TO 7.

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:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 4.

4. 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. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for at least 70 seconds.
6. Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
7. Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> GO TO 5.

5. 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 - 2,550 rpm
B/FUEL SCHDL	1.25 - 5.8 msec
COOLAN TEMP/S	More than 0°C (32°F)

CAUTION:

Always drive vehicle at a safe speed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to [EC6-548, "Diagnosis Procedure"](#).

7. PERFORM COMPONENT FUNCTION CHECK

NOTE:

P0441 EVAP CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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.

⊗ Without CONSULT

1. Lift up drive wheels.
2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and wait at least 70 seconds.
7. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM		
Connector	+	-
	Terminal	
E152	173	200

8. Check EVAP control system pressure sensor value at idle speed and note it.
9. 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

10. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 8) for at least 1 second.

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC6-548. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013591642

1. CHECK DTC PRIORITY

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
NO >> GO TO 2.

2. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

Is the inspection result normal?

- YES-1 >> With CONSULT: GO TO 3.
YES-2 >> Without CONSULT: GO TO 4.
NO >> Replace EVAP canister. Refer to [FL-18. "Exploded View"](#).

3. CHECK PURGE FLOW

Ⓟ With CONSULT

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.

P0441 EVAP CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check vacuum existence.

PURG VOL C/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 5.

4.CHECK PURGE FLOW

⊗ Without CONSULT

- Start engine and warm it up to normal operating temperature.
- Stop engine.
- 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 [EC6-33. "ENGINE CONTROL SYSTEM : Component Parts Location"](#).
- Start engine and let it idle.
Do not depress accelerator pedal even slightly.
- Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

- Revvng engine up to 2,000rpm after 100 seconds passed after starting engine.

Vacuum should exist.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 5.

5.CHECK EVAP PURGE LINE

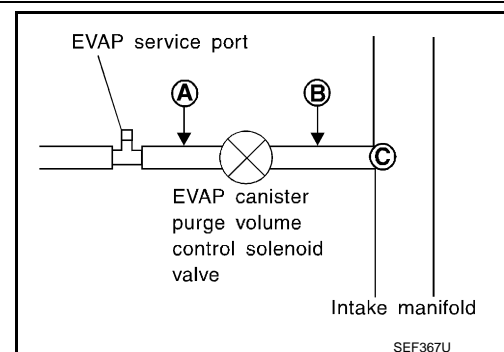
- Turn ignition switch OFF.
- Check EVAP purge line for improper connection or disconnection.
Refer to [EC6-88. "EVAPORATIVE EMISSION SYSTEM : System Description"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair it.

6.CHECK EVAP PURGE HOSE AND PURGE PORT

- Disconnect purge hoses connected to EVAP service port (A) and EVAP canister purge volume control solenoid valve (B).
- Blow air into each hose and EVAP purge port (C).



P0441 EVAP CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

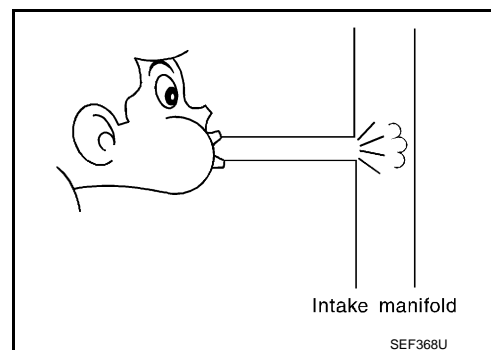
3. Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 7.

YES-2 >> Without CONSULT: GO TO 8.

NO >> Repair or clean hoses and/or purge port.



7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Start engine.

2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 9.

NO >> GO TO 8.

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC6-555. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [FL-18. "Exploded View"](#).

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector. Refer to [FL-18. "Exploded View"](#).

2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18. "Exploded View"](#).

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to [EC6-573. "DTC Description"](#) for DTC P0452, [EC6-576. "DTC Description"](#) for DTC P0453.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18. "Exploded View"](#).

11. 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 12.

NO >> Clean the rubber tube using an air blower.

12. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC6-563. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace EVAP canister vent control valve. Refer to [FL-18. "Exploded View"](#).

13. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

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Refer to [EC6-88. "EVAPORATIVE EMISSION SYSTEM : System Description"](#).

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace it.

14. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> INSPECTION END

A

EC6

C

D

E

F

G

H

I

J

K

L

M

N

O

P

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Description

INFOID:000000013591643

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0443	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit)	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

POSSIBLE CAUSE

- 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.)

FAIL-SAFE

Not applicable

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.

Do you have CONSULT

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

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. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
7. Touch "START".
8. 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.
9. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

- OK >> INSPECTION END
NG >> Proceed to [EC6-553, "Diagnosis Procedure"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE

With GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

5. Start engine and let it idle for at least 20 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC displayed?

- YES >> Proceed to [EC6-553, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591644

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F136	1	Ground	Battery voltage

Is the inspection result normal?

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

2. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

EVAP canister purge volume control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F136	1	E123	59	Existed

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

Is the inspection result normal?

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

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F136	2	F142	155	Existed

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

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector. Refer to [FL-18, "Exploded View"](#).
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC6-572, "Component Inspection"](#).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.

YES-2 >> Without CONSULT: GO TO 7.

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start the engine.
4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8.

NO >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC6-555, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [FL-18, "Exploded View"](#).

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC6-563, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP canister vent control valve. Refer to [FL-18, "Exploded View"](#).

10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

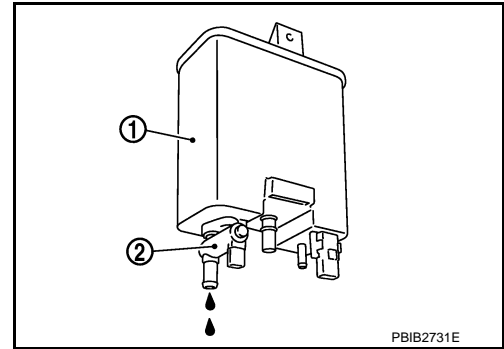
2. Check if water will drain from EVAP canister ①.

② : EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 11.

NO >> INSPECTION END



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> INSPECTION END

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.

Component Inspection

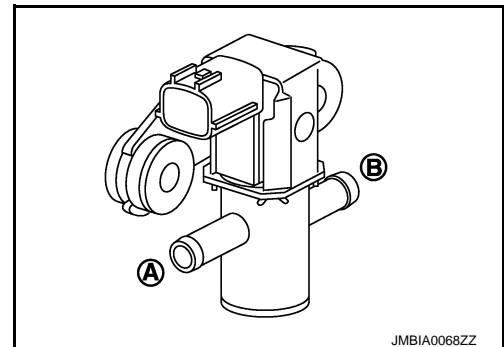
INFOID:000000013591645

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

④ 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. Start the engine.
5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
6. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



⊗ Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

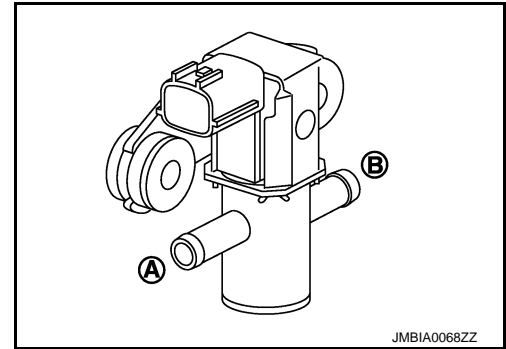
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [FL-18, "Exploded View"](#).



P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Description

INFOID:000000013591646

EC6

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0444	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit open)	An excessively low voltage signal is sent to ECM through the valve
P0445	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit shorted)	An excessively high voltage signal is sent to ECM through the valve

POSSIBLE CAUSE

DTC P0444

- Harness or connectors (The solenoid valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

DTC P0445

- Harness or connectors (The solenoid valve circuit is shorted.)
- EVAP canister purge volume control solenoid valve
- ECM power supply

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-557, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591647

1.THE DETECTED DTC CONFIRMATION

Which DTC is detected?

P0444 >> GO TO 6.

P0445 >> GO TO 2.

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. CHECK FUEL PUMP RELAY OUTPUT VOLTAGE

Check fuel pump relay output voltage as the following.

+		-	Condition	Voltage
IPDM E/R				
Connector	Terminal			
E120	15	Ground	Approx. 1 second or more after turning the ignition switch ON	0 – 1 V
			For Approx. 1 second or more after turning the ignition switch ON	6 – 16 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3. CHECK FUSE

1. Turn ignition switch OFF.

2. Pull out #52 fuse (15 A) and check that the fuse is not blown (open).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace the fuse after repairing the applicable circuit.

4. CHECK IPDM E/R POWER SUPPLY AND GROUND CIRCUIT

Check IPDM E/R power supply circuit. Refer to [PCS-43, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

5. CHECK ECM POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect IPDM E/R harness connector.

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E152	197	E120	15	Existed

5. Check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.

2. Disconnect EVAP canister purge volume control solenoid valve harness connector.

3. Turn ignition switch ON.

4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F136	1	Ground	Battery voltage

Is the inspection result normal?

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- YES >> GO TO 8.
NO >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

EVAP canister purge volume control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F136	1	E123	59	Existed

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

Is the inspection result normal?

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

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.


EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F136	2	F142	155	Existed

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

Is the inspection result normal?

- YES-1 >> With CONSULT: GO TO 9.
YES-2 >> Without CONSULT: GO TO 10.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

9. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

 **With CONSULT**

1. Reconnect all harness connectors disconnected.
2. Start the engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

- YES >> INSPECTION END
NO >> GO TO 10.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC6-559, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [FL-18, "Exploded View"](#).

Component Inspection

INFOID:000000013591648

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **With CONSULT**

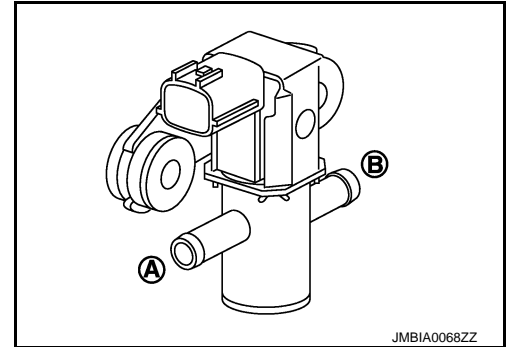
P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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. Start the engine.
5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
6. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

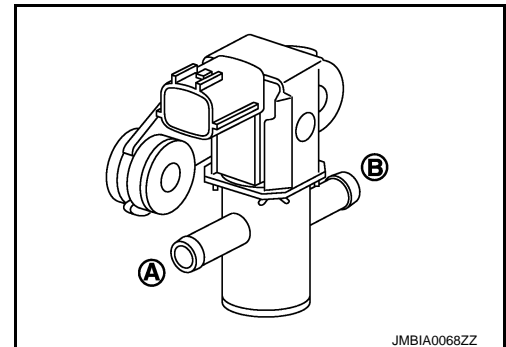
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



⊗ Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [FL-18. "Exploded View"](#).

P0447 EVAP CANISTER VENT CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:000000013591649

DTC DETECTION LOGIC

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0447	VENT CONTROL VALVE (Evaporative emission system vent control circuit open)	An improper voltage signal is sent to ECM through EVAP canister vent control valve.

POSSIBLE CAUSE

- Harness or connectors (The valve circuit is open or shorted.)
- EVAP canister vent control valve

FAIL-SAFE

Not applicable

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 [EC6-561, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591650

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT

1. Turn ignition switch OFF and then ON.
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with 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 6.

P0447 EVAP CANISTER VENT CONTROL VALVE

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

EVAP canister vent control valve		Ground	Voltage
Connector	Terminal		
B85	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister vent control valve harness connector and IPDM E/R harness connector.

EVAP canister vent control valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
B85	1	E120	13	Existed

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

Is the inspection result normal?

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

NO >> Repair or replace error-detected parts.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector.

EVAP canister vent control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B85	2	E152	193	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Clean the rubber tube using an air blower.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC6-563, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

P0447 EVAP CANISTER VENT CONTROL VALVE

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace EVAP canister vent control valve. Refer to [FL-18, "Exploded View"](#).

Component Inspection

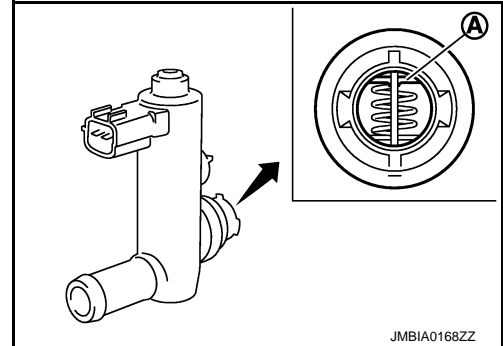
INFOID:000000013591651

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister. Refer to [FL-18, "Exploded View"](#).
3. Check portion (A) of EVAP canister vent control valve for rust.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to [FL-18, "Exploded View"](#).
- NO >> GO TO 2.



JMBIA0168ZZ

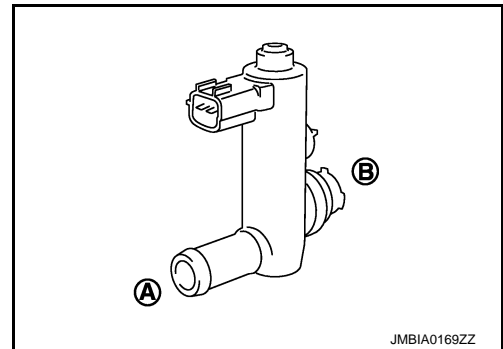
2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.
Make sure that 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.



JMBIA0169ZZ

Without CONSULT

1. Disconnect EVAP canister vent control valve harness connector.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

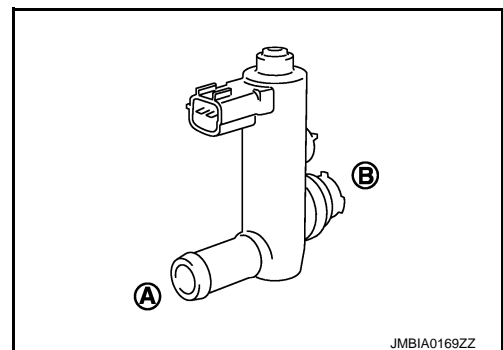
Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace EVAP canister vent control valve. Refer to [FL-18, "Exploded View"](#).

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.



JMBIA0169ZZ

P0447 EVAP CANISTER VENT CONTROL VALVE

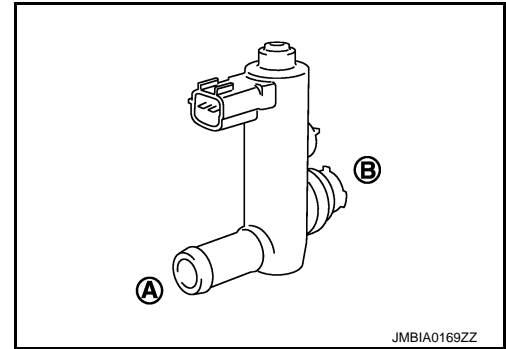
[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3. Check air passage continuity and operation delay time.
Make sure that 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.



JMBIA0169ZZ

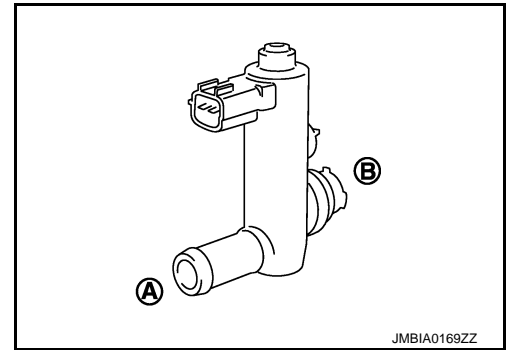
⊗ Without CONSULT

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 that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.



JMBIA0169ZZ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to [FL-18. "Exploded View"](#).

P0448 EVAP CANISTER VENT CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Description

INFOID:000000013591652

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0448	VENT CONTROL VALVE (Evaporative emission system vent control circuit shorted)	EVAP canister vent control valve remains closed under specified driving conditions.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

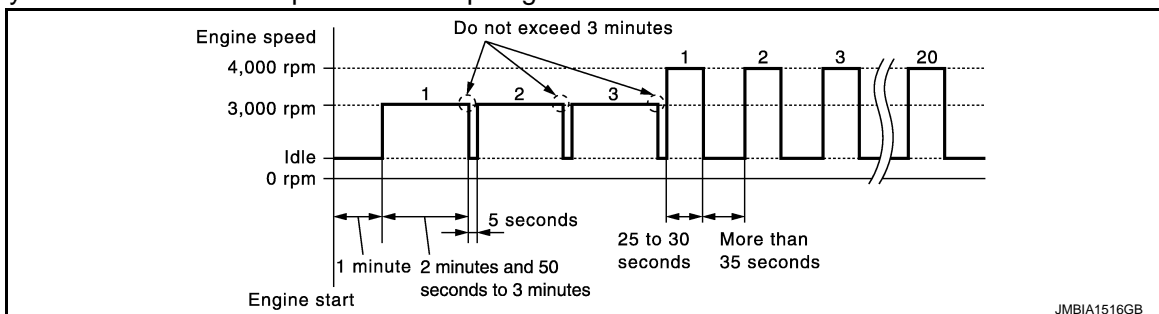
If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

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. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 1 minute.
4. Repeat next procedures five times.
 - Increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 2 minutes. **Do not exceed 2 minutes.**
 - Fully released accelerator pedal and keep engine idle for about 5 seconds.
5. Repeat next procedure 27 times.
 - Quickly increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 25 to 30 seconds.
 - Fully released accelerator pedal and keep engine idle for at least 35 seconds.



6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-566, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

P0448 EVAP CANISTER VENT CONTROL VALVE

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000013591653

Diagnosis Procedure

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Clean rubber tube using an air blower.

2. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC6-567, "Component Inspection"](#).

Is the inspection result normal?

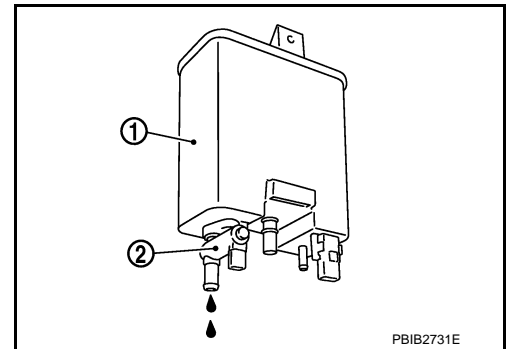
- YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve. Refer to [FL-18, "Exploded View"](#).

3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve ② and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister ①.

Does water drain from EVAP canister?

- YES >> GO TO 4.
NO >> GO TO 6.



4. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector. Refer to [FL-18, "Exploded View"](#).
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC6-572, "Component Inspection"](#).

Is the inspection result normal?

P0448 EVAP CANISTER VENT CONTROL VALVE

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

Component Inspection

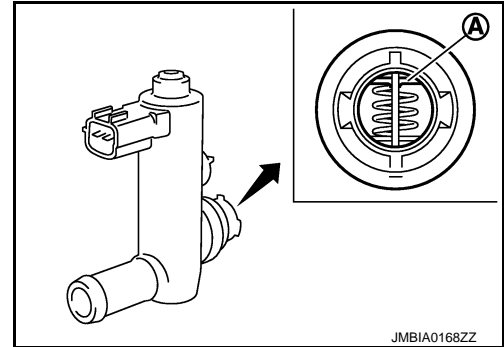
INFOID:000000013591654

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister. Refer to [FL-18, "Exploded View"](#).
3. Check portion (A) of EVAP canister vent control valve for rust.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to [FL-18, "Exploded View"](#).
- NO >> GO TO 2.



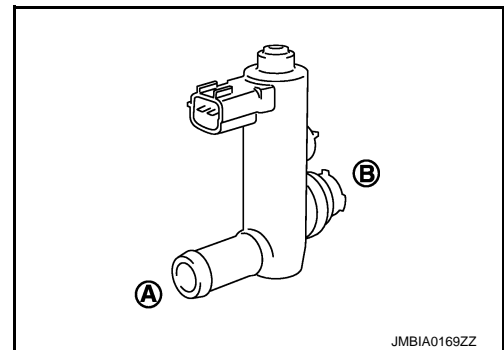
2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.
Make sure that 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.

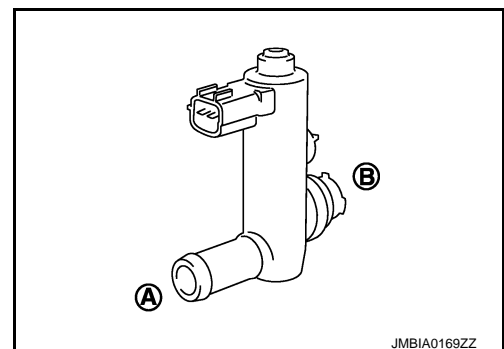


Without CONSULT

1. Disconnect EVAP canister vent control valve harness connector.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.



Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace EVAP canister vent control valve. Refer to [FL-18, "Exploded View"](#).

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.

P0448 EVAP CANISTER VENT CONTROL VALVE

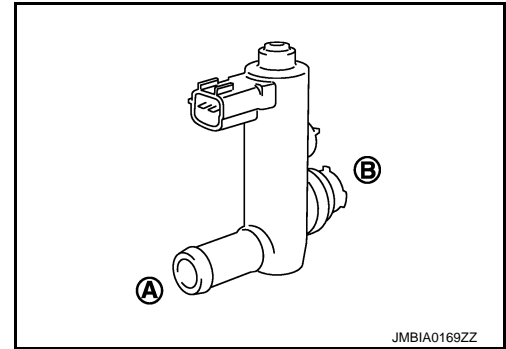
[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3. Check air passage continuity and operation delay time.
Make sure that 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.



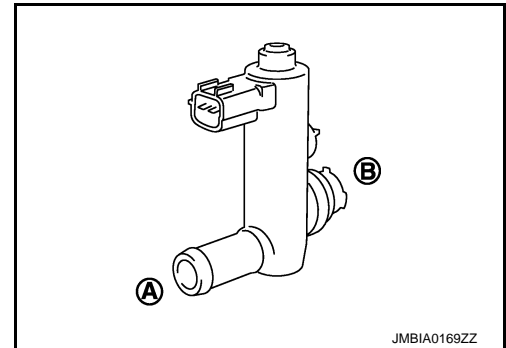
⊗ Without CONSULT

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 that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to [FL-18. "Exploded View"](#).

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Description

INFOID:000000013591655

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0451	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch range/performance)	ECM detects a sloshing signal from the EVAP control system pressure sensor

POSSIBLE CAUSE

- Harness or connectors (EVAP control system pressure sensor circuit is shorted.)
- EVAP control system pressure sensor
- Each sensor, connector with sensor power supply 3 circuit

FAIL-SAFE

Not applicable

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-I

Ⓜ 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 [EC6-570, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

Ⓜ With CONSULT

1. Select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE".
2. Let it idle until "OFF" of "EVAP DIAG READY" changes to "ON".

NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

3. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

4. Turn ignition switch ON.
5. Select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE".
6. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 4.

YET >> 1. Perform DTC CONFIRMATION PROCEDURE again.


P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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2. GO TO 1.

4. PERFORM DTC CONFIRMATION PROCEDURE-III

 With CONSULT
Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-570, "Diagnosis Procedure"](#).
NO >> INSPECTION END

5. PERFORM DTC CONFIRMATION PROCEDURE-IV

 With GST

1. Start engine and let it idle for least 40 seconds.

NOTE:

Do not depress accelerator pedal even slightly.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-570, "Diagnosis Procedure"](#).
NO >> GO TO 6.

6. PERFORM DTC CONFIRMATION PROCEDURE-V

 With GST

1. Let it idle for at least 2 hours.

2. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

3. Turn ignition switch ON.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-570, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591656

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

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

2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness connector.

3. 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.

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

EVAP control system pressure sensor		Ground	Voltage (V)
Connector	Terminal		
B108	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	3	E152	177	Existed

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

Is the inspection result normal?

YES >> Check sensor power supply 3 circuit. Refer to [EC6-997, "TURBO HIGH PRESSURE MODEL : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	1	E152	200	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	2	E152	173	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

A
EC6
C
D
E
F
G
H
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J
K
L
M
N
O
P

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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Check EVAP control system pressure sensor. Refer to [EC6-572, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

Component Inspection

INFOID:0000000013591657

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector.
Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	173	200	Not applied	1.8 - 4.8
			-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Description

INFOID:000000013591658

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0452	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch low)	An excessively low voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (EVAP control system pressure sensor circuit is shorted.)
- EVAP control system pressure sensor
- Each sensor, connector with sensor power supply 3 circuit

FAIL-SAFE

Not applicable

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. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Select "DATA MONITOR" mode with CONSULT.
7. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
8. Start engine and wait at least 20 seconds.
9. Check 1st trip DTC.

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes to ECM harness connector terminals as per the following.

Connector	ECM	
	+	-
	Terminal	
E152	173	200

3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Turn ignition switch OFF and wait at least 10 seconds.
7. Start engine and wait at least 20 seconds.
8. Check 1st trip DTC.

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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Is 1st trip DTC detected?

- YES >> Proceed to [EC6-574, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591659

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

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

2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage (V)
Connector	Terminal		
B108	3	Ground	Approx. 5

Is the inspection result normal?

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

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	3	E152	177	Existed

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

Is the inspection result normal?

- YES >> Check sensor power supply 3 circuit. Refer to [EC6-997, "TURBO HIGH PRESSURE MODEL : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	1	E152	200	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	2	E152	173	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to [EC6-575, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

Component Inspection

INFOID:000000013591660

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- Turn ignition switch OFF.
- Remove EVAP control system pressure sensor with its harness connector.
Always replace O-ring with a new one.
- Install a vacuum pump to EVAP control system pressure sensor.
- Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	173	200	Not applied	1.8 - 4.8
			-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Description

INFOID:000000013591661

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0453	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (EVAP control system pressure sensor circuit is shorted.)
- EVAP control system pressure sensor
- Each sensor, connector with sensor power supply 3 circuit

FAIL-SAFE

Not applicable

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. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Select "DATA MONITOR" mode with CONSULT.
7. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
8. Start engine and wait at least 20 seconds.
9. Check 1st trip DTC.

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes to ECM harness connector terminals as per the following.

Connector	ECM	
	+	-
E152	173	200

3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Turn ignition switch OFF and wait at least 10 seconds.
7. Start engine and wait at least 20 seconds.
8. Check 1st trip DTC.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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Is 1st trip DTC detected?

- YES >> Proceed to [EC6-577, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591662

EC6

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

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

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace harness connector.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage (V)
Connector	Terminal		
B108	3	Ground	Approx. 5

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 4.

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	3	E152	177	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Check sensor power supply 3 circuit. Refer to [EC6-997, "TURBO HIGH PRESSURE MODEL : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	1	E152	200	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B108	2	E152	173	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC6-563. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve. Refer to [FL-18. "Exploded View"](#).

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to [EC6-579. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18. "Exploded View"](#).

10.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

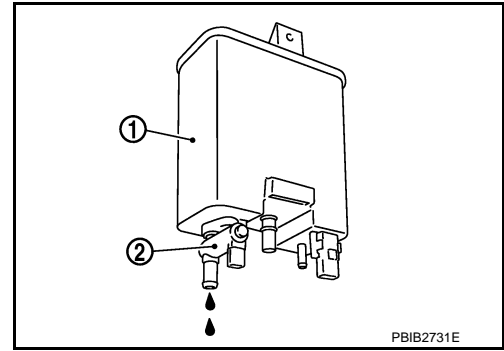
2. Check if water will drain from the EVAP canister ①.

② : EVAP canister vent control valve

Does water drain from EVAP canister?

YES >> GO TO 11.

NO >> INSPECTION END



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> INSPECTION END

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.

Component Inspection

INFOID:0000000013591663

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector.
Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	173	200	Not applied	1.8 - 4.8
			-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18. "Exploded View"](#).

P0456 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0456 EVAP CONTROL SYSTEM

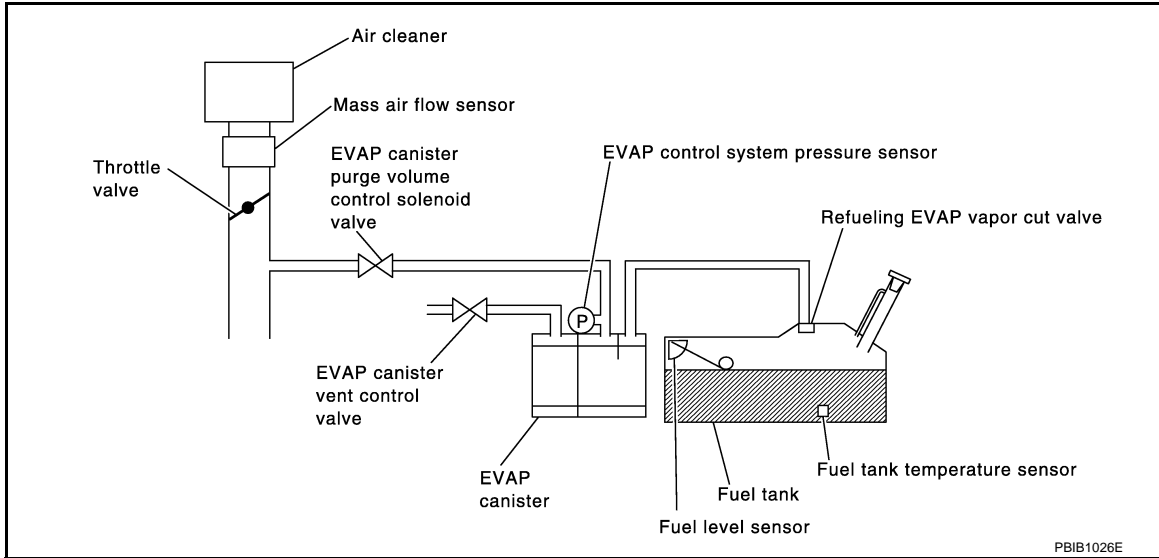
DTC Description

INFOID:000000013591664

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 that there are no leaks, the diagnosis will be OK.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0456	EVAP VERY SML LEAK [Evaporative emission system leak detected (very small leak)]	<ul style="list-style-type: none"> • EVAP system has a very small leak. • EVAP system does not operate properly.

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.

POSSIBLE CAUSE

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- EVAP canister is saturated with water
- EVAP control system pressure sensor
- Refueling EVAP vapor cut valve
- ORVR system leaks
- Fuel level sensor and the circuit
- Foreign matter caught in EVAP canister purge volume control solenoid valve

P0456 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

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FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

Do you have CONSULT?

- YES >> GO TO 2.
NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT.
2. Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON".

NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

3. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode with 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 COMPONENT FUNCTION CHECK-II

Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-581, "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 [EC6-581, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591665

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

P0456 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

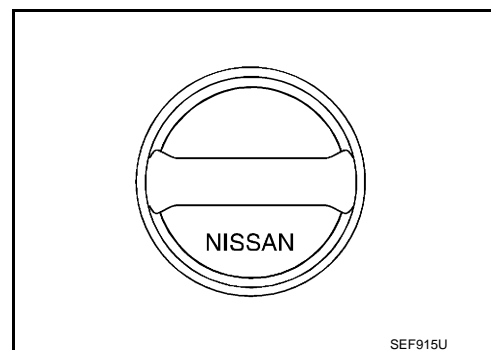
[VR30DDTT FOR USA AND CANADA]

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC6-991, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to [EC6-1011, "Inspection"](#).

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

6.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.

Refer to [FL-18, "Exploded View"](#).

- EVAP canister vent control valve.

Refer to [EC6-563, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

7.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

P0456 EVAP CONTROL SYSTEM

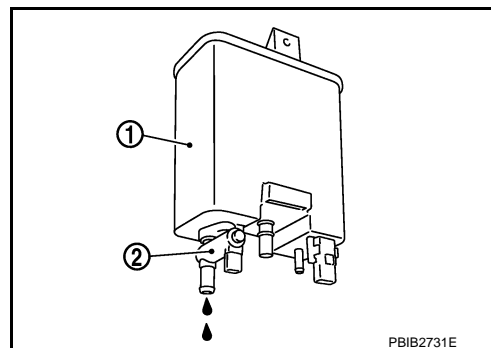
[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Remove EVAP canister ① with EVAP canister vent control valve ② and EVAP control system pressure sensor attached.
2. Check if water will drain from EVAP canister.

Does water drain from the 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.

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.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓜ **With CONSULT**

1. Disconnect vacuum hose connected to EVAP service port and EVAP canister purge volume control solenoid valve from EVAP service port.
2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT screen to increase "PURG VOL C/V" opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

- YES >> GO TO 13.
NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

ⓧ **Without CONSULT**

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP service port and EVAP canister purge volume control solenoid valve from 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

P0456 EVAP CONTROL SYSTEM

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< DTC/CIRCUIT DIAGNOSIS >

Check vacuum hoses for clogging or disconnection. Refer to [EC6-88, "EVAPORATIVE EMISSION SYSTEM : System Description"](#).

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

13.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC6-555, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [FL-18, "Exploded View"](#).

14.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC6-473, "Component Inspection \(Fuel Tank Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel level sensor unit.

15.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC6-572, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor. Refer to [FL-18, "Exploded View"](#).

16.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.

Refer to [EC6-88, "EVAPORATIVE EMISSION SYSTEM : System Description"](#).

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or reconnect the hose.

17.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 18.

18.CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness and improper connection. For location, refer to [EC6-989, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair or replace hoses and tubes.

19.CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 20.

NO >> Repair or replace hose, tube or filler tube.

20.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC6-991, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to [FL-18, "Exploded View"](#).

21.CHECK FUEL LEVEL SENSOR

P0456 EVAP CONTROL SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Refer to [MWI-126. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel level sensor unit. Refer to [FL-10. "Removal and Installation"](#).

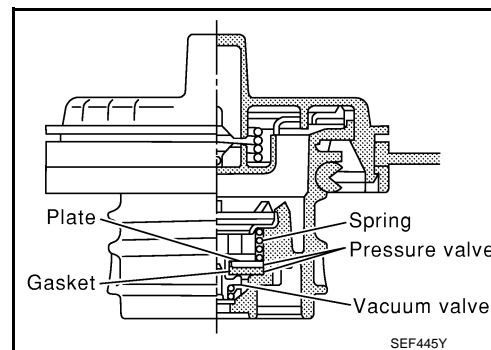
Component Inspection

INFOID:0000000013591666

EC6

1. CHECK FUEL TANK VACUUM RELIEF VALVE

1. Turn ignition switch OFF.
2. Remove fuel filler cap.
3. Wipe clean valve housing.



4. Check valve opening pressure and vacuum.

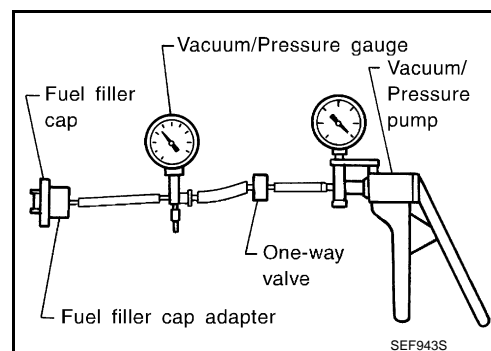
Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -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 >

[VR30DDTT FOR USA AND CANADA]

P0460 FUEL LEVEL SENSOR

DTC Description

INFOID:000000013591667

DTC DETECTION LOGIC

When the vehicle is parked, the fuel level in the fuel tank is naturally stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0460	FUEL LEV SEN SLOSH (Fuel level sensor "A" circuit)	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0460 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0607: Refer to [EC6-625, "DTC Description"](#).

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

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-586, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591668

1.CHECK DTC PRIORITY

If DTC P0460 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

P0460 FUEL LEVEL SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
 - DTC P0607: Refer to [EC6-625, "DTC Description"](#).
- NO >> GO TO 2.

A

EC6

2.CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70, "CONSULT Function"](#).

C

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to [MWI-125, "Component Function Check"](#).

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P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0461 FUEL LEVEL SENSOR

DTC Description

INFOID:000000013591669

DTC DETECTION LOGIC

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0461	FUEL LEVEL SENSOR (Fuel level sensor "A" circuit range/performance)	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

POSSIBLE CAUSE

- 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

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0461 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0607: Refer to [EC6-625, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

WARNING:

When performing the following procedure, always observe the handling of the fuel. Refer to [FL-3, "General Precautions"](#).

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT?

YES >> GO TO 3.

NO >> GO TO 4.

3. PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of the fuel level sensor. During this check, a 1st trip DTC might not be confirmed.

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 [EC6-279, "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.

P0461 FUEL LEVEL SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT.
7. Check "FUEL LEVEL SE" output voltage and note it.
8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT.
9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check "FUEL LEVEL SE" output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check "FUEL LEVEL SE" output voltage and note it.
13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-589, "Diagnosis Procedure"](#).

4.PERFORM COMPONENT FUNCTION CHECK

 Without CONSULT

NOTE:

Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line. Refer to [EC6-279, "Work Procedure"](#).
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-589, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013591670

1.CHECK DTC PRIORITY

If DTC P0461 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0607: Refer to [EC6-625, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70, "CONSULT Function"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [MWI-125, "Component Function Check"](#).

P0462, P0463 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0462, P0463 FUEL LEVEL SENSOR

DTC Description

INFOID:000000013591671

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0462	FUEL LEVL SEN/CIRC (Fuel level sensor "A" circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0463	FUEL LEVL SEN/CIRC (Fuel level sensor "A" circuit high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

DTC P0462

- 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 P0463

- 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

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0462 or P0463 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0607: Refer to [EC6-625. "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

>> GO TO 3.

3. 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 [EC6-591. "Diagnosis Procedure"](#).

P0462, P0463 FUEL LEVEL SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

A

Diagnosis Procedure

INFOID:0000000013591672

1. CHECK DTC PRIORITY

EC6

If DTC P0462 or P0463 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

C

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0607: Refer to [EC6-625, "DTC Description"](#).

D

NO >> GO TO 2.

E

2. CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70, "CONSULT Function"](#).

F

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [MWI-125, "Component Function Check"](#).

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P0500 VSS

Description

INFOID:000000013591673

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.

DTC Description

INFOID:000000013591674

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0500	VEHICLE SPEED SEN A (Vehicle speed sensor "A")	At 20 km/h (13 MPH), ECM detects the following 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 communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).

POSSIBLE CAUSE

- 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

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	<ul style="list-style-type: none"> • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Shift the selector lever to D range and wait at least for 2 seconds.
3. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-593, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

A

Diagnosis Procedure

INFOID:0000000013591675

EC6

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-111, "VR30DDTT : DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Perform trouble shooting relevant to DTC indicated.

C

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-72, "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Perform trouble shooting relevant to DTC indicated.

D

3.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to [MWI-87, "DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Perform trouble shooting relevant to DTC indicated.

E

4.CHECK OUTPUT SPEED SENSOR

Check output speed sensor. Refer to [TM-184, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace or replace error-detected parts.

F

5.CHECK WHEEL SENSOR

Check wheel sensor. Refer to [BRC-116, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace or replace error-detected parts.

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P0506 ISC SYSTEM

Description

INFOID:000000013591676

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 Description

INFOID:000000013591677

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0506	ISC SYSTEM (Idle air control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.

POSSIBLE CAUSE

- Electric throttle control actuator
- Intake air leak

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0506 is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

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.

If the idle speed is out of the specified value, perform [EC6-273. "Description"](#), 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 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.

P0506 ISC SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Restart engine and run it for at least 1 minute at idle speed.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-595, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591678

1. CHECK DTC PRIORITY

If DTC P0506 is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- NO >> GO TO 2.

2. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Discover air leak location and repair.
- NO >> GO TO 3.

3. REPLACE ECM

1. Stop the engine.
2. Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
3. Proceed to [EC6-267, "Description"](#).

>> INSPECTION END

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P0507 ISC SYSTEM

Description

INFOID:000000013591679

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 Description

INFOID:000000013591680

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0507	ISC SYSTEM (Idle air control system RPM higher than expected)	The idle speed is more than the target idle speed by 200 rpm or more.

POSSIBLE CAUSE

- Electric throttle control actuator
- Intake air leak
- PCV system

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0507 is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

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.

If the idle speed is out of the specified value, perform [EC6-273. "Description"](#), 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 3.

3. 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.

P0507 ISC SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and run it for at least 1 minute at idle speed.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-597, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591681

1.CHECK DTC PRIORITY

If DTC P0507 is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
NO >> GO TO 2.

2.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Discover air leak location and repair.
NO >> GO TO 4.

4.REPLACE ECM

1. Stop engine.
2. Replace ECM. refer to [EC6-1014, "Removal and Installation"](#).
3. Proceed to [EC6-267, "Description"](#).

>> INSPECTION END

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P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P050A, P050B, P050E COLD START CONTROL

Description

INFOID:000000013591682

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 Description

INFOID:000000013591683

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P050A	COLD START CONTROL (Cold start idle air control system performance)	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.
P050B	COLD START CONTROL (Cold start ignition timing performance)	ECM does not control ignition timing properly when engine is started with pre-warming up condition.
P050E	COLD START CONTROL (Cold start engine exhaust temperature too low)	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.

POSSIBLE CAUSE

DTC P050A

- Lack of intake air volume
- Fuel injection system
- ECM

DTC P050B

- Lack of intake air volume
- Fuel injection system
- ECM

DTC P050E

- Lack of intake air volume
- Fuel injection system
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P050A, P050B, or P050E is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select "DATA MONITOR" mode with CONSULT.
4. Check the indication of "COOLAN TEMP/S".

With GST

Follow the procedure "With CONSULT" above.

Is the value of "COOLAN TEMP/S" between 5°C (41°F) and 36°C (97°F)?

YES >> GO TO 4.

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.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Set the select lever in N range.
2. Start the engine and warm up in idle with the value of "COOLAN TEMP/S" between 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?

YES >> Proceed to [EC6-599, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591684

1.CHECK DTC PRIORITY

If DTC P050A, P050B, or P050E is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).

NO >> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC6-273, "Description"](#).

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 3.

NO >> Follow the instruction of Idle Air Volume Learning.

3.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage
- Intake air passage clogging
- Clogging of throttle body

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning part

4.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform DTC Confirmation Procedure for DTC P0171, P0174. Refer to [EC6-461, "DTC Description"](#).

P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 5.

NO >> Proceed to [EC6-462, "Diagnosis Procedure"](#) for DTC P0171, P0174.

5. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC Confirmation Procedure.
See [EC6-598, "DTC Description"](#).

Is the 1st trip DTC P050A, P050B, or P050E displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6. REPLACE ECM

1. Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
2. Proceed to [EC6-267, "Description"](#).

>> INSPECTION END

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0520 EOP SENSOR

DTC Description

INFOID:0000000013591685

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0520	EOP SENSOR/SWITCH [Engine oil pressure (EOP) sensor circuit]	ECM detects the following status continuously for 5 seconds or more: <ul style="list-style-type: none">A voltage signal transmitted from the engine oil pressure sensor is lower than 0.3 V.A voltage signal transmitted from the engine oil pressure sensor is higher than 5.02 V.

C

D

POSSIBLE CAUSE

- Harness or connectors (Engine oil pressure sensor circuit is open or shorted.)
- Engine oil level abnormality
- Engine oil pressure sensor
- Sensor power supply 2 circuit

E

F

FAIL-SAFE

Not applicable

G

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

H

I

>> GO TO 2.

J

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

K

Is 1st trip DTC detected?

L

YES >> Proceed to [EC6-601, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591686

M

1. CHECK EOP SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect EOP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EOP sensor harness connector terminals.

N

O

Connector	EOP sensor		Voltage (Approx.)
	+	-	
F42	3	1	5 V

P

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 4.

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. CHECK EOP SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

+		-		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	2	F143	51	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK EOP SENSOR

Check EOP sensor. Refer to [EC6-603, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Repair or replace error-detected parts.

4. CHECK EOP SENSOR POWER SUPPLY-II

Check the voltage between EOP sensor harness connector terminal and ground.

+		-	Voltage (Approx.)
EOP sensor			
Connector	Terminal		
F42	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. CHECK EOP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

+		-		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	3	F143	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check sensor power supply 2 circuit. Refer to [EC6-995, "Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

6. CHECK EOP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

P0520 EOP SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

+		-		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	1	F143	24	Existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000013591687

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 (kΩ)
+	-		
Terminal			
1	2	None	4 kΩ – 10 kΩ
	3		2 kΩ – 8 kΩ
2	1		4 kΩ – 10 kΩ
	3		1 kΩ – 3 kΩ
3	1		2 kΩ – 8 kΩ
	2		1 kΩ – 3 kΩ

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace EOP sensor. Refer to [EM-238. "Exploded View"](#).

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0524 ENGINE OIL PRESSURE

DTC Description

INFOID:000000013591688

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
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.

POSSIBLE CAUSE

- Decrease in engine oil pressure
- Decrease in engine oil level
- Engine oil condition
- EOP sensor
- Engine body

FAIL-SAFE

Fail safe mode	Vehicle behavior
Others	<ul style="list-style-type: none">• ECM illuminates engine oil pressure warning lamp on the combination meter.• Engine speed will not rise more than 4,000rpm due to the fuel cut.• Fail-safe is canceled when ignition switch OFF → ON.

DTC CONFIRMATION PROCEDURE

CAUTION:

If "[EC6-605, "Diagnosis Procedure"](#)" 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.

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 DTC.

Is DTC detected?

P0524 ENGINE OIL PRESSURE

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-605. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

4.CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to [LU-27. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Proceed to [EC6-605. "Diagnosis Procedure"](#).

5.CHECK ENGINE OIL PRESSURE

 With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition	Value (Approx.)
EOP SENSOR	<ul style="list-style-type: none">• Engine oil temperature: 80°C (176°F)• Selector lever: P or N position• Air conditioner switch: OFF• No load	Engine speed: Idle 1,000 - 1,500 mV (50 - 150 kPa)
		Engine speed: 2,000 rpm 1,750 - 2,150 mV (200 - 300 kPa)

 Without CONSULT

Check engine oil pressure. Refer to [LU-27. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Proceed to [EC6-605. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013591689

1.CHECK ENGINE OIL LEVEL

1. Turn ignition switch OFF.
2. Check engine oil level. Refer to [LU-27. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ENGINE OIL PRESSURE

 With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition	Value (Approx.)
EOP SENSOR	<ul style="list-style-type: none">• Engine oil temperature: 80°C (176°F)• Selector lever: P or N position• Air conditioner switch: OFF• No load	Engine speed: Idle 1,000 - 1,500 mV (50 - 150 kPa)
		Engine speed: 2,000 rpm 1,750 - 2,150 mV (200 - 300 kPa)

 Without CONSULT

Check engine oil pressure. Refer to [LU-27. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Check oil pump. Refer to [LU-40. "Inspection"](#).

3.CHECK EOP SENSOR

P0524 ENGINE OIL PRESSURE

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Check EOP sensor. Refer to [EC6-606. "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to [LU-24. "Engine Lubrication System"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace error-detected parts.

5.CHECK CAUSE OF ENGINE OIL CONSUMPTION

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC6-1013. "Inspection"		
2	Turbocharger	EM-236. "Inspection"		
3	Exhaust front tube	Visual	<ul style="list-style-type: none"> • No blocking • No abnormal sounds 	—
4	Oil pump	Visual	<ul style="list-style-type: none"> • No blocking • No abnormal sounds 	—
4	Oil pump	LU-40. "Inspection"		
5	<ul style="list-style-type: none"> • Piston • Piston pin • Piston ring 	<ul style="list-style-type: none"> • Piston to piston pin oil clearance • Piston ring side clearance • Piston ring end gap 		EM-289
6	Cylinder block	<ul style="list-style-type: none"> • Cylinder block top surface distortion • Piston to cylinder bore clearance 		EM-279

>> Repair or replace error-detected parts.

Component Inspection

INFOID:000000013591690

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 (kΩ)						
+	-								
Terminal		None							
1	2			None					
	3								
2	1					None			
	3								
3	1							None	
	2								

Is the inspection result normal?

- YES >> INSPECTION END.
- NO >> Replace EOP sensor. Refer to [EM-238. "Exploded View"](#).

P0544 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0544 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013591691

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0544	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit bank 1 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 1) is less than 0.025 V for 5 consecutive seconds.

C

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POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (bank 1) circuit is shorted.]
- Exhaust gas temperature sensor (bank 1)

E

FAIL-SAFE

Not applicable

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.

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TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V.

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>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

J

Is 1st trip DTC detected?

K

- YES >> Proceed to [EC6-607. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

L

Diagnosis Procedure

INFOID:000000013591692

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1)

M

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B1" indication as follows.

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Monitor item	Condition	Value (Approx.)	
EXHAUST GAS TEMP SEN 1 B1	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	2.53250 V
		2,000 rpm	1.29500 V

P

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

P0544 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	67	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	2.0 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 1). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 1) harness connector terminal and ground.

+		-	Voltage (Approx.)
Exhaust gas temperature sensor (bank 1)			
Connector	Terminal		
F95	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

P0544 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-		Continuity
Exhaust gas temperature sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	1	F143	67	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

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P0545, P0546 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0545, P0546 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013665253

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0545	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit low bank 1 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 1) is less than Approx. 0.2 V for 5 consecutive seconds.
P0546	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit high bank 1 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 1) is more than Approx. 4.8 V for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (bank 1) circuit is shorted.]
- Exhaust gas temperature sensor (bank 1)

FAIL-SAFE

Not applicable

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.

>> 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 [EC6-610, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013665254

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1)

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B1" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B1	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 2.53250 V
	2,000 rpm	1.29500 V

P0545, P0546 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	67	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	2.0 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 1). Refer to [EM-231. "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 1) harness connector terminal and ground.

+		-	Voltage (Approx.)
Exhaust gas temperature sensor (bank 1)			
Connector	Terminal		
F95	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

P0545, P0546 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-		Continuity
Exhaust gas temperature sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	Existed
F95	1	F143	67	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

P0547 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0547 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013591693

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0547	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit bank 2 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 2) is less than 0.025 V for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (bank 2) circuit is shorted.]
- Exhaust gas temperature sensor (bank 2)

FAIL-SAFE

Not applicable

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.

>> 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 [EC6-613. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591694

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2)

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B2" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B2" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B2	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 2.45625 V
		2,000 rpm 1.33125 V

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

P0547 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	47	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	1.8 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 2). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 2) harness connector terminal and ground.

+		-	Voltage (Approx.)
Exhaust gas temperature sensor (bank 2)			
Connector	Terminal		
F96	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

P0547 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-		Continuity
Exhaust gas temperature sensor (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	1	F143	47	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

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P0548, P0549 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0548, P0549 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013665255

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0548	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit low bank 2 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 2) is less than Approx. 0.2 V for 5 consecutive seconds.
P0549	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit high bank 2 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 2) is more than Approx. 4.8 V for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (bank 2) circuit is shorted.]
- Exhaust gas temperature sensor (bank 2)

FAIL-SAFE

Not applicable

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.

>> 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 [EC6-616, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013665256

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2)

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B2" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B2" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B2	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 2.45625 V
	2,000 rpm	1.33125 V

P0548, P0549 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	47	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	1.8 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 2). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 2) harness connector terminal and ground.

+		-	Voltage (Approx.)
Exhaust gas temperature sensor (bank 2)			
Connector	Terminal		
F96	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

P0548, P0549 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-		Continuity
Exhaust gas temperature sensor (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	Existed
F96	1	F143	47	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

P0603 ECM

DTC Description

INFOID:0000000013591698

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0603	ECM BACK UP/CIRCUIT [Internal control module keep alive memory (KAM) error]	<ul style="list-style-type: none"> Malfunction in the internal back up RAM of ECM. Malfunction in the internal EEPROM system of ECM.

POSSIBLE CAUSE

- ECM power supply
- ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Others	ASCD operation may be deactivated.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Turn ignition switch OFF and wait at least 10 seconds.
- Repeat step 1 and 2 for 10 times.
- Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-619, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591699

1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Perform trouble diagnosis for ECM power supply and ground circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace error-detected parts.

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

P0603 ECM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC6-619, "DTC Description"](#).

Is the 1st trip DTC P0603 displayed again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

P0604 ECM

DTC Description

INFOID:000000013591700

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0604	ECM [Internal control module random access memory (RAM) error]	Malfunction in the internal RAM of ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON (engine stopped) and wait least 20 minutes.
CAUTION:
Never start engine during this procedure.
- 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 [EC6-621, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591701

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Erase DTC.
- Perform DTC confirmation procedure. Refer to [EC6-621, "DTC Description"](#).

Is the 1st trip DTC P0604 displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
- NO >> INSPECTION END

P0605 ECM

DTC Description

INFOID:000000013591702

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0605	ECM [Internal control module read only memory (ROM) error]	Malfunction in the internal ROM of ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON (engine stopped) and wait least 20 minutes.

CAUTION:

Never start engine during this procedure.

- 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 [EC6-622, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591703

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Erase DTC.
- Perform DTC confirmation procedure. Refer to [EC6-622, "DTC Description"](#).

Is the 1st trip DTC P0605 displayed again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

P0606 ECM

DTC Description

INFOID:0000000013591704

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0606	CONTROL MODULE (Control module processor)	Malfunction in ECM processor.

C

POSSIBLE CAUSE

ECM

D

FAIL-SAFE

E

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

F

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DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

H

- 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 with ignition switch ON.

I

J

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

K

- Turn ignition switch ON (engine stopped) and wait at least 10 seconds.

CAUTION:

Never start engine during this procedure.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Check 1st trip DTC.

L

M

Is 1st trip DTC detected?

YES >> Proceed to [EC6-624. "Diagnosis Procedure"](#).

NO >> GO TO 3.

N

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Start engine.
- Rev up the engine quickly to approximately 3,000 rpm under unloaded condition and completely release the accelerator pedal.
- Let the engine idle and wait at least 10 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Check 1st trip DTC.

O

P

Is 1st trip DTC detected?

YES >> Proceed to [EC6-624. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591705

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure for 3 times. Refer to [EC6-623, "DTC Description"](#).

Is the 1st trip DTC P0606 displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
NO >> INSPECTION END

P0607 ECM

DTC Description

INFOID:0000000013591706

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0607	ECM (Control module performance)	ECM internal communication system is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Others	ASCD operation may be deactivated.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-625, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591707

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC6-625, "DTC Description"](#).

Is the 1st trip DTC P0607 displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
- NO >> INSPECTION END

P060A ECM

DTC Description

INFOID:000000013591708

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P060A	CONTROL MODULE (Internal control module monitoring processor performance)	ECM internal monitoring processor is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

Fail safe mode	Vehicle behavior
Engine output control	<p>ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible.</p> <p>NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.</p>
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	<ul style="list-style-type: none"> ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ASCD operation may be deactivated.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait at least 10 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.
- Repeat step 1 and 2 for 5 times.
- Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-627, "Diagnosis Procedure"](#).

P060A ECM

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< DTC/CIRCUIT DIAGNOSIS >

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

A

Diagnosis Procedure

INFOID:0000000013591709

1. PERFORM DTC CONFIRMATION PROCEDURE

EC6

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC6-626, "DTC Description"](#).

C

Is the 1st trip DTC P060A displayed again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

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P060B ECM

DTC Description

INFOID:000000013591710

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P060B	CONTROL MODULE (Internal control module A/D processing performance)	ECM internal analog/digital conversion processing system is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON (engine stopped) and wait least 10 seconds.
- 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 [EC6-628, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591711

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Erase DTC.
- Perform DTC confirmation procedure. Refer to [EC6-628, "DTC Description"](#).

Is the 1st trip DTC P060B displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
- NO >> INSPECTION END

P0611 ECM PROTECTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0611 ECM PROTECTION

Description

INFOID:000000013591712

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.

EC6

DTC Description

INFOID:000000013591713

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0611	FIC MODULE (ECM protection)	ECM overheat protection control is activated.

POSSIBLE CAUSE

ECM overheated

FAIL-SAFE

Not applicable

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 [EC6-629, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013591714

1. INSPECTION START

1. Perform DTC confirmation procedure. Refer to [EC6-622, "DTC Description"](#).
2. Check 1st trip DTC.

Is DTC P0605 detected?

- YES >> Proceed to [EC6-622, "Diagnosis Procedure"](#).
- NO >> Explain the customer about the activation of the protection function.

P062B ECM

Description

INFOID:000000013591715

This DTC is detected when the ECM-integrated injector driver unit has a malfunction. For injector driver unit, refer to [EC6-42, "ECM \(With Barometric Pressure Sensor\)"](#).

DTC Description

INFOID:000000013591716

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P062B	ECM (Internal control module fuel injector control performance)	Injector driver unit is malfunctioning.

POSSIBLE CAUSE

- Harness and connectors (Injector circuit is open or shorted)
- Battery power supply
- ECM (injector driver unit)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and keep the engine speed at idle for 30 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-630, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591717

1. CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC6-971, "Component Function Check"](#).

Is inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. PERFORM DTC CONFIRMATION PROCEDURE

P062B ECM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to [EC6-630, "DTC Description"](#).
4. Check 1st trip DTC.

Is the DTC P062B displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
NO >> INSPECTION END

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P062F CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P062F CONTROL MODULE

DTC Description

INFOID:000000013591718

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P062F	CONTROL MODULE (Internal control module EEPROM error)	ECM calculation is function malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Check the DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-632, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591719

1. INSPECTION START

1. Perform DTC Confirmation Procedure. Refer to [EC6-632, "DTC Description"](#).
2. Erase DTC.

Is DTC erased?

- YES >> INSPECTION END
- NO >> GO TO 2.

2. REPLACE ECM

1. Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
2. Perform [EC6-267, "Description"](#).

>> INSPECTION END

P0641 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P0641 SENSOR POWER SUPPLY

DTC Description

INFOID:0000000013600775

DTC DETECTION LOGIC

A

EC6

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0641	Sensor reference voltage A (Sensor reference voltage "A" circuit open)	When an input voltage of sensor reference is not 3.3 V.

C

POSSIBLE CAUSE

- Electric IVT control module

D

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

E

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

F

G

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none"> • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

H

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.

J

K

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

L

M

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

N

O

Is DTC P0641 detected?

YES >> Proceed to [EC6-633, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P

Diagnosis Procedure

INFOID:0000000013600776

1. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

P0641 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

P0643 SENSOR POWER SUPPLY

TURBO HIGH PRESSURE MODEL

A

TURBO HIGH PRESSURE MODEL : Description

INFOID:0000000013591720

EC6

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

C

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

D

E

F

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

G

Sensor power supply 2

- Mass air flow sensor (bank 2)
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

H

I

J

Sensor power supply 3

- Turbocharger speed sensor (bank 1)
- Turbocharger speed sensor (bank 2)
- EVAP control system pressure sensor

K

TURBO LOW PRESSURE MODEL

L

TURBO LOW PRESSURE MODEL : Description

INFOID:0000000013924202

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

M

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

N

O

P

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor (bank 2)

P0643 SENSOR POWER SUPPLY

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

Sensor power supply 3

EVAP control system pressure sensor

DTC Description

INFOID:000000013591721

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0643	SENSOR POWER/CIRC (Sensor power supply 1 circuit short)	ECM detects a voltage of power source for sensor is excessively low or high.

POSSIBLE CAUSE

Sensor power supply 1 circuit

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

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 [EC6-636. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591722

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.

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- Check the voltage between APP sensor harness connector and ground.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal	Ground	5 V
M124*1	4		
M126*2	5		

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124*1	4	E152	198	Existed
M126*2	5			

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit.

3. CHECK SENSOR POWER SUPPLY 1 CIRCUIT

- Disconnect following sensors harness connector.
- Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
E152	198	APP sensor 1	M124*1	4	
			M126*2	5	
F143	34	Crankshaft position sensor	F88	1	
	35	Throttle position sensor (bank 1)	F118	5	
	36	Intake camshaft position sensor (bank 1)	F135	1	
	37	Mass air flow sensor (bank 1)	F99	1	
	38		Turbocharger boost sensor (bank 1)	F90	2
			Turbocharger boost sensor (bank 2)	F91	2
			Multi-way control valve	F117	5
	39		Electric wastegate control actuator (bank 1)	F139	3
Electric wastegate control actuator (bank 2)			F138	3	

*1: With ICC

*2: Without ICC

Is the inspection result normal?

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

YES >> GO TO 4.

NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.

- APP sensor 1 (Refer to [EC6-826, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).)
- Crankshaft position sensor (bank 1) (Refer to [EC6-528, "Component Inspection \(Crankshaft Position Sensor\)"](#).)
- Throttle position sensor (bank 1) (Refer to [EC6-417, "Component Inspection \(Throttle Position Sensor\)"](#).)
- Turbocharger boost sensor (bank 1) (Refer to [EC6-500, "Component Inspection \(Turbocharger Boost Sensor\)"](#).)
- Turbocharger boost sensor (bank 2) (Refer to [EC6-500, "Component Inspection \(Turbocharger Boost Sensor\)"](#).)
- Mass air flow sensor (bank 1) (Refer to [EC6-383, "Component Inspection \(Mass Air Flow Sensor\)"](#).)
- Multi-way control valve (Refer to [EC6-900, "Component Inspection \(Multi-way Control Valve\)"](#).)
- Electric wastegate control actuator (bank 1), or Electric wastegate control actuator (bank 2) (Refer to [EC6-849, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 1\)\]"](#) or [EC6-863, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 2\)\]"](#).)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning component.

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

DTC Description

INFOID:000000013591723

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P06DA	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit/open)	ECM detects the following status continuously for 5 seconds or more: A voltage signal from engine oil pressure control solenoid valve is around 0V or more and less than normal operating voltage
P06DB	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal from engine oil pressure control solenoid valve is around 0V

C

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E

POSSIBLE CAUSE

- Harness or connectors (Engine oil pressure control solenoid valve circuit is open or shorted.)
- Engine oil pressure control solenoid valve

F

FAIL-SAFE

Not applicable

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.

H

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>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine.
2. Maintain engine speed at 4,500 rpm or more for at least 5 seconds.
3. Check DTC.

J

K

Is DTC detected?

L

M

YES >> Proceed to [EC6-639, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591724

1. CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil pressure control solenoid valve harness connector and ground.

N

O

+		-	Voltage
Connector	Terminal		
F89	1	Ground	Battery voltage

P

Is the inspection result normal?

YES >> GO TO 2.

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil pressure control solenoid valve harness connector and ECM harness connector.

+		-		Continuity
Engine oil pressure control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F89	2	F142	142	Existed

4. 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 ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

Check the engine oil pressure control solenoid valve. Refer to [EC6-640, "Component Inspection \(Engine Oil Pressure Control Solenoid Valve\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil pressure control solenoid valve. Refer to [LU-39, "Exploded View"](#).

Component Inspection (Engine Oil Pressure Control Solenoid Valve)

INFOID:0000000013591725

1.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE-1

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure control solenoid valve harness connector.
3. Check resistance between engine oil pressure control solenoid valve terminals as follows.

Engine oil pressure control solenoid valve		Condition		Resistance
+	-			
Terminal				
1	2	Temperature	20°C (68°F)	19.8 - 24.2 Ω
1	Ground			∞ Ω (Continuity should not exist)
2				

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine oil pressure control solenoid valve. Refer to [LU-39, "Exploded View"](#).

2.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE-2

1. Remove engine oil pressure control solenoid valve. Refer to [LU-39, "Exploded View"](#).
2. Provide 12 V DC between engine oil pressure 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 engine oil pressure control solenoid valve.

NOTE:

Always replace O-ring when engine oil pressure control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> Replace engine oil pressure control solenoid valve. Refer to [LU-39. "Exploded View"](#).

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P0850 PNP SWITCH

DTC Description

INFOID:000000013591727

When the selector lever position is P or N, park/neutral position (PNP) signal from the TCM is sent to ECM. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0850	P-N POS SW/CIRCUIT (Park/Neutral switch input circuit)	The signal of the park/neutral position (PNP) signal does not change during driving after the engine is started.

POSSIBLE CAUSE

- Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.]
- TCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

- YES >> GO TO 2.
- NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.CHECK PNP SIGNAL

 With CONSULT

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
N or P position	ON
Except above position	OFF

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Proceed to [EC6-643. "Diagnosis Procedure"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ENG SPEED	1,195 – 6,375 rpm
COOLAN TEMP/S	More than 66°C (151°F)
B/FUEL SCHDL	1.5 – 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-643, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage (V)	
Connector	+	-			
	Terminal				
F142	121	95	Selector lever	P or N	Battery voltage
				Except above	Approx. 0

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-643, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013591728

1.CHECK DTC WITH TCM

Refer to [TM-85, "Diagnosis Description"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

YES >> GO TO 3.

NO >> Check DTC with BCM. Refer to [BCS-17, "COMMON ITEM : CONSULT Function \(BCM - COMMON ITEM\)"](#).

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/T assembly harness connector and ECM harness connector.

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-		Continuity
A/T assembly		ECM		
Connector	Terminal	Connector	Terminal	
F2	9	F142	121	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P1140 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1140 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013599815

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1140	INTK TIM S/CIRC-B1 (Intake timing sensor circuit bank 1)	Intake camshaft position sensor signal is not inputted to ECM for approximately 1 consecutive second during engine run.
		Intake camshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second during engine run.

C

D

POSSIBLE CAUSE

- Harness or connectors
[Intake camshaft position sensor (bank 1) circuit is open or shorted.]
- Intake camshaft position sensor (bank 1)
- Intake camshaft (bank 1) (sensor rotor)

E

F

FAIL-SAFE

Not applicable

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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 10 seconds.
2. Check DTC.

J

K

Is DTC detected?

- YES >> Proceed to [EC6-645. "DTC Description"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

L

Diagnosis Procedure

INFOID:0000000013599816

M

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect CMP sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor (bank 1) harness connector and ground.

N

O

+		-	Voltage (Approx.)
Connector	Terminal		
F135	1	Ground	5 V

P

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 2.

P1140 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. CHECK INTAKE CMP SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor (bank 1) harness connector and ECM harness connector.

Intake CMP sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	1	F143	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE CMP SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor (bank 1) harness connector and ECM harness connector.

Intake CMP sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	2	F143	29	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 INTAKE CMP SENSOR (BANK 1) INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor (bank 1) harness connector and ECM harness connector.

Intake CMP sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	3	F143	26	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK INTAKE CMP SENSOR (BANK 1)

Check intake CMP sensor (bank 1). Refer to [EC6-647, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace intake CMP sensor (bank 1). Refer to [EM-250, "Exploded View"](#).

6. CHECK INTAKE CAMSHAFT (BANK 1)

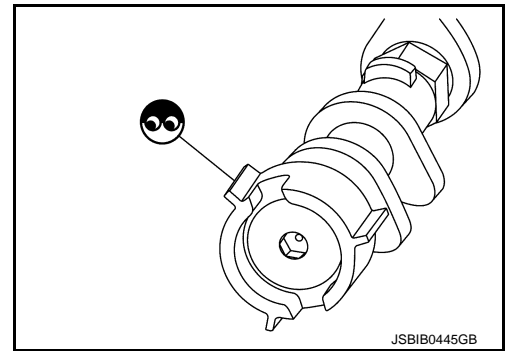
Check the following items:

P1140 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate intake camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250. "Exploded View"](#).

Component Inspection

INFOID:000000013599817

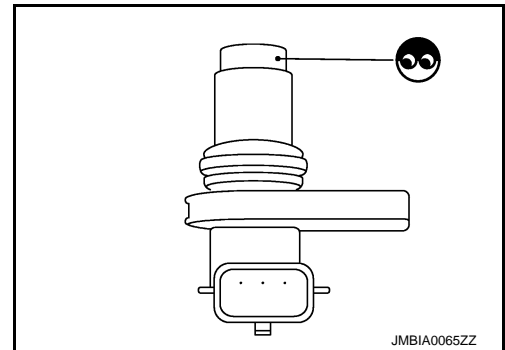
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250. "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250. "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250. "Exploded View"](#).

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P1145 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1145 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013599818

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1145	INTK TIM S/CIRC-B2 (Intake timing sensor circuit bank 2)	Intake camshaft position sensor signal is not inputted to ECM for approximately 1 consecutive second during engine run.
		Intake camshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second during engine run.

POSSIBLE CAUSE

- Harness or connectors
(Intake camshaft position sensor (bank 2) circuit is open or shorted.)
- Intake camshaft position sensor (bank 2)
- Intake camshaft (bank 2) (sensor rotor)

FAIL-SAFE

Not applicable

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 the engine and let it idle at least 10 seconds.
2. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-648. "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599819

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect CMP sensor (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F97	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> GO TO 2.

P1145 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. CHECK INTAKE CMP SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor (bank 2) harness connector and ECM harness connector.

Intake CMP sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	1	F143	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE CMP SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor (bank 2) harness connector and ECM harness connector.

Intake CMP sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	2	F143	82	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 INTAKE CMP SENSOR (BANK 2) INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor (bank 2) harness connector and ECM harness connector.

Intake CMP sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	3	F143	77	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK INTAKE CMP SENSOR (BANK 2)

Check intake CMP sensor (bank 2). Refer to [EC6-650. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace intake CMP sensor (bank 2). Refer to [EM-250. "Exploded View"](#).

6. CHECK INTAKE CAMSHAFT (BANK 2)

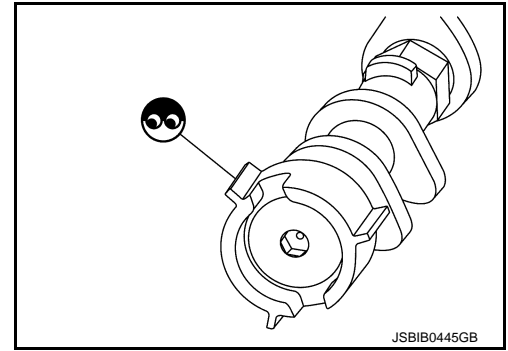
Check the following items:

P1145 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate intake camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection

INFOID:000000001359820

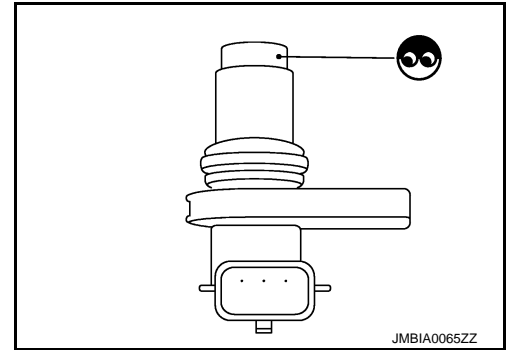
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P1148, P1168 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1148, P1168 CLOSED LOOP CONTROL

DTC Description

INFOID:000000013591747

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1148	CLOSED LOOP-B1 (Closed loop bank 1)	The closed loop control function for bank 1 does not operate even when vehicle is being driven in the specified condition.
P1168	CLOSED LOOP-B2 (Closed loop bank 2)	The closed loop control function for bank 2 does not operate even when vehicle is being driven in the specified condition.

POSSIBLE CAUSE

DTC P1148

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1
- A/F sensor 1 heater

DTC P1168

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1
- A/F sensor 1 heater

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1148 or P1168 is displayed with DTC for A/F sensor 1, first perform the confirmation procedure (trouble diagnosis) of DTC corresponding to A/F sensor 1.

Is applicable DTC detected?

- YES >> Proceed to [EC6-651. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591748

1. CHECK DTC PRIORITY

If DTC P1148 or P1168 is displayed with DTC for A/F sensor 1, first perform the confirmation procedure (trouble diagnosis) of DTC corresponding to A/F sensor 1.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- NO >> INSPECTION END

P1197 OUT OF GAS

< DTC/CIRCUIT DIAGNOSIS >

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P1197 OUT OF GAS

DTC Description

INFOID:000000013591750

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1197	FUEL RUN OUT (Out of gas)	<ul style="list-style-type: none">Fuel rail pressure remains at 1.1 MPa (11.2 kg/cm², 159.5 psi) or less for 5 seconds or more with the fuel level too low.Fuel rail pressure remains 2.7 MPa (27.5 kg/cm², 392 psi) lower than a target fuel pressure for 5 seconds or more with the fuel level too low.

POSSIBLE CAUSE

- Out of gas
- Harness or connectors (Low pressure fuel pump circuit is open or shorted.)
- Low pressure fuel pump
- Harness or connectors (High pressure fuel pump circuit is shorted.)
- Fuel pressure regulator
- Low pressure fuel system
- High pressure fuel pump
- High pressure fuel pump power supply circuit
- High pressure fuel system
- Fuel rail pressure sensor
- Disconnection of the fuel hose

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

Start the engine.

Does the engine start?

- YES >> GO TO 3.
NO >> Proceed to [EC6-653, "Diagnosis Procedure"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Warm up the engine to the normal operating temperature.

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).

2. Keep the engine speed at 3,500 rpm for 5 seconds and let it idle at least 60 seconds.

P1197 OUT OF GAS

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3. Check the 1st trip DTC.

NOTE:

If the fuel tank has sufficient fuel, this diagnosis result may not be detected.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-653, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591751

1. REFUEL THE VEHICLE

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 DTC confirmation procedure again. Refer to [EC6-652, "DTC Description"](#).

Is 1st trip DTC detected?

- YES >> GO TO 2.
NO >> INSPECTION END

2. CHECK LOW PRESSURE FUEL PUMP

Check low pressure fuel pump. Refer to [EC6-976, "Component Function Check"](#).

Is inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK HIGH PRESSURE FUEL PUMP CONTROL CIRCUIT

Check high pressure fuel pump control circuit. Refer to [EC6-979, "Component Function Check"](#).

Is inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK ECM POWER SUPPLY CIRCUIT

Check ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

Is inspection result normal?

- YES >> Check the fuel hose for disconnection and looseness.
NO >> Repair or replace error-detected parts.

A

EC6

C

D

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P

P119A, P119B FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P119A, P119B FUEL RAIL PRESSURE SENSOR

DTC Description

INFOID:000000013686625

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P119A	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: <ul style="list-style-type: none">• Battery voltage: 8 V or more• Under engine start condition• Engine coolant temperature at previous ignition switch OFF: 65°C (149°F) or more• Engine coolant temperature: 35°C (65°F) or less• Temperature difference between engine coolant and intake air: Less than 6°C (42°F)• Fuel rail pressure: Less than 1.0 MPa (10.2 kg/cm², 145 psi) (calculated by ECM)• Fuel system monitor: Excessively RICH
P119B	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: <ul style="list-style-type: none">• Battery voltage: 8 V or more• Ignition switch: ON (engine stopped)• Engine coolant temperature at previous ignition switch OFF: 65°C (149°F) or more• Engine coolant temperature: 35°C (65°F) or less• Temperature difference between engine coolant and intake air: Less than 6°C (42°F)• Fuel rail pressure: More than 1.5 MPa (15.3 kg/cm², 217 psi) (calculated by ECM)• Fuel system monitor: Excessively LEAN

POSSIBLE CAUSE

- Harness or connectors
 - The fuel rail pressure sensor circuit is open or shorted.
 - Sensor power supply 2 is shorted.
- Fuel rail pressure sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING-1

If DTC Confirmation Procedure is 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, check that battery voltage is 9 V or more with ignition switch ON.

>> GO TO 2.

2. PRECONDITIONING-2

P119A, P119B FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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NOTE:

- When it is certain that the previous driving is performed with the engine warmed up, the next steps can be performed.
- When it is difficult to satisfy the conditions, performing Component Function Check can identify the presence or absence of malfunction in the part/system that may result in a possible cause of this DTC. (Perform DTC Confirmation Procedure as much as possible.)

1. Start the engine and warm it up until engine coolant temperature reaches 70°C (158°F) or more.
2. Stop the engine and leave the vehicle in a cool place (soak 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 less.**
- **Never turn ignition switch ON during soak the engine.**

Are the conditions satisfied?

- YES >> GO TO 4.
NO >> GO TO 3.

3. COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch OFF.
2. Start the engine.
3. On CONSULT screen, select "DATA MONITOR" mode of "ENGINE".
4. Check the value of "FUEL PRES SEN V" under the following conditions.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT

1. Turn ignition switch OFF.
2. Start the engine.
3. Check fuel rail pressure sensor signal voltage.

Connector	ECM		Condition	Value (Approx.)
	+	-		
Terminal				
F143	53	83	[Engine is running] • Warm-up condition • Idle speed	1.14 – 1.46 V
			[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

- YES >> INSPECTION END.
NO >> Proceed to [EC6-656. "Diagnosis Procedure"](#).

4. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Turn ignition switch ON (engine stopped).
2. On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "COOLAN TEMP/S" and "INT/A TEMP SE".
3. Check that the indicated value of "COOLAN TEMP/S" is less than 35°C (95°F).
4. Check that the difference between "INT/A TEMP SE" and "COOLAN TEMP/S" is 5°C (41°F) or less.
5. Check "Self-diagnostic result" of "ENGINE".

Is the DTC detected?

- YES >> Proceed to [EC6-656. "Diagnosis Procedure"](#).
NO-1 (Conditions satisfied)>>GO TO 5.

P119A, P119B FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO-2 (Conditions not satisfied)>>GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start the engine (or cranking) at least 1 second.
2. Check "Self-diagnostic result" of "ENGINE".

Is the DTC detected?

- YES >> Proceed to [EC6-656, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013686626

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-1

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.

Connector	FRP sensor		Voltage (Approx.)
	+	-	
F137	3	1	5 V

Inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and the ground.

+		-	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F137	3	Ground	5 V

Is inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK FRP SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	3	F143	80	Existed

4. Also check harness for short to power.

Is inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

P119A, P119B FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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4. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC6-995. "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

5. CHECK FRP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	1	F143	83	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 FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

7. CHECK FRP SENSOR SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	2	F143	53	Existed

4. Also check harness for short to ground and to power.

P119A, P119B FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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Is inspection result normal?

- YES >> GO TO 8.
- NO >> Repair or replace error-detected parts.

8.CHECK FRP SENSOR

Check the FRP sensor. Refer to [EC6-658, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000013686792

1.CHECK FRP SENSOR

WITH CONSULT

1. Turn ignition switch OFF.
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
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	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.

Connector	ECM		Condition	Value (Approx.)
	+	-		
	Terminal			
F143	53	83	[Engine is running] • Warm-up condition • Idle speed	1.14 – 1.46 V
			[Engine is running] • Warm-up condition • Revving 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-182, "Exploded View"](#).

P119C FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P119C FUEL RAIL PRESSURE SENSOR

DTC Description

INFOID:000000013686627

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P119C	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: <ul style="list-style-type: none">• Battery voltage: 8 V or more• Engine speed: 600 rpm or more• Engine coolant temperature: With a background of 65°C (149°F) or more during the trip• Remaining fuel amount: 15% or more• Fuel cut: No

POSSIBLE CAUSE

- Harness or connectors
 - The fuel rail pressure sensor circuit is open or shorted.
 - Sensor power supply 2 is shorted.
- Fuel rail pressure sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P119C is displayed with DTC P0190, first perform the confirmation procedure (trouble diagnosis) for DTC P0190.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-477. "DTC Description"](#).
NO >> GO TO 2.

2. PRECONDITIONING-1

If DTC Confirmation Procedure is 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, check that battery voltage is 9 V or more with ignition switch ON.
- Remaining fuel amount must be 15% or more.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up until the engine coolant temperature reaches 70°C (158°F) or more.
2. Drive the vehicle and accelerate 10 consecutive seconds or more with the engine speed 1,500 rpm or more.
3. Check "Self-diagnostic result" of "ENGINE".

Is the DTC detected?

P119C FUEL RAIL PRESSURE SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-660. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013686628

NOTE:

Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P119C. Be sure to erase the DTC when the diagnosis procedure.

1. CHECK DTC PRIORITY

If DTC P119C is displayed with DTC P0190, first perform the confirmation procedure (trouble diagnosis) for DTC P0190.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-477. "DTC Description"](#).
NO >> GO TO 2.

2. CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-1

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.

Connector	FRP sensor		Voltage (Approx.)
	+	-	
F137	3	1	5 V

Inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and the ground.

+		-	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F137	3	Ground	5 V

Is inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 4.

4. CHECK FRP SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	3	F143	80	Existed

4. Also check harness for short to power.

Is inspection result normal?

- YES >> GO TO 5.

P119C FUEL RAIL PRESSURE SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

5.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC6-995. "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

6.CHECK FRP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	1	F143	83	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

8.CHECK FRP SENSOR SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	2	F143	53	Existed

P119C FUEL RAIL PRESSURE SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK FRP SENSOR

Check the FRP sensor. Refer to [EC6-662, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000013686793

1.CHECK FRP SENSOR

WITH CONSULT

1. Turn ignition switch OFF.
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
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	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.

Connector	ECM		Condition	Value (Approx.)
	+	-		
	Terminal			
F143	53	83	[Engine is running] • Warm-up condition • Idle speed	1.14 – 1.46 V
			[Engine is running] • Warm-up condition • Revving 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-182, "Exploded View"](#).

P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1212 TCS COMMUNICATION LINE

DTC Description

INFOID:0000000013591755

- This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and "ABS actuator and electric unit (control unit)".
Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.
- **Freeze frame data is not stored in the ECM for this self-diagnosis.**

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1212	TCS/CIRC (TCS control unit circuit)	ECM cannot receive the information from "ABS actuator and electric unit (control unit)" continuously.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- ABS actuator and electric unit (control unit)
- Dead (Weak) battery

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1212 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0607: Refer to [EC6-625. "DTC Description"](#).

NO >> GO TO 2.

2.PRECONDITIONING

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-663. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591756

1.CHECK DTC PRIORITY

If DTC P1212 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

-
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
 - DTC P0607: Refer to [EC6-625, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK DTC WITH BRC

Perform the trouble diagnosis for BRC.

>> Proceed to [BRC-87, "Work Flow"](#).

P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1217 ENGINE OVER TEMPERATURE

DTC Description

INFOID:000000013591757

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1217	ENG OVER TEMP [Engine over temperature (Overheat)]	<ul style="list-style-type: none">• 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.

CAUTION:

When a malfunction is indicated, always replace the coolant. Refer to [CO-33, "Draining"](#) and [CO-34, "Refilling"](#). Also, replace the engine oil. Refer to [LU-29, "Draining"](#) and [LU-29, "Refilling"](#).

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Always use coolant with the proper mixture ratio. Refer to [MA-20, "Recommended Fluids and Lubricants"](#).
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

- Harness or connectors (The cooling fan circuit is open or shorted.)
- IPDM E/R
- Cooling fan control module
- Cooling fan motor
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Multi-way control valve
- Engine coolant temperature sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
 - DTC P0607: Refer to [EC6-625, "DTC Description"](#).
- NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK 1

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

NOTE:

P1217 ENGINE OVER TEMPERATURE

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< DTC/CIRCUIT DIAGNOSIS >

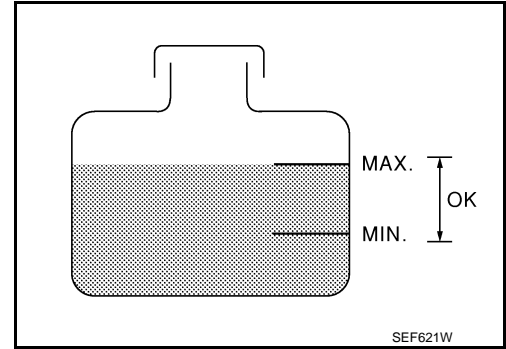
Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

- YES >> Proceed to [EC6-666, "Diagnosis Procedure"](#).
- NO >> GO TO 3.



3.PERFORM COMPONENT FUNCTION CHECK 2

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Proceed to [EC6-666, "Diagnosis Procedure"](#).
- NO >> GO TO 4.

4.PERFORM COMPONENT FUNCTION CHECK 3

With CONSULT

1. Turn ignition switch ON.
2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to [PCS-12, "Diagnosis Description"](#).

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> Proceed to [EC6-666, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013591758

1.CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
 - DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
 - DTC P0607: Refer to [EC6-625, "DTC Description"](#).
- NO >> GO TO 2.

2.CHECK COOLING FAN OPERATION

With CONSULT

1. Turn ignition switch ON.
2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to [PCS-12, "Diagnosis Description"](#).
2. Make sure that cooling fan operates.

Is the inspection result normal?

- YES >> GO TO 3.

P1217 ENGINE OVER TEMPERATURE

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Proceed to [EC6-958, "Diagnosis Procedure \(Cooling Fan Motor 1\)"](#).

3.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to [CO-33, "Inspection"](#).

Is leakage detected?

YES >> GO TO 4.

NO >> GO TO 5.

4.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

5.CHECK RADIATOR CAP

Check radiator cap. Refer to [CO-37, "RESERVOIR TANK CAP : Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace radiator cap. Refer to [CO-39, "Exploded View"](#).

6.CHECK MULTI-WAY CONTROL VALVE

Check multi-way control valve. Refer to [EC6-899, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace multi-way control valve. Refer to [CO-63, "Removal and Installation"](#).

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Check engine coolant temperature sensor 1. Refer to [EC6-411, "Component Inspection \(Engine Coolant Temperature Sensor 1\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).

8.OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the [CO-31, "Troubleshooting Chart"](#).

>> INSPECTION END

A

EC6

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P1220 FUEL PUMP CONTROL MODULE (FPCM)

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1220 FUEL PUMP CONTROL MODULE (FPCM)

DTC Description

INFOID:000000013591759

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1220	FPCM/CIRCUIT (Fuel pump control module circuit)	During engine cranking, the signal voltage of the FPCM to the ECM is too low.

POSSIBLE CAUSE

- Harness or connectors
- FPCM circuit is open or shorted
- Fuel pump circuit is open or shorted
- FPCM

FAIL-SAFE

Noapplicable

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 12 - 15 V at idle.
- Before performing the following procedure, check that the engine coolant temperature is -10°C (14°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
If engine does not start, crank engine for at least 5 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-668, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591760

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 52) from IPDM E/R.
3. Check 15 A fuse for blown.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
- NO >> GO TO 2.

2. CHECK FPCM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between FPCM harness connector and ground.

P1220 FUEL PUMP CONTROL MODULE (FPCM)

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< DTC/CIRCUIT DIAGNOSIS >

+		-	Voltage
FPCM			
Connector	Terminal		
B11	6	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK FPCM POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between FPCM harness connector and IPDM E/R harness connector.

FPCM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
B11	6	E120	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4. CHECK FPCM GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between FPCM harness connector and ground.

+		-	Continuity
FPCM			
Connector	Terminal		
B11	3	Ground	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 FPCM INPUT AND OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between FPCM harness connector and ECM harness connector.

+		-		Continuity
FPCM		ECM		
Connector	Terminal	Connector	Terminal	
B11	4	E152	182	Existed
	5		188	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK FUEL PUMP CONTROL CIRCUIT FOR OPEN AND SHORT

1. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.

P1220 FUEL PUMP CONTROL MODULE (FPCM)

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. Check the continuity between FPCM harness connector and “fuel level sensor unit and fuel pump (main)” harness connector.

+		-		Continuity
FPCM		Fuel level sensor unit and fuel pump (main)		
Connector	Terminal	Connector	Terminal	
B11	1	B101	5	Existed
	2		6	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK FPCM

Refer to [EC6-670, "Component Inspection \(FPCM\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace FPCM. Refer to [EC6-1016, "Removal and Installation"](#).

Component Inspection (FPCM)

INFOID:000000013591761

1. CHECK FUEL PUMP CONTROL MODULE (FPCM)

1. Check the voltage between FPCM terminals under the following conditions.

FPCM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
B11	1	2	For 1 second after turning ignition switch ON	Approx. 9.9 V
			More than 1 second after turning ignition switch ON	Approx. 0 V
			Idle speed	Approx. 9.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace FPCM. Refer to [EC6-1016, "Removal and Installation"](#).

P1225, P1234 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1225, P1234 TP SENSOR

DTC Description

INFOID:0000000013591762

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1225	CTP LEARNING-B1 (Closed throttle position learning bank 1)	Closed throttle position learning value is excessively low.
P1234	CTP LEARNING-B2 (Closed throttle position learning bank 2)	

POSSIBLE CAUSE

DTC P1225

- Electric throttle control actuator (bank 1) (TP sensor 1 and 2)

DTC P1234

- Electric throttle control actuator (bank 2) (TP sensor 1 and 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-671, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591763

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to [EM-165, "Exploded View"](#).

P1225, P1234 TP SENSOR

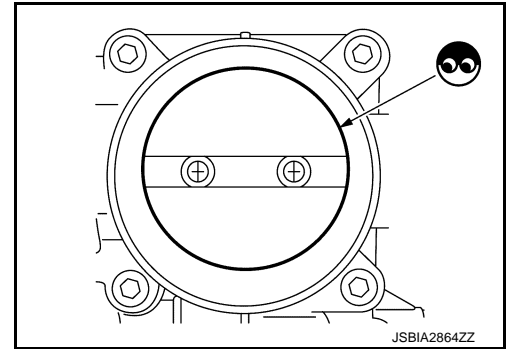
[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace malfunctioning electric throttle control actuator.
Refer to [EM-173, "Exploded View"](#).
- NO >> 1. Remove the foreign matter and clean the electric throttle control actuator inside.
2. Perform throttle valve closed position leaning. Refer to [EC6-272, "Description"](#).



P1226, P1235 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1226, P1235 TP SENSOR

DTC Description

INFOID:000000013591764

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1226	CTP LEARNING-B1 (Closed throttle position learning bank 1)	Closed throttle position learning is not performed successfully, repeatedly.
P1235	CTP LEARNING-B2 (Closed throttle position learning bank 2)	

POSSIBLE CAUSE

DTC P1226

- Electric throttle control actuator (bank 1) (TP sensor 1 and 2)

DTC P1235

- Electric throttle control actuator (bank 2) (TP sensor 1 and 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-673, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591765

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to [EM-165, "Exploded View"](#).

P1226, P1235 TP SENSOR

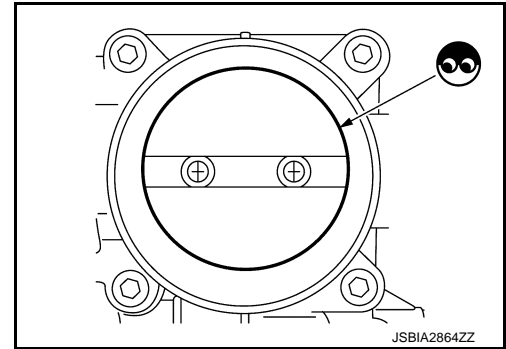
[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace malfunctioning electric throttle control actuator.
Refer to [EM-173, "Exploded View"](#).
- NO >> 1. Remove the foreign matter and clean the electric throttle control actuator inside
2. Perform throttle valve closed position leaning. Refer to [EC6-272, "Description"](#).



P1233 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1233 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Description

INFOID:0000000013591766

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1233	ETC_FNCTN/CIRC-B2 (ETC Function Circuit Bank 2)	Electric throttle control function does not operate properly.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is open or shorted)
- Electric throttle control actuator (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1233 is displayed with DTC P1238 or P1290, first perform the confirmation procedure for DTC P1238 or P1290.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P1238: Refer to [EC6-680, "DTC Description"](#).
 - DTC P1290: Refer to [EC6-686, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 3.

3. 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 [EC6-675, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591767

1. CHECK DTC PRIORITY

P1233 ELECTRIC THROTTLE CONTROL FUNCTION

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< DTC/CIRCUIT DIAGNOSIS >

If DTC P1233 or P2101 is displayed with DTC P1238 or P1290, first perform the confirmation procedure for DTC P1238 or P1290.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P1238: Refer to [EC6-680, "DTC Description"](#).
 - DTC P1290: Refer to [EC6-686, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 63) from IPDM E/R.
3. Check 15 A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector terminals as per the following.

ECM				Condition		Voltage (V)
+		-				
Connector	Terminal	Connector	Terminal			
F142	96	E152	204	Ignition switch	OFF	Approx. 0
					ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 4.

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E124	65	F142	123	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E123	57	F142	96	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

P1233 ELECTRIC THROTTLE CONTROL FUNCTION

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

6. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F119	1	F142	147	Existed
			148	Not existed
	2		147	Not existed
			148	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

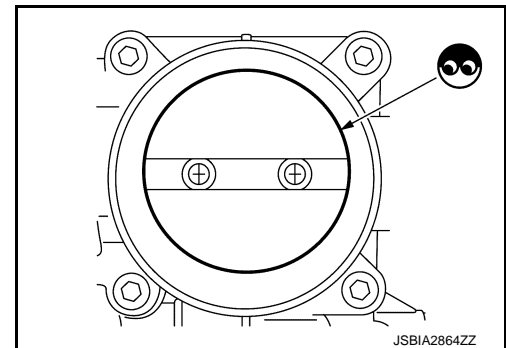
1. Remove the intake air duct. Refer to [EM-165. "Exploded View"](#).
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.

NO >> 1. Remove the foreign matter and clean the electric throttle control actuator inside.

2. Perform throttle valve closed position leaning. Refer to [EC6-272. "Description"](#).



8. CHECK THROTTLE CONTROL MOTOR

Refer to [EC6-679. "Component Inspection \(Throttle Control Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunction electric throttle control actuator. Refer to [EM-173. "Exploded View"](#).

Component Inspection (Throttle Control Motor)

INFOID:0000000013591768

1. CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Condition		Resistance (Ω)
Bank	Terminals			
1	1 and 2	Temperature	25°C (77°F)	1 – 15
2	1 and 2			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173. "Exploded View"](#).

P1236 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1236 THROTTLE CONTROL MOTOR

DTC Description

INFOID:000000013591769

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1236	ETC_MOT-B2 (ETC Motor Bank 2)	ECM detects short in both circuits between ECM and throttle control motor.

POSSIBLE CAUSE

- Harness or connectors [Throttle control motor circuit is shorted.]
- Electric throttle control actuator (bank 2) (Throttle control motor)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

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 [EC6-678. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591770

1. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

P1236 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F119	1	F142	147	Existed
			148	Not existed
	2		147	Not existed
			148	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK THROTTLE CONTROL MOTOR

Refer to [EC6-679, "Component Inspection \(Throttle Control Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection (Throttle Control Motor)

INFOID:000000013591771

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Condition		Resistance (Ω)
Bank	Terminals			
1	1 and 2	Temperature	25°C (77°F)	1 – 15
2	1 and 2			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

P1238 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1238 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:000000013591772

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P1238	ETC ACTR-B2 (ETC Actuator Bank 2)	A	Electric throttle control actuator does not function properly due to the return spring malfunction.
		B	Throttle valve opening angle in fail-safe mode is not in specified range.
		C	ECM detect the throttle valve is stuck open.

POSSIBLE CAUSE

- Electric throttle control actuator (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

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. Shift selector lever to D position and wait at least 3 seconds.
3. Shift selector lever to P position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Shift selector lever to D position and wait at least 3 seconds.
7. Shift selector lever to P position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-681. "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

P1238 ELECTRIC THROTTLE CONTROL ACTUATOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch ON and wait at least 1 second.
2. Shift selector lever to D position and wait at least 3 seconds.
3. Shift selector lever to P position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-681, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591773

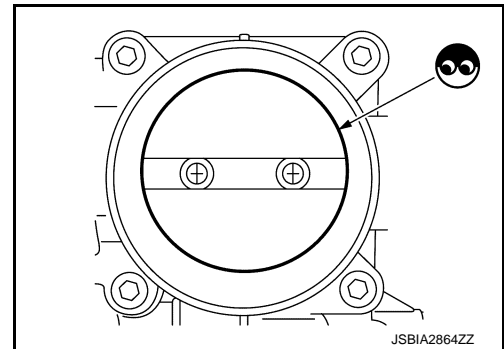
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to [EM-165, "Exploded View"](#).
3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> Replace malfunctioning electric throttle control actuator.
Refer to [EM-173, "Exploded View"](#).

- NO >> 1. Remove the foreign matter and clean the electric throttle control actuator inside.
2. Perform throttle valve closed position leaning. Refer to [EC6-272, "Description"](#).



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P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1239, P2135 TP SENSOR

DTC Description

INFOID:000000013591774

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1239	TP SENSOR-B2 (Throttle position sensor bank 2)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.
P2135	TP SENSOR-B1 (Throttle/Pedal position sensor/switch "A"/ "B" voltage correlation)	

POSSIBLE CAUSE

DTC P1239

- Harness or connector [TP sensor 1 or 2 (bank 2) circuit is open or shorted.]
- Electric throttle control actuator (bank 2) (TP sensor 1 or 2)

DTC P2135

- Harness or connector [TP sensor 1 or 2 (bank 1) circuit is open or shorted.]
- Electric throttle control actuator (bank 1) (TP sensor 1 or 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Others	<p>The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.</p> <p>The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.</p> <p>So, the acceleration will be poor.</p>

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2135 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

P1239, P2135 TP SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-683, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591775

EC6

1. CHECK DTC PRIORITY

If DTC P2135 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

DTC	+			-	Voltage (Approx.)
	Electric throttle control actuator				
	Bank	Connector	Terminal		
P1239	2	F119	5	Ground	5 V
P2135	1	F118	5		

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P1239	2	F119	5	F142	105	Existed
P2135	1	F118	5	F143	35	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES-1 (P2135 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).
YES-2 (P1239 is detected)>>GO TO 4.
YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).
NO >> Repair or replace error-detected parts.

4. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).
NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

P1239, P2135 TP SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P1239	2	F119	4	F142	104	Existed
P2135	1	F118	4	F143	44	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P1239	2	F119	3	F142	112	Existed
			6		106	
P2135	1	F118	3	F143	48	
			6		43	

2. 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.

P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

8. CHECK THROTTLE POSITION SENSOR

Refer to [EC6-685. "Component Inspection \(Throttle Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173. "Exploded View"](#).

Component Inspection (Throttle Position Sensor)

INFOID:000000013591776

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC6-272. "Description"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
F143	43 [TP sensor 1 (bank 1)]	44	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F142	106 [TP sensor 1 (bank 2)]	104	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F143	48 [TP sensor 2 (bank 1)]	44	Fully released	Less than 4.75
			Fully depressed	More than 0.36
F142	112 [TP sensor 2 (bank 2)]	104	Fully released	Less than 4.75
			Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Proceed to [EC6-272. "Description"](#).

>> INSPECTION END

P1290 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1290 THROTTLE CONTROL MOTOR RELAY

DTC Description

INFOID:000000013591777

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1290	ETC MOT PWR-B2 [Throttle control motor relay circuit open (bank 2)]	ECM detects a voltage of power source for throttle control motor is excessively low.

POSSIBLE CAUSE

DTC P1290

- Harness or connectors (Throttle control motor relay circuit is open)
- Throttle control motor relay

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	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.

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.

>> 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 [EC6-686, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591778

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 63) from IPDM E/R.
3. Check 15 A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

P1290 THROTTLE CONTROL MOTOR RELAY

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E124	65	F142	123	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Check the continuity between IPDM E/R sensor harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E123	57	F142	96	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

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P1334 TC SYSTEM

DTC Description

INFOID:000000013665251

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1334	TC SYSTEM-B2 (Turbocharger/supercharger "B" overboost condition)	Turbocharger boost is excessively high.

POSSIBLE CAUSE

- Harness or connectors
[Electric wastegate control actuator (bank 2) circuit.]
[Turbocharger boost sensor (bank 2) circuit]
- Electric wastegate control actuator (bank 2)
- Turbocharger boost sensor (bank 2)
- Turbocharger (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1334 is displayed with DTC P0241 or P0242, first perform the trouble diagnosis for DTC P0241 or P0242.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-504, "DTC Description"](#).
- NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of turbocharger system circuit.

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "WASTEGATE ACTUATOR".
3. Operate "Up" or "Down", set "W/G ACTUATOR POSITION B2" to 0.002 m, and make a quick short note of value "V1" of "W/G ACTUATOR POSI SEN B2".
4. Operate "Up" or "Down", set "W/G ACTUATOR POSITION B2" to 0.006 m, and make a quick short note of value "V2" of "W/G ACTUATOR POSI SEN B2".

Do the values of "V1" and "V2" change (visually. ACTUATOR SHAFT operates) and "V2" minus "V1" becomes equal to or more than 1.3 V?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> Proceed to [EC6-688, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013665252

1.CHECK DTC PRIORITY

P1334 TC SYSTEM

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P1334 is displayed with DTC P0241 or P0242, first perform the trouble diagnosis for DTC P0241 or P0242.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-504, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK TURBOCHARGER BOOST SENSOR

Perform diagnosis procedure for turbocharger boost sensor. Refer to [EC6-505, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Perform trouble diagnosis for electric wastegate control actuator. Refer to [EC6-341, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.PERFORM ELECTRIC WASTEGATE CONTROL ACTUATOR INITIALIZATION

1. Perform electric wastegate control actuator initialization. Refer to [EC6-277, "Description"](#).

2. Perform drive test.

3. Check DTC.

Is DTC P1334 detected again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

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P1423, P1424 COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1423, P1424 COLD START CONTROL

Description

INFOID:000000013591779

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 Description

INFOID:000000013591780

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
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.
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.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1423 or P1424 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

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

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 that "COOLAN TEMP/S".
 - If it is between 5°C (41°F) and 40°C (104°F) go to the following steps.
 - If it is below 5°C (41°F) warm engine up to more than 5°C (41°F) and retry from step 1.
 - If it is above 40°C (104°F) cool engine down to less than 40°C (104°F) and retry from step 1.
5. Start engine and let it idle for 5 minutes.
6. Check 1st trip DTC.

WITH GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

P1423, P1424 COLD START CONTROL

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-691, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

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Diagnosis Procedure

INFOID:0000000013591781

EC6

1. CHECK DTC PRIORITY

If DTC P1423 or P1424 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
NO >> GO TO 2.

2. INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC6-690, "DTC Description"](#).
4. Check 1st trip DTC.

Is the 1st trip DTC P1423 or P1424 displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
NO >> INSPECTION END

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P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013599822

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A2	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	A signal duty of the CAC coolant pump operation command sent from ECM is less than 2% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14A2 is detected?

- YES >> Proceed to [EC6-692, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599823

1.COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4		

Is the inspection result normal?

P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599825

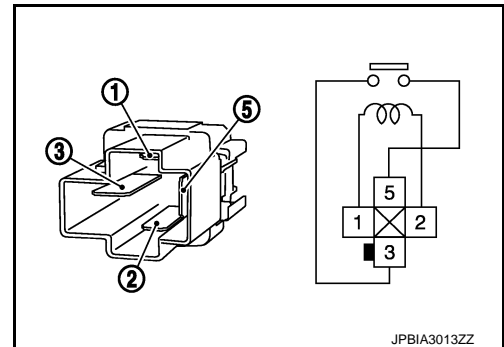
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013599826

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A3	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	A signal duty of the CAC coolant pump operation command sent from ECM is more than 98% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14A3 is detected?

- YES >> Proceed to [EC6-696, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599827

1. COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4		

Is the inspection result normal?

P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599829

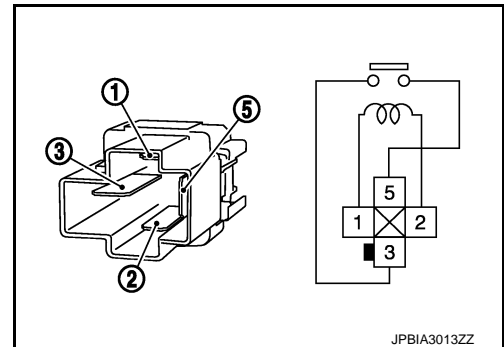
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013599830

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A4	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is less than 2% for 10 consecutive seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14A4 is detected?

- YES >> Proceed to [EC6-700, "DTC Description"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599831

1. COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty*	Normal mode	20 – 80

∴: Turbo high pressure model

Is the inspection result normal?

P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	Existed

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4	Ground	Existed

Is the inspection result normal?

P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599833

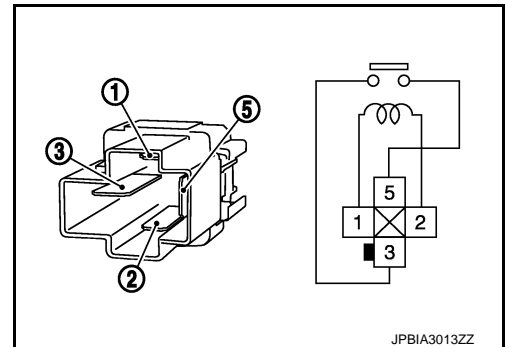
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013599834

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A5	Charge air cooler coolant pump (Charge air cooler coolant pump control circuit high)	Pump feedback duty signal is more than 98% for 10 consecutive seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been precisely conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14A5 is detected?

- YES >> Proceed to [EC6-704, "DTC Description"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599835

1. COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
• Electric water pump 1 duty • Electric water pump 2 duty*	Normal mode	20 – 80

∴: Turbo high pressure model

Is the inspection result normal?

P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

YES >> Replace the fuse after repairing the applicable circuit.

NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4		

Is the inspection result normal?

P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599837

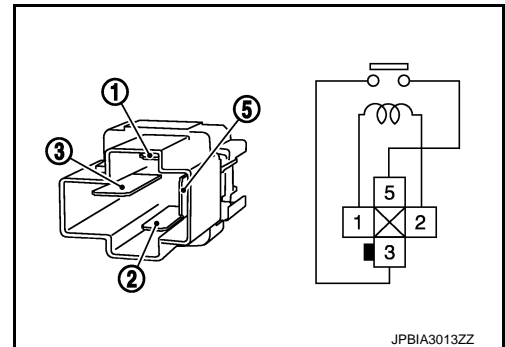
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013599846

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A6	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Any one of the following conditions is maintained for 10 consecutive seconds or more when pump command signal is 10%: <ul style="list-style-type: none">• Pump feedback duty is less than 7%• Pump feedback duty is more than 13%

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been precisely conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14A6 is detected?

- YES >> Proceed to [EC6-708. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599847

1. COMPONENT FUNCTION CHECK

Ⓟ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty*	Normal mode	20 – 80

*: Turbo high pressure model

P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4		

Is the inspection result normal?

P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599849

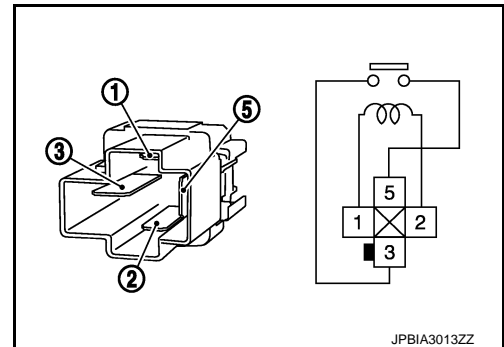
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013599850

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A7	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is 12-18% for 10 consecutive seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14A7 is detected?

- YES >> Proceed to [EC6-712, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599851

1.COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
• Electric water pump 1 duty • Electric water pump 2 duty*	Normal mode	20 – 80

*: Turbo high pressure model

Is the inspection result normal?

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7. CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8. CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9. CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10. CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11. CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4		

Is the inspection result normal?

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599853

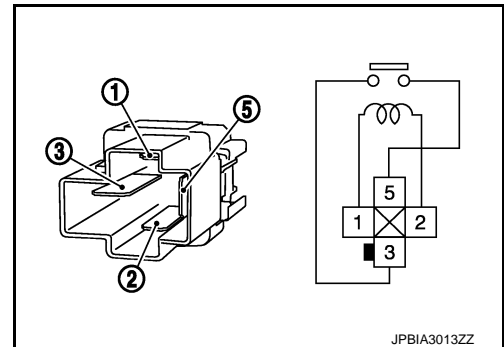
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013599854

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A8	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is 2-8% for 19 consecutive seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14A8 is detected?

- YES >> Proceed to [EC6-716. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599855

1.COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
• Electric water pump 1 duty • Electric water pump 2 duty*	Normal mode	20 – 80

∴: Turbo high pressure model

Is the inspection result normal?

P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4		

Is the inspection result normal?

P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599857

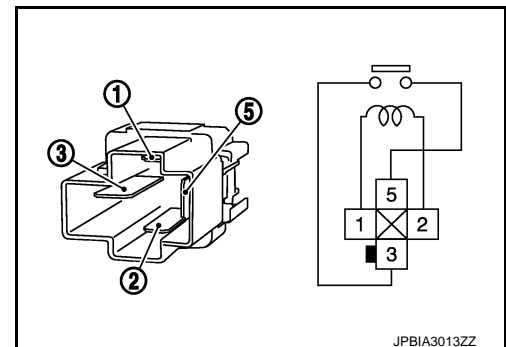
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



P14A9 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14A9 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013642194

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A9	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 12-19 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14A9 detected?

- YES >> Proceed to [EC6-720, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013642195

1.CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14A9 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-720, "DTC Description"](#).

Is the DTC P14A9 detected again?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 1 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).

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P14AA CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14AA CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013642196

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AA	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 8-12 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-722, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013642197

1.CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14AA CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-722, "DTC Description"](#).

Is the DTC P14AA detected again?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 1 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).

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P14AC CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14AC CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013642198

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AC	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 8-19 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14AC detected?

- YES >> Proceed to [EC6-724, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013642199

1.CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14AC CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-724, "DTC Description"](#).

Is the DTC P14AC detected again?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 1 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).

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P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013599838

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AD	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	A signal duty of the CAC coolant pump operation command sent from ECM is less than 2% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14AD is detected?

- YES >> Proceed to [EC6-726, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599839

1. COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
• Electric water pump 1 duty • Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

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+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4		

Is the inspection result normal?

P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599841

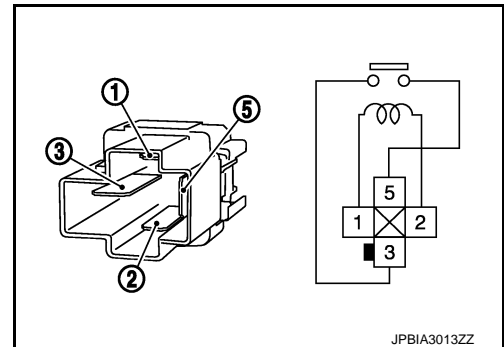
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013599842

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AE	Charge air cooler coolant pump (Charge air cooler coolant pump control circuit high)	A signal duty of the CAC coolant pump operation command sent from ECM is more than 98% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14AE is detected?

- YES >> Proceed to [EC6-730. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599843

1. COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal	Ground	Battery voltage
E161	2		

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal	Ground	Battery voltage
E151	2		

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4		

Is the inspection result normal?

P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599845

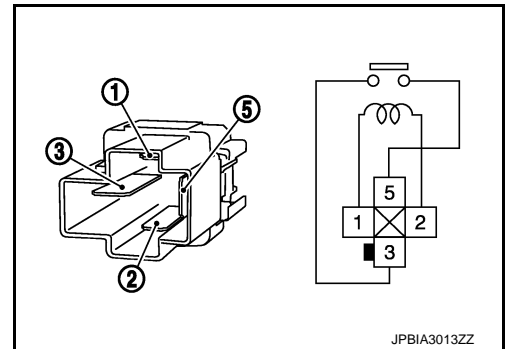
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013599858

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AF	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Any one of the following conditions is maintained for 10 consecutive seconds or more when pump command signal is 10 %: <ul style="list-style-type: none">• Pump feedback duty is less than 7%• Pump feedback duty is more than 13%

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14AF is detected?

- YES >> Proceed to [EC6-734, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599859

1. COMPONENT FUNCTION CHECK

Ⓟ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4		

Is the inspection result normal?

P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599861

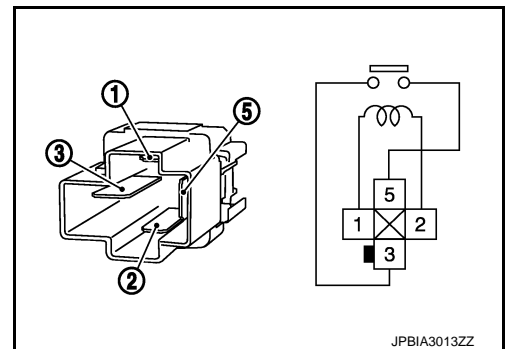
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

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P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013599862

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B0	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is 12-18% for 10 consecutive seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14B0 is detected?

- YES >> Proceed to [EC6-738. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599863

1. COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
• Electric water pump 1 duty • Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

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NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

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+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4		

Is the inspection result normal?

P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599865

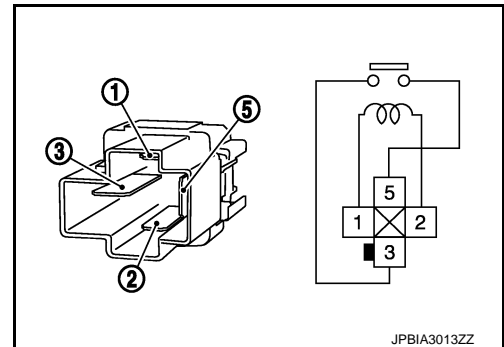
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013599866

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B1	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is 2-8% for 19 consecutive seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14B1 is detected?

- YES >> Proceed to [EC6-742, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599867

1. COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
• Electric water pump 1 duty • Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-511, "Component Inspection \(Charge Air Cooler Cooling Relay\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4		

Is the inspection result normal?

P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013599869

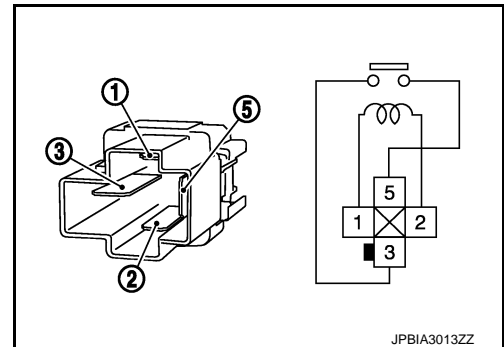
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14B2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14B2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013642200

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B2	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 12-19 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-746, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013642201

1.CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14B2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

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3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-746, "DTC Description"](#).

Is the DTC P14B2 detected again?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 2 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).

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P14B3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14B3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013642202

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B3	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 8-19 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-748, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013642203

1.CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14B3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

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3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-748, "DTC Description"](#).

Is the DTC P14B3 detected again?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 2 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).

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P14B5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P14B5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013642204

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B5	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 8-19 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-750. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013642205

1.CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33. "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34. "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14B5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-750, "DTC Description"](#).

Is the DTC P14B5 detected again?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 2 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).

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P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1550 BATTERY CURRENT SENSOR

DTC Description

INFOID:000000013591782

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1550	BAT CURRENT SENSOR (Battery current sensor)	The output voltage of the battery current sensor remains within the specified range while engine is running.

POSSIBLE CAUSE

- Harness or connectors
 - Battery current sensor circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Battery current sensor
- Each sensor, connector with sensor power supply 2 circuit

FAIL-SAFE

Not applicable

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 wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-752. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591783

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.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
E7	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 2.

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	4	F143	81	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

P1550 BATTERY CURRENT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	1	F143	52	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair or replace error-detected parts.

7. CHECK BATTERY CURRENT SENSOR

Refer to [EC6-754, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

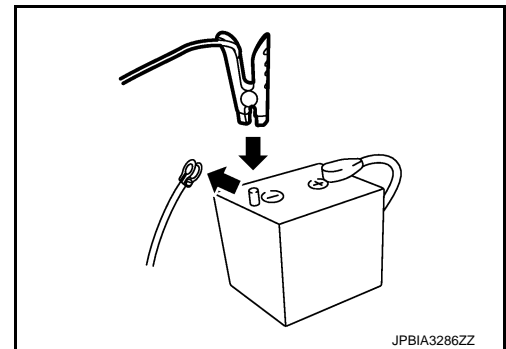
Component Inspection

INFOID:000000013591784

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector terminals as per the following.

ECM				Voltage (Approx.)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	2.5 V



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Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245, "VR30DDTT : How to Handle Battery"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1551, P1552 BATTERY CURRENT SENSOR

DTC Description

INFOID:0000000013591785

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1551	BAT CURRENT SENSOR (Battery current sensor)	An excessively low voltage from the sensor is sent to ECM.
P1552	BAT CURRENT SENSOR (Battery current sensor)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
 - Battery current sensor circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Battery current sensor
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

Not applicable

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 with ignition switch ON

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-755, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591786

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.

+		-	Voltage (Approx.)
Connector	Terminal		
E7	4	Ground	5 V

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	4	F143	81	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	1	F143	52	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK BATTERY CURRENT SENSOR

Refer to [EC6-757, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

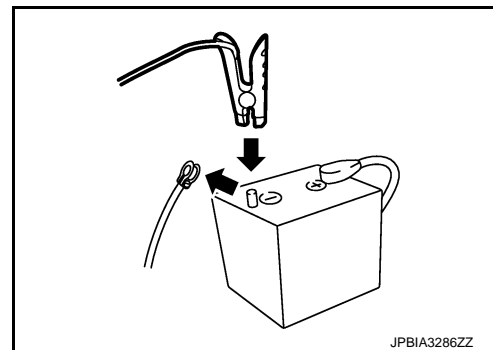
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:000000013591787

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector terminals as per the following.



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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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ECM				Voltage (Approx.)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245](#), "[VR30DDTT : How to Handle Battery](#)".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1553 BATTERY CURRENT SENSOR

DTC Description

INFOID:000000013591788

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1553	BAT CURRENT SENSOR (Battery current sensor)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.

C

POSSIBLE CAUSE

- Harness or connectors
 - Battery current sensor circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Battery current sensor
- Each sensor, connector with sensor power supply 2 circuit

D

FAIL-SAFE

Not applicable

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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.

F

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 [EC6-759, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

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Diagnosis Procedure

INFOID:000000013591789

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.

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+		-	Voltage (Approx.)
Connector	Terminal		
E7	4	Ground	5 V

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Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 2.

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	4	F143	81	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

P1553 BATTERY CURRENT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	1	F143	52	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair or replace error-detected parts.

7. CHECK BATTERY CURRENT SENSOR

Refer to [EC6-761, "Component Inspection"](#).

Is the inspection result normal?

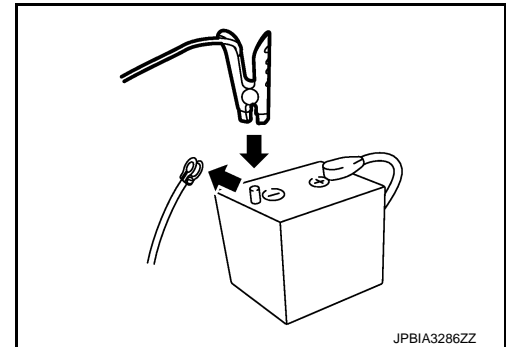
- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000013591790

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector terminals as per the following.



ECM				Voltage (Approx.)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245, "VR30DDTT : How to Handle Battery"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1554 BATTERY CURRENT SENSOR

DTC Description

INFOID:000000013591791

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1554	BAT CURRENT SENSOR (Battery current sensor)	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.

POSSIBLE CAUSE

- Harness or connectors
 - Battery current sensor circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Battery current sensor
- Each sensor, connector with sensor power supply 2 circuit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.
- Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

>> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With CONSULT

1. Start engine and let it idle.
2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT.
3. Check "BAT CUR SEN" indication for 10 seconds.
"BAT CUR SEN" should be above 2,300 mV at least once.

Without CONSULT

1. Start engine and let it idle.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM				Voltage (V)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	Above 2.3 at least once

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
 YES-2 >> Confirmation after repair: INSPECTION END
 NO >> Proceed to [EC6-763, "Diagnosis Procedure"](#)

P1554 BATTERY CURRENT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000013591792

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48. "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

Battery current sensor		Ground	Voltage (V)
Connector	Terminal		
E7	4	Ground	Approx. 5

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

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	
E7	4	F143	81	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 4.

4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E7	1	F143	52	Existed

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P1554 BATTERY CURRENT SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK BATTERY CURRENT SENSOR

Refer to [EC6-764, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

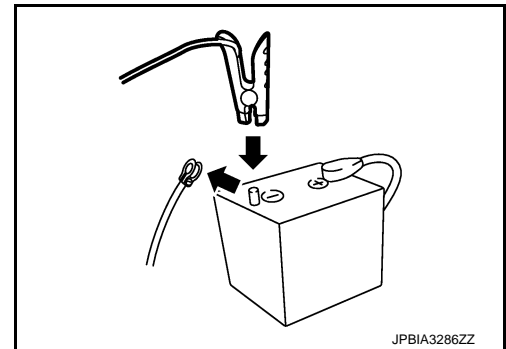
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:000000013591793

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector terminals as per the following.



ECM				Voltage (Approx.)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245, "VR30DDTT : How to Handle Battery"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Description

INFOID:0000000013591794

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1556	BAT TMP SEN/CIRC (Battery temperature sensor circuit low input)	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 seconds or more.
P1557	BAT TMP SEN/CIRC (Battery temperature sensor circuit high input)	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 seconds or more.

POSSIBLE CAUSE

- Harness or connectors
- Battery current sensor (Battery temperature sensor) circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Refrigerant pressure sensor circuit is shorted.
- Battery current sensor (Battery temperature sensor)
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-765, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591795

1. CHECK BATTERY TEMPERATURE SENSOR INPUT SIGNAL

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (V)
Battery current sensor			
Connector	Terminal		
E7	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK BATTERY TEMPERATURE SENSOR INPUT SIGNAL CIRCUIT

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

1. Turn ignition switch ON.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	3	F143	54	Existed

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace error-detected parts.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).
 NO >> Repair or replace error-detected parts.

4.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair or replace error-detected parts.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

6. CHECK BATTERY TEMPERATURE SENSOR

Refer to [EC6-767. "Component Inspection \(Battery Temperature Sensor\)".](#)

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

Component Inspection (Battery Temperature Sensor)

INFOID:000000013591796

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		Resistance
+	-	
Terminal		
2	3	continuity with the resistance value 100 Ω or more

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1564 ASCD STEERING SWITCH

DTC Description

INFOID:000000013591797

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1564	ASCD SW (ASCD steering switch)	<ul style="list-style-type: none">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.

POSSIBLE CAUSE

- Harness or connectors (The ASCD steering switch circuit is open or shorted.)
- ASCD steering switch
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-622, "DTC Description"](#).

NO >> GO TO 2.

2.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.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds.
- Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-768, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591798

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

P1564 ASCD STEERING SWITCH

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Perform diagnosis of applicable. Refer to [EC6-622. "DTC Description"](#).
 NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

- Turn ignition switch ON.
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
- Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as per the following.

Connector	ECM		Condition	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	186 (ASCD steering switch signal)	187	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 1
			SET/COAST switch: Pressed	Approx. 2
			RESUME/ACCELERATE switch: Pressed	Approx. 3
			All ASCD steering switches: Released	Approx. 4

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect combination switch (spiral cable) harness connector.
- Check the continuity between combination switch harness and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M87	32	E152	187	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair or replace error-detected parts.

4.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M87	25	E152	186	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK COMBINATION SWITCH

Check the continuity between combination switch (spiral cable) connect terminals.

Combination switch		Continuity
+	-	
Terminal		Existed
13	25	
16	32	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace spiral cable. Refer to [SR-22, "Removal and Installation"](#).

6. CHECK ASCD STEERING SWITCH

Refer to [EC6-770, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [ST-32, "Removal and Installation"](#) (Vehicle speed sensitive P/S models), [ST-134, "Removal and Installation"](#) (Direct adaptive steering models).

Component Inspection

INFOID:000000013591799

1. CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector M301.
3. Check resistance between combination switch harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M301	13 and 16	MAIN switch: Pressed	Approx. 0
		CANCEL switch: Pressed	Approx. 250
		SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [ST-32, "Exploded View"](#) (Vehicle speed sensitive P/S models), [ST-134, "Removal and Installation"](#) (Direct adaptive steering models).

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1564 ICC STEERING SWITCH

DTC Description

INFOID:000000013591800

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1564	ASCD SW (ICC steering switch)	<ul style="list-style-type: none">• An excessively high voltage signal from the ICC steering switch is sent to ECM.• ECM detects that input signal from the ICC steering switch is out of the specified range.• ECM detects that the ICC steering switch is stuck ON.

POSSIBLE CAUSE

- Harness or connectors (The ICC steering switch circuit is open or shorted.)
- ICC steering switch
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-622, "DTC Description"](#).
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

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press DYNAMIC DRIVE ASSISTANCE SYSTEMS switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-771, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591801

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-622, "DTC Description"](#).
 NO >> GO TO 2.

2. CHECK ICC STEERING SWITCH CIRCUIT

With CONSULT

- Turn ignition switch ON.
- Select "MAIN SW", "DYNAMIC DRIVE ASSISTANCE SYSTEMS SW", "CANCEL SW", "RESUME/ACC SW", "SET SW" and "DIST SW" in "DATA MONITOR" mode with CONSULT.
- Check each item indication under the following conditions.

Monitor item	Condition	Indication	
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
DYNAMIC DRIVE ASSISTANCE SYSTEMS SW	DYNAMIC DRIVE ASSISTANCE SYSTEMS switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF
DIST SW	DISTANCE switch	Pressed	ON
		Released	OFF

Without CONSULT

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as per the following.

Connector	ECM		Condition	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	186 (ICC steering switch signal)	187	MAIN switch: Pressed	Approx. 0
			DYNAMIC DRIVE ASSISTANCE SYSTEMS switch: Pressed	Approx. 1.0
			CANCEL switch: Pressed	Approx. 1.9
			DISTANCE switch: Pressed	Approx. 2.6
			SET/COAST switch: Pressed	Approx. 3.2
			RESUME/ACCELERATE switch: Pressed	Approx. 3.7
			All ICC steering switches: Released	Approx. 4.2

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 4.

3. CHECK ICC STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect combination switch harness connector.
- Check the continuity between combination switch and ECM harness connector.

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M87	32	E152	187	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ICC STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M87	25	E152	186	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK COMBINATION SWITCH

Check the continuity between combination switch (spiral cable) connect terminals.

Combination switch		Continuity
+	-	
Terminal		Existed
13	25	
16	32	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace spiral cable. Refer to [SR-22, "Removal and Installation"](#).

6.CHECK ICC STEERING SWITCH

Refer to [EC6-773, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC steering switch. Refer to [ST-32, "Removal and Installation"](#) (Vehicle speed sensitive P/S models), [ST-134, "Removal and Installation"](#) (Direct adaptive steering models).

Component Inspection

INFOID:000000013591802

1.CHECK ICC STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector M301.
3. Check resistance between combination switch harness connector terminals under the following conditions.

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M301	13 and 16	MAIN switch: Pressed	Approx. 0
		DYNAMIC DRIVE ASSISTANCE SYSTEMS switch: Pressed	Approx. 270
		CANCEL switch: Pressed	Approx. 620
		DISTANCE switch: Pressed	Approx. 1,090
		SET/COAST switch: Pressed	Approx. 1,810
		RESUME/ACCELERATE switch: Pressed	Approx. 2,990
		All ICC steering switches: Released	Approx. 5,420

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC steering switch. Refer to [ST-32, "Removal and Installation"](#) (Vehicle speed sensitive P/S models), [ST-134, "Removal and Installation"](#) (Direct adaptive steering models).

P1568 ICC FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1568 ICC FUNCTION

DTC Description

INFOID:000000013591803

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1568	ICC COMMAND VALUE (ICC function)	ECM detects a difference between signals from ADAS control unit is out of specified range.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- ADAS control unit
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1568 is displayed with DTC UXXXX, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0605: Refer to [EC6-622. "DTC Description"](#).
- DTC P0607: Refer to [EC6-625. "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Step 4 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Press MAIN switch on ICC 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/COAST switch.
5. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-776. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591804

1. CHECK DTC PRIORITY

If DTC P1568 is displayed with DTC UXXXX, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0605: Refer to [EC6-622, "DTC Description"](#).
- DTC P0607: Refer to [EC6-625, "DTC Description"](#).

NO >> GO TO 2.

2. REPLACE ADAS CONTROL UNIT

1. Replace ADAS control unit.
2. Perform [CCS-126, "Work Procedure \(Vehicle-To-Vehicle Distance Control Mode\)"](#).
3. Check DTC of ADAS control unit. Refer to [DAS-26, "On Board Diagnosis Function \(With ICC\)"](#).

>> INSPECTION END

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1572 BRAKE PEDAL POSITION SWITCH

WITHOUT ICC MODELS

WITHOUT ICC MODELS : DTC Description

INFOID:0000000013591805

A

EC6

When the brake pedal is depressed, brake pedal position switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).

Refer to [EC6-83. "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for the ASCD function.

C

DTC DETECTION LOGIC

NOTE:

- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

D

E

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P1572	ASCD BRAKE SW (Brake pedal position switch)	A	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the brake pedal position switch are sent to the ECM at the same time.
		B	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is being driven.

F

G

H

POSSIBLE CAUSE

- Harness or connectors (The stop lamp switch circuit is shorted.)
- Harness or connectors (The brake pedal position switch circuit is shorted.)
- Stop lamp switch
- Brake pedal position switch
- Incorrect stop lamp switch installation
- Incorrect brake pedal position switch installation
- ECM

I

J

FAIL-SAFE

Not applicable

K

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

M

YES >> Perform diagnosis of applicable. Refer to [EC6-622. "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

N

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.

O

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

P

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

P1572 BRAKE PEDAL POSITION SWITCH

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Start engine (VDC switch OFF).
2. Press MAIN switch and make sure that CRUISE lamp illuminates.
3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-778, "WITHOUT ICC MODELS : Diagnosis Procedure"](#).

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-778, "WITHOUT ICC MODELS : Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

WITHOUT ICC MODELS : Diagnosis Procedure

INFOID:0000000013591806

1.CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-622, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK OVERALL FUNCTION-I

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
	Brake pedal	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM			Condition		Voltage (V)
Connector	+	-			
	Terminal	Terminal	Brake pedal	Brake pedal	
E152	192 (Brake pedal position switch signal)	204	Slightly depressed	Approx. 0	
			Fully released	Battery voltage	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

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.

+		-	Voltage
Brake pedal position switch	Terminal		
Connector	Terminal	Ground	Battery voltage
E44	1		

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 4.

4. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Brake pedal position switch	Terminal	Fuse block (J/B)	Terminal	
Connector	Terminal	Connector	Terminal	
E44	1	E65	11F	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK FUSE

1. Disconnect 10A fuse (No. 12) from fuse block (J/B).
2. Check 10A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform trouble diagnosis for power supply circuit.

6. CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

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P1572 BRAKE PEDAL POSITION SWITCH

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+		-		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E44	2	E152	192	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK BRAKE PEDAL POSITION SWITCH

Refer to [EC6-781, "WITHOUT ICC MODELS : Component Inspection \(Brake Pedal Position Switch\)"](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-24, "Exploded View"](#).

8. CHECK OVERALL FUNCTION-II

With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT

Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
E152	191 (Stop lamp switch signal)	204	Brake pedal Slightly depressed	Battery voltage
			Fully released	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 9.

9. CHECK STOP LAMP SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

+		-	Voltage
Stop lamp switch			
Connector	Terminal		
E57	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 10.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.

P1572 BRAKE PEDAL POSITION SWITCH

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Stop lamp switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E57	3	E65	2F	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace error-detected parts.

11.CHECK FUSE

- Disconnect 10A fuse (No. 19) from fuse block (J/B).
- Check 10A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform trouble diagnosis for power supply circuit.

12.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		-		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E57	4	E152	191	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace error-detected parts.

13.CHECK STOP LAMP SWITCH

Refer to [EC6-782. "WITHOUT ICC MODELS : Component Inspection \(Stop Lamp Switch\)"](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-24. "Exploded View"](#).

WITHOUT ICC MODELS : Component Inspection (Brake Pedal Position Switch)

INFOID:000000013591807

1.CHECK BRAKE PEDAL POSITION SWITCH-I

- Turn ignition switch OFF.
- Disconnect brake pedal position harness connector.
- Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

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P1572 BRAKE PEDAL POSITION SWITCH

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< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to [BR-12. "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal Fully released	Existed
		Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to [BR-24. "Exploded View"](#).

WITHOUT ICC MODELS : Component Inspection (Stop Lamp Switch)

INFOID:0000000013591808

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition	Continuity
3 and 4	Brake pedal Fully released	Not existed
	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to [BR-12. "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition	Continuity
3 and 4	Brake pedal Fully released	Not existed
	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to [BR-24. "Exploded View"](#).

WITH ICC MODELS

WITH ICC MODELS : DTC Description

INFOID:0000000013591809

DTC DETECTION LOGIC

NOTE:

- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P1572	ASCD BRAKE SW (Brake pedal position switch)	A	ON signals from the stop lamp switch and the BRAKE pedal position switch are sent to ECM at the same time.
		B	BRAKE pedal position switch signal is not sent to ECM for extremely long time while the vehicle is being driven

A

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POSSIBLE CAUSE

- Harness or connectors (The stop lamp switch circuit is shorted.)
- Harness or connectors (The brake pedal position switch circuit is shorted.)
- Stop lamp switch
- Brake pedal position switch
- ICC brake hold relay
- Incorrect stop lamp switch installation
- Incorrect brake pedal position switch installation
- ECM

C

FAIL-SAFE

Not applicable

D

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-622. "DTC Description"](#).
NO >> GO TO 2.

E

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.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

F

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine (VDC switch OFF).
2. Press MAIN switch and make sure that CRUISE lamp illuminates.
3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

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Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-784. "WITH ICC MODELS : Diagnosis Procedure"](#).

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P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle.

If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-784, "WITH ICC MODELS : Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

WITH ICC MODELS : Diagnosis Procedure

INFOID:000000013591810

1. CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-622, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK OVERALL FUNCTION-I

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
	Brake pedal	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Voltage (V)	
	+	-			
	Terminal	Terminal			
E152	192 (Brake pedal position switch signal)	204	Brake pedal	Slightly depressed	Approx. 0
			Brake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

P1572 BRAKE PEDAL POSITION SWITCH

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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.

+		-	Voltage
Brake pedal position switch			
Connector	Terminal		
E44	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Brake pedal position switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E44	1	E65	11F	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK FUSE

1. Disconnect 10A fuse (No. 12) from fuse block (J/B).
2. Check 10A fuse for blown.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> Perform trouble diagnosis for power supply circuit.

6.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		-		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E44	2	E152	192	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK BRAKE PEDAL POSITION SWITCH

Refer to [EC6-788, "WITH ICC MODELS : Component Inspection \(Brake Pedal Position Switch\)"](#)

Is the inspection result normal?

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P1572 BRAKE PEDAL POSITION SWITCH

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-24, "Exploded View"](#).

8. CHECK OVERALL FUNCTION-II

With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT

Check the voltage between ECM harness connector terminals as per the following.

Connector	ECM		Condition	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	191 (Stop lamp switch signal)	204	Brake pedal Slightly depressed	Battery voltage
			Fully released	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 9.

9. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- Disconnect ICC brake hold relay harness connector.
- Check the voltage between stop lamp switch harness connector and ground.

+		-	Voltage
Stop lamp switch			
Connector	Terminal		
E57	3	Ground	Battery voltage

- Check the voltage between ICC brake hold relay harness connector and ground.

+		-	Voltage
ICC brake hold relay			
Connector	Terminal		
E52	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 10.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect fuse block (J/B) harness connector.
- Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-		Continuity
Stop lamp switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E57	3	E65	2F	Existed

4. Check the continuity between ICC brake hold relay harness connector and fuse block (J/B) harness connector.

+		-		Continuity
ICC brake hold relay		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E52	5	E65	2F	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace error-detected parts.

11.CHECK FUSE

1. Disconnect 10A fuse (No. 19) from fuse block (J/B).
2. Check 10A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform trouble diagnosis for power supply circuit.

12.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		-		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E57	4	E152	191	Existed

3. Check the continuity between ICC brake hold relay harness connector and ECM harness connector.

+		-		Continuity
ICC brake hold relay		ECM		
Connector	Terminal	Connector	Terminal	
E52	3	E152	191	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace error-detected parts.

13.CHECK STOP LAMP SWITCH

Refer to [EC6-788, "WITH ICC MODELS : Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace stop lamp switch. Refer to [BR-24, "Exploded View"](#).

14.CHECK ICC BRAKE HOLD RELAY

Refer to [EC6-789, "WITH ICC MODELS : Component Inspection \(ICC Brake Hold Relay\)"](#).

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace ICC brake hold relay.

WITH ICC MODELS : Component Inspection (Brake Pedal Position Switch)

INFOID:0000000013591811

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect brake pedal position harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly de-pressed Not existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to [BR-12, "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly de-pressed Not existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace brake pedal position switch. Refer to [BR-24, "Exploded View"](#).

WITH ICC MODELS : Component Inspection (Stop Lamp Switch)

INFOID:0000000013591812

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition	Continuity
3 and 4	Brake pedal	Fully released Not existed
		Slightly depressed Existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to [BR-12, "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals under the following conditions.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Terminals	Condition		Continuity
3 and 4	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-24. "Exploded View"](#).

WITH ICC MODELS : Component Inspection (ICC Brake Hold Relay)

INFOID:000000013591813

1. CHECK ICC BRAKE HOLD RELAY

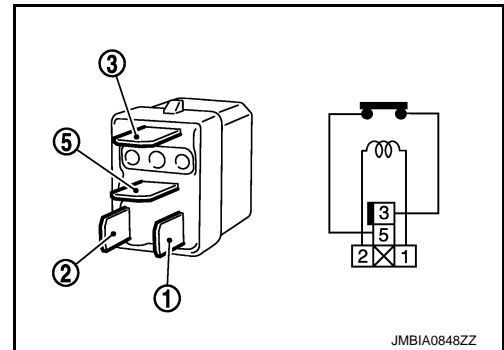
1. Turn ignition switch OFF.
2. Remove ICC brake hold relay.
3. Check the continuity between ICC brake hold relay terminals under the following conditions.

Terminals	Condition	Continuity
③ and ⑤	12V direct current supply between terminals ① and ②	Existed
	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake hold relay



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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1574 ASCD VEHICLE SPEED SENSOR

DTC Description

INFOID:000000013591814

The ECM receives two vehicle speed signals via the CAN communication line. One is sent from “combination meter”, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to [EC6-83, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for ASCD functions.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1574	ASCD VHL SPD SEN (ASCD vehicle speed sensor)	The difference between the two vehicle speed signals is out of the specified range.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- Combination meter
- ABS actuator and electric unit (control unit)
- Wheel sensor
- TCM
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC UXXXX, P0500, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0500, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0500: Refer to [EC6-592, "DTC Description"](#).
- DTC P0605: Refer to [EC6-622, "DTC Description"](#).
- DTC P0607: Refer to [EC6-625, "DTC Description"](#).

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

1. Start engine (VDC switch OFF).
2. Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

3. Check DTC.

P1574 ASCD VEHICLE SPEED SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is DTC detected?

- YES >> Proceed to [EC6-791, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591815

EC6

1.CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC UXXXX, P0500, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0500, P0605 or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
 - DTC P0500: Refer to [EC6-592, "DTC Description"](#).
 - DTC P0605: Refer to [EC6-622, "DTC Description"](#).
 - DTC P0607: Refer to [EC6-625, "DTC Description"](#).
- NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-85, "Diagnosis Description"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to [BRC-61, "CONSULT Function"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70, "CONSULT Function"](#).

>> INSPECTION END

P1574 ICC VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1574 ICC VEHICLE SPEED SENSOR

DTC Description

INFOID:000000013591816

The ECM receives two vehicle speed 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 ICC control. Refer to [CCS-14, "System Description"](#) for ICC functions.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1574	ASCD VHL SPD SEN (ICC vehicle speed sensor)	The difference between the two vehicle speed signals is out of the specified range.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- Combination meter
- ABS actuator and electric unit (control unit)
- Wheel sensor
- TCM
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC UXXXX, P0500, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0500, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- DTC P0500: Refer to [EC6-592, "DTC Description"](#).
- DTC P0605: Refer to [EC6-622, "DTC Description"](#).
- DTC P0607: Refer to [EC6-625, "DTC Description"](#).

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

1. Start engine (VDC switch OFF).
2. Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

3. Check DTC.

Is DTC detected?

P1574 ICC VEHICLE SPEED SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-793, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

A

Diagnosis Procedure

INFOID:0000000013591817

EC6

1. CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC UXXXX, P0500, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0500, P0605 or P0607.

C

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
 - DTC P0500: Refer to [EC6-592, "DTC Description"](#).
 - DTC P0605: Refer to [EC6-622, "DTC Description"](#).
 - DTC P0607: Refer to [EC6-625, "DTC Description"](#).
- NO >> GO TO 2.

D

E

F

2. CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-85, "Diagnosis Description"](#).

G

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform trouble shooting relevant to DTC indicated.

H

3. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to [BRC-61, "CONSULT Function"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace.

I

J

4. CHECK DTC WITH "COMBINATION METER"

Check combination meter function.

Refer to [MWI-70, "CONSULT Function"](#).

K

>> INSPECTION END

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P

P1805 STOP LAMP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P1805 STOP LAMP SWITCH

DTC Description

INFOID:000000013591825

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1805	BRAKE SW/CIRCUIT (Stop lamp switch circuit)	Stop lamp switch signal is not sent to ECM for extremely long time while the vehicle is being driven.

POSSIBLE CAUSE

- Harness or connectors (Stop lamp switch circuit is open or shorted.)
- Stop lamp switch

FAIL-SAFE

Fail safe mode	Vehicle behavior
Others	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor. <ul style="list-style-type: none">• Vehicle condition: Driving condition• When engine is idling: Normal• When accelerating: Poor acceleration

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-794, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591826

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E57	3	Ground	Battery voltage

P1805 STOP LAMP SWITCH

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 3.

3.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Stop lamp switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E57	3	E65	2F	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4.CHECK FUSE

1. Disconnect 10A fuse (No. 19) from fuse block (J/B).
2. Check 10A fuse for blown.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
- NO >> Perform trouble diagnosis for power supply circuit.

5.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect stop lamp switch harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E57	4	E152	191	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6.CHECK STOP LAMP SWITCH

Refer to [EC6-795. "Component Inspection \(Stop Lamp Switch\)".](#)

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace stop lamp switch. Refer to [BR-24. "Exploded View".](#)

Component Inspection (Stop Lamp Switch)

INFOID:000000013591827

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

P1805 STOP LAMP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Terminals	Condition		Continuity
3 and 4	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to [BR-12, "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
3 and 4	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-24, "Exploded View"](#).

P2080 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2080 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013599874

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2080	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit range/ performance bank 1 sensor 1)	ECM detects the following status continuously for 20 seconds or more: <ul style="list-style-type: none">The difference between estimated exhaust gas temperature calculated by ECM and temperature sent from exhaust gas temperature sensor is approx. 100°C (212°F) or more.The difference between exhaust gas temperature sent from exhaust gas temperature calculated by ECM is approx. 100°C (212°F) or more.

POSSIBLE CAUSE

- Exhaust gas leaks
- Exhaust gas temperature sensor (BANK 1)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

- DTC P2080 is displayed with DTCs related to following items, perform the trouble diagnosis for the detected DTCs.
 - Crankshaft position sensor
 - Misfire
 - Fuel system
 - A/F sensor 1
 - A/F sensor 1 heater
 - Mass air flow sensor
 - Engine coolant temperature sensor 1
 - Intake air temperature sensor
 - Vehicle speed signal
- DTC P2080 is displayed with DTC P0544, P0545, P0546, or P2081, first perform the trouble diagnosis for DTC P0544, P0545, P0546, or P2081.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. 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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.

P2080 EXHAUST GAS TEMPERATURE SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. On CONSULT screen, select "ENGINE" >> "DATA MONITOR".
3. Select the following items:
 - COOLANT TEMP/S
 - INT/A TEMP SE
 - VHCL SPEED SE
4. Start the engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 120 consecutive seconds.

CAUTION:

Always drive vehicle in safe manner and obey all traffic laws.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Items	Conditions
COOLANT TEMP/S	More than 65°C (149°F)
INT/A TEMP SE	<ul style="list-style-type: none">• More than 0°C (32°F)• Less than 50°C (122°F)
VHCL SPEED SE	90 – 100 km/h (56 – 62 MPH)

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-798, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599875

1. CHECK DTC PRIORITY

1. DTC P2080 is displayed with DTCs related to following items, perform the trouble diagnosis for the detected DTCs.
 - Crankshaft position sensor
 - Misfire
 - Fuel system
 - A/F sensor 1
 - A/F sensor 1 heater
 - Mass air flow sensor
 - Engine coolant temperature sensor 1
 - Intake air temperature sensor
 - Vehicle speed signal
2. DTC P2080 is displayed with DTC P0544, P0545, P0546, or P2081, first perform the trouble diagnosis for DTC P0544, P0545, P0546, or P2081.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. CHECK FOR EXHAUST GAS LEAKS

1. Start the engine and let it idle.
2. Listen for an exhaust gas leak upstream the three way catalyst.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. COMPONENT FUNCTION CHECK

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. On CONSULT screen, select ENGINE >> DATA MONITOR >> "EXHAUST GAS TEMP SEN 1 B1".

P2080 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. Check that "EXHAUST GAS TEMP SEN 1 B1" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B1	<ul style="list-style-type: none"> Engine coolant temperature: Warmed-up condition Engine speed: Idling 	1.05 – 4.00 V

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	67	F142	100	<ul style="list-style-type: none"> Engine coolant temperature: Warmed-up condition Engine speed: Idling 	1.05 – 4.00 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust gas temperature sensor (bank 1). Refer to [EM-231. "Exploded View"](#).

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P2081 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2081 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013591831

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2081	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit intermittent bank 1 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 1) is 4.84 V or more for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (BANK 1) circuit is open.]
- Exhaust gas temperature sensor (BANK 1)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

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 more than 11 V at idle.

>> GO TO 2.

2.PRECONDITIONING-2

With CONSULT

1. Turn ignition switch ON.
2. Select "COOLANT TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check the following conditions:

COOLANT TEMP/S	More than -30°C (-22°F)
----------------	-------------------------

With GST

Follow the procedure "With CONSULT" above.

Is the condition satisfied?

- YES >> GO TO 4.
NO >> GO TO 3.

3.PRECONDITIONING-3

With CONSULT

1. Start the engine until the following condition is satisfied.

COOLANT TEMP/S	More than -30°C (-22°F)
----------------	-------------------------

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.

With GST

Follow the procedure "With CONSULT" above.

>> GO TO 4.

P2081 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Shift the selector lever to P range.
2. Start engine and let it idle for at least 20 seconds.
3. Depress the accelerator pedal for 5 seconds or more.

NOTE:

Do not release the accelerator pedal during DTC confirmation procedure.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-801, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591832

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1)

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B1" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B1	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load Idle	2.53250 V
	2,000 rpm	1.29500 V

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	67	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	2.0 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 1). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 1) harness connector terminal and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F95	1	Ground	5 V

P2081 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (BANK 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (BANK 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	1	F143	67	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

P2082 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2082 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013599877

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2082	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit range/ performance bank 2 sensor 1)	ECM detects the following status continuously for 20 seconds or more: <ul style="list-style-type: none">• The difference between estimated exhaust gas temperature calculated by ECM and temperature sent from exhaust gas temperature sensor is approx. 100°C (212°F) or more.• The difference between exhaust gas temperature sent from exhaust gas temperature calculated by ECM is approx. 100°C (212°F) or more.

POSSIBLE CAUSE

- Exhaust gas leaks
- Exhaust gas temperature sensor (BANK 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

1. DTC P2082 is displayed with DTCs related to following items, perform the trouble diagnosis for the detected DTCs.
 - Crankshaft position sensor
 - Misfire
 - Fuel system
 - A/F sensor 1
 - A/F sensor 1 heater
 - Mass air flow sensor
 - Engine coolant temperature sensor 1
 - Intake air temperature sensor
 - Vehicle speed signal
2. DTC P2082 is displayed with DTC P0547, P0548, P0549, or P2083, first perform the trouble diagnosis for DTC P0547, P0548, P0549, or P2083.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.

P2082 EXHAUST GAS TEMPERATURE SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. On CONSULT screen, select "ENGINE" >> "DATA MONITOR".
3. Select the following items:
 - COOLANT TEMP/S
 - INT/A TEMP SE
 - VHCL SPEED SE
4. Start the engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 120 consecutive seconds.

CAUTION:

Always drive vehicle in safe manner and obey all traffic laws.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Items	Conditions
COOLANT TEMP/S	More than 65°C (149°F)
INT/A TEMP SE	<ul style="list-style-type: none">• More than 0°C (32°F)• Less than 50°C (122°F)
VHCL SPEED SE	90 – 100 km/h (56 – 62 MPH)

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-798, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599878

1. CHECK DTC PRIORITY

1. DTC P2082 is displayed with DTCs related to following items, perform the trouble diagnosis for the detected DTCs.
 - Crankshaft position sensor
 - Misfire
 - Fuel system
 - A/F sensor 1
 - A/F sensor 1 heater
 - Mass air flow sensor
 - Engine coolant temperature sensor 1
 - Intake air temperature sensor
 - Vehicle speed signal
2. DTC P2082 is displayed with DTC P0547, P0548, P0549, or P2083, first perform the trouble diagnosis for DTC P0547, P0548, P0549, or P2083.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. CHECK FOR EXHAUST GAS LEAKS

1. Start the engine and let it idle.
2. Listen for an exhaust gas leak upstream the three way catalyst.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. COMPONENT FUNCTION CHECK

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. On CONSULT screen, select ENGINE >> DATA MONITOR >> "EXHAUST GAS TEMP SEN 1 B2".

P2082 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. Check that "EXHAUST GAS TEMP SEN 1 B2" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B2	<ul style="list-style-type: none"> • Engine coolant temperature: Warmed-up condition • Engine speed: Idling 	1.05 – 4.00 V

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	47	F142	100	<ul style="list-style-type: none"> • Engine coolant temperature: Warmed-up condition • Engine speed: Idling 	1.05 – 4.00 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust gas temperature sensor (bank 2). Refer to [EM-231. "Exploded View"](#).

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P2083 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2083 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013591833

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2083	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit intermittent bank 2 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 2) is 4.84 V or more for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (BANK 2) circuit is open.]
- Exhaust gas temperature sensor (BANK 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

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 more than 11 V at idle.

>> GO TO 2.

2.PRECONDITIONING-2

With CONSULT

1. Turn ignition switch ON.
2. Select "COOLANT TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check the following conditions:

COOLANT TEMP/S	More than -30°C (-22°F)
----------------	-------------------------

With GST

Follow the procedure "With CONSULT" above.

Is the condition satisfied?

- YES >> GO TO 4.
NO >> GO TO 3.

3.PRECONDITIONING-3

With CONSULT

1. Start the engine until the following condition is satisfied.

COOLANT TEMP/S	More than -30°C (-22°F)
----------------	-------------------------

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.

With GST

Follow the procedure "With CONSULT" above.

>> GO TO 4.

P2083 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

4. PERFORM DTC CONFIRMATION PROCEDURE

- Shift the selector lever to P range.
- Start engine and let it idle for at least 20 seconds.
- Depress the accelerator pedal for 5 seconds or more.

NOTE:

Do not release the accelerator pedal during DTC confirmation procedure.

- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-807, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591834

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2)

With CONSULT

- Turn ignition switch ON.
- Select "EXHAUST GAS TEMP SEN 1 B2" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Start engine and warm it up to normal operating temperature.
- Check that "EXHAUST GAS TEMP SEN 1 B2" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B2	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load Idle	2.45625 V
	2,000 rpm	1.33125 V

Without CONSULT

- Start engine and warm it up to normal operating temperature.
- Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Value (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	47	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	1.8 V

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Replace exhaust gas temperature sensor (bank 2). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect exhaust gas temperature sensor (bank 2) (bank 2) harness connector.
- Turn ignition switch ON.
- Check the voltage between exhaust gas temperature sensor (bank 2) harness connector terminal and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F96	1	Ground	5 V

P2083 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (BANK 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (BANK 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	1	F143	47	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

P2096, P2097, P2098, P2099 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2096, P2097, P2098, P2099 A/F SENSOR 1

DTC Description

INFOID:000000013591835

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2096	POST CATALYST FUEL TRIM SYS B1 (Post catalyst fuel trim system too lean bank 1)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.
P2097	POST CATALYST FUEL TRIM SYS B1 (Post catalyst fuel trim system too rich bank 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period.
P2098	POST CATALYST FUEL TRIM SYS B2 (Post catalyst fuel trim system too lean bank 2)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.
P2099	POST CATALYST FUEL TRIM SYS B2 (Post catalyst fuel trim system too rich bank 2)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period.

POSSIBLE CAUSE

DTC P2096

- A/F sensor 1 (bank 1)
- A/F sensor 1 heater
- Heated oxygen sensor 2 (bank 1)
- Fuel pressure
- Fuel injector
- Intake air leaks
- Exhaust gas leaks

DTC P2097

- A/F sensor 1 (bank 1)
- A/F sensor 1 heater
- Heated oxygen sensor 2 (bank 1)
- Fuel pressure
- Fuel injector
- Intake air leaks
- Exhaust gas leaks

DTC P2098

- A/F sensor 1 (bank 2)
- A/F sensor 1 heater
- Heated oxygen sensor 2 (bank 2)
- Fuel pressure
- Fuel injector
- Intake air leaks
- Exhaust gas leaks

DTC P2099

- A/F sensor 1 (bank 2)
- A/F sensor 1 heater
- Heated oxygen sensor 2 (bank 2)
- Fuel pressure
- Fuel injector
- Intake air leaks
- Exhaust gas leaks

FAIL-SAFE

Not applicable

P2096, P2097, P2098, P2099 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Clear the mixture ratio self-learning value. Refer to [EC6-275, "Description"](#).
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 1 minute under no load.
6. Let engine idle for 1 minute.
7. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-810, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591836

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

1. Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to [EM-231, "Exploded View"](#) (A/F sensor 1) and [EM-226, "Exploded View"](#) (Heated oxygen sensor 2).

>> GO TO 3.

3. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas detected?

YES >> Repair or replace.

NO >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 5.

5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC6-275, "Description"](#).

P2096, P2097, P2098, P2099 A/F SENSOR 1

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC6-462. "Diagnosis Procedure"](#) or [EC6-467. "Diagnosis Procedure"](#).

NO >> GO TO 6.

6.CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace harness connector.

7.CHECK A/F SENSOR 1 POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P2096 P2097	1	F133	1	Ground	Battery voltage
P2098 P2099	2	F134	1		

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between A/F sensor 1 harness connector and IPDM E/R harness connector.

DTC	A/F sensor 1			IPDM E/R		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P2096 P2097	1	F133	1	E123	52	Existed
P2098 P2099	2	F134	1			

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

9.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

P2096, P2097, P2098, P2099 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P2096 P2097	1	F133	3	F142	102	Existed
			4		101	
P2098 P2099	2	F134	3		111	
			4		107	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P2096 P2097	1	F133	3	Ground	Not existed
			4		
P2098 P2099	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P2096 P2097	1	F142	102	Ground	Not existed
			101		
P2098 P2099	2		111		
			107		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

10. CHECK A/F SENSOR 1 HEATER

Refer to [EC6-336, "Component Inspection \(A/F Sensor 1 Heater\)"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 13.

11. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC6-436, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EX-6, "Exploded View"](#).

12. CHECK INTERMITTENT INCIDENT

Perform [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

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.

P2096, P2097, P2098, P2099 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

- 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).

Do you have CONSULT?

YES >> GO TO 14.

NO >> GO TO 15.

14.CONFIRM A/F ADJUSTMENT DATA

 **With CONSULT**

1. Turn ignition switch ON.
2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT.
3. Make sure that "0.000" is displayed on CONSULT screen.

Is "0.000" displayed?

YES >> INSPECTION END

NO >> GO TO 15.

15.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to [EC6-275, "Description"](#).

Do you have CONSULT?

YES >> GO TO 16.

NO >> INSPECTION END

16.CONFIRM A/F ADJUSTMENT DATA

 **With CONSULT**

1. Turn ignition switch ON.
2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT.
3. Make sure that "0.000" is displayed on CONSULT screen.

>> INSPECTION END

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P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Description

INFOID:000000013591837

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
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.
P2103	ETC MOT PWR (Throttle control motor relay circuit short)	ECM detect the throttle control motor relay is stuck ON.

POSSIBLE CAUSE

DTC P2100

- Harness or connectors (Throttle control motor relay circuit is open)
- Throttle control motor relay

DTC P2103

- Harness or connectors (Throttle control motor relay circuit is shorted)
- Throttle control motor relay

FAIL-SAFE

Not applicable

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.

With DTC is detected?

P2100 >> GO TO 2.

P2103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-814. "Diagnosis Procedure"](#).

NO >> INSPECTION END

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-814. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591838

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connector and ground.

+		-		Voltage
ECM				
Connector	Terminal	Connector	Terminal	
F142	123	E152	204	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F142	123	E124	65	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector and ground as per the following conditions.

ECM				Condition	Voltage (Approx.)
Connector	+	Connector	-		
	Terminal		Terminal		
F142	96	E152	204	Ignition switch: OFF	0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

- YES >> INSPECTION END
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.

+		-		Continuity
ECM				
Connector	Terminal	Connector	Terminal	
F142	96	E123	57	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Description

INFOID:000000013591839

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2101	ETC FNCTN/CIRC-B1 (Electric throttle control performance)	Electric throttle control function does not operate properly.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is open or shorted)
- Electric throttle control actuator

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the confirmation procedure for DTC P2100 or P2119.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P2100: Refer to [EC6-814, "DTC Description"](#).
 - DTC P2119: Refer to [EC6-822, "DTC Description"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 3.

3.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 [EC6-816, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000013591840

1.CHECK DTC PRIORITY

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the confirmation procedure for DTC P2100 or P2119.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P2100: Refer to [EC6-814, "DTC Description"](#).
 - DTC P2119: Refer to [EC6-822, "DTC Description"](#).

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector terminals as per the following conditions.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F142	123	E152	204	Ignition switch: OFF	0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.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.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F142	123	E124	65	Existed

5. 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 THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F142	96	E123	57	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.

5.CHECK THROTTLE CONTROL MOTOR (BANK 1) OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 1) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator (bank 1) harness connector and ECM harness connector.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Electric throttle control actuator (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F118	2	F142	150	Existed
			149	Not existed
	1		150	Not existed
			149	Existed

5. 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 THROTTLE CONTROL MOTOR (BANK 2) OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator (bank 2) harness connector and ECM harness connector.

Electric throttle control actuator (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F119	2	F142	148	Existed
			147	Not existed
	1		148	Not existed
			147	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to [EM-165, "Exploded View"](#).
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC6-272, "Description"](#).

8.CHECK THROTTLE CONTROL MOTOR (BANK 1) AND (BANK 2)

Check the throttle control motor (bank 1) and (bank 2). Refer to [EC6-818, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection

INFOID:000000013591841

1.CHECK THROTTLE CONTROL MOTOR (BANK 1)

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 1) harness connector.
3. Check the resistance between electric throttle control actuator (bank 1) terminals as per the following.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Electric throttle control actuator (bank 1)		Resistance (Approx.)
+	-	
Terminals		
2	1	1 - 15 Ω [at 25°C (77°F)]

A

EC6

Is the inspection result normal?

C

YES >> GO TO 2.

NO >> Replace electric throttle control actuator (bank 1). Refer to [EM-173. "Exploded View"](#).

2. CHECK THROTTLE CONTROL MOTOR (BANK 2)

D

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 2) harness connector.
3. Check the resistance between electric throttle control actuator (bank 2) terminals as per the following.

E

Electric throttle control actuator (bank 2)		Resistance (Approx.)
+	-	
Terminals		
2	1	1 - 15 Ω [at 25°C (77°F)]

F

G

Is the inspection result normal?

H

YES >> INSPECTION END

NO >> Replace electric throttle control actuator (bank 2). Refer to [EM-173. "Exploded View"](#).

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P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2118 THROTTLE CONTROL MOTOR

DTC Description

INFOID:000000013591842

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2118	ETC MOT-B1 (Throttle control motor circuit short)	ECM detects short in both circuits between ECM and throttle control motor.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is shorted.)
- Electric throttle control actuator (Throttle control motor)

FAIL-SAFE

Not applicable

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 [EC6-820, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591843

1. CHECK THROTTLE CONTROL MOTOR (BANK 1) OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 1) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator (bank 1) harness connector and ECM harness connector.

Electric throttle control actuator (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F118	2	F142	150	Existed
			149	Not existed
	1		150	Not existed
			149	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

P2118 THROTTLE CONTROL MOTOR

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 2.
- NO >> Repair or replace error-detected parts.

2.CHECK THROTTLE CONTROL MOTOR (BANK 2) OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator (bank 2) harness connector and ECM harness connector.

Electric throttle control actuator (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F119	2	F142	148	Existed
			147	Not existed
	1		148	Not existed
			147	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 THROTTLE CONTROL MOTOR (BANK 1) AND (BANK 2)

Check the throttle control motor (bank 1) and (bank 2). Refer to [EC6-821, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection

INFOID:000000013591844

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Resistance (Approx.)
+	-	
Terminals		
2	1	1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:000000013591845

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P2119	ETC ACTR-B1 (Electric throttle control actuator)	A	Electric throttle control actuator does not function properly due to the re- turn spring malfunction.
		B	Throttle valve opening angle in fail-safe mode is not in specified range.
		C	ECM detect the throttle valve is stuck open.

POSSIBLE CAUSE

Electric throttle control actuator

FAIL-SAFE

Not applicable

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 position and wait at least 3 seconds.
3. Set selector lever to P 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 position and wait at least 3 seconds.
7. Set selector lever to P position.
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-822, "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 position and wait at least 3 seconds.
3. Set selector lever to P position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-822, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591846

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

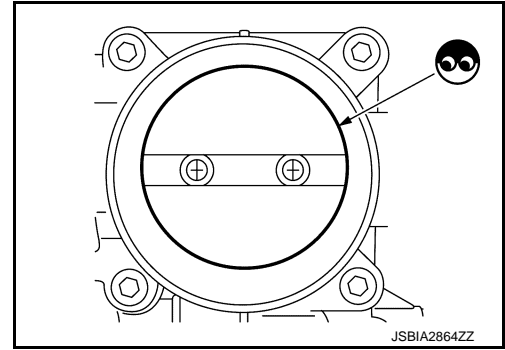
< DTC/CIRCUIT DIAGNOSIS >

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1. Remove the intake air duct. Refer to [EM-165, "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-173, "Exploded View"](#).
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC6-272, "Description"](#).



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P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2122, P2123 APP SENSOR

DTC Description

INFOID:000000013591847

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2122	APP SEN 1/CIRC (Throttle/Pedal position sensor/switch "D" circuit low)	An excessively low voltage from the APP sensor 1 is sent to ECM.
P2123	APP SEN 1/CIRC (Throttle/Pedal position sensor/switch "D" circuit high)	An excessively high voltage from the APP sensor 1 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (APP sensor 1 circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-824. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591848

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

P2122, P2123 APP SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK APP SENSOR 1 POWER SUPPLY

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

+		-	Voltage (V)
APP sensor			
Connector	Terminal	Ground	Approx. 5
M124*1	4*1		
M126*2	5*2		

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	Existed
M124*1	4*1	E152	198	
M126*2	5*2			

*1: With ICC

*2: Without ICC

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	Existed
M124*1	5*1	E152	203	
M126*2	4*2			

*1: With ICC

*2: Without ICC

4. Also check harness for short to ground and short to power.

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair or replace error-detected parts.

5. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124 ^{*1}	6 ^{*1}	E152	202	Existed
M126 ^{*2}	3 ^{*2}			

*1: With ICC

*2: Without ICC

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair or replace error-detected parts.

6. CHECK APP SENSOR

Refer to [EC6-826, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM) or [ACC-6, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITH DISTANCE CONTROL ASSIST SYSTEM).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000013591849

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage ECM harness connector terminals as per the following.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
E152	202 (APP sensor 1)	203	Fully released	0.45 – 1.0
			Fully depressed	4.4 – 4.8
	195 (APP sensor 2)	196	Fully released	0.22 – 0.50
			Fully depressed	2.1 – 2.5

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM) or [ACC-6, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITH DISTANCE CONTROL ASSIST SYSTEM).

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2127, P2128 APP SENSOR

DTC Description

INFOID:000000013591850

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2127	APP SEN 2/CIRC (Throttle/Pedal position sensor/switch "E" circuit low)	An excessively low voltage from the APP sensor 2 is sent to ECM.
P2128	APP SEN 2/CIRC (Throttle/Pedal position sensor/switch "E" circuit high)	An excessively high voltage from the APP sensor 2 is sent to ECM.

C

D

E

POSSIBLE CAUSE

- Harness or connectors
- APP sensor 2 circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Accelerator pedal position sensor (APP sensor 2)
- Each sensor, connected with sensor power supply 2 circuit

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FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

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.

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TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

L

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

M

Is DTC detected?

N

YES >> Proceed to [EC6-827, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

O

Diagnosis Procedure

INFOID:000000013591851

1. CHECK APP SENSOR 2 POWER SUPPLY

P

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage (V)
APP sensor			
Connector	Terminal	Ground	Approx. 5
M124*1	10*1		
M126*2	6*2		

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	Existed
M124*1	10*1	E152	194	
M126*2	6*2			

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	Existed
M124*1	11*1	E152	196	
M126*2	2*2			

*1: With ICC

*2: Without ICC

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

5. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124*1	12*1	E152	195	Existed
M126*2	1*2			

*1: With ICC

*2: Without ICC

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK APP SENSOR

Refer to [EC6-829, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM) or [ACC-6, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITH DISTANCE CONTROL ASSIST SYSTEM).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000013591852

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage ECM harness connector terminals as per the following.

Connector	ECM		Condition	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	202 (APP sensor 1)	203	Fully released	0.45 – 1.0
			Fully depressed	4.4 – 4.8
	195 (APP sensor 2)	196	Fully released	0.22 – 0.50
			Fully depressed	2.1 – 2.5

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM) or [ACC-6, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITH DISTANCE CONTROL ASSIST SYSTEM).

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2138 APP SENSOR

DTC Description

INFOID:000000013591853

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2138	APP SENSOR (Throttle/Pedal position sensor/switch "D"/ "E" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.

POSSIBLE CAUSE

- Harness or connectors
 - APP sensor 1 circuit is open or shorted.
 - APP sensor 2 circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Accelerator pedal position sensor (APP sensor 1)
- Accelerator pedal position sensor (APP sensor 2)
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2138 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).
 NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-830. "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591854

1.CHECK DTC PRIORITY

P2138 APP SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

If DTC P2138 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK APP SENSOR 1

Check APP sensor 1. Refer to [EC6-824, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2

Check APP sensor 2. Refer to [EC6-827, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-995, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

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P219A, P219B AIR FUEL RATIO

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P219A, P219B AIR FUEL RATIO

DTC Description

INFOID:000000013591855

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P219A	AIR FUEL RATIO IMBALANCE B1 (Air-fuel ratio imbalance bank 1)	ECM detects a lean/rich air fuel ratio state in any cylinder for a specified length of time.
P219B	AIR FUEL RATIO IMBALANCE B2 (Air-fuel ratio imbalance bank 2)	

POSSIBLE CAUSE

- Fuel injector
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor
- Intake air leaks
- Lack of fuel
- Incorrect PCV hose connection
- Improper spark plug
- Insufficient compression
- The fuel injector circuit is open or shorted
- ignition coil
- The ignition signal circuit is open or shorted

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P219A, or P219B is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for the other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. PRECONDITIONING - 1

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 3.

3. PRECONDITIONING - 2

1. Turn ignition switch ON.
2. Clear the mixture ratio self-learning value. Refer to [EC6-275, "Description"](#).

Will CONSULT be used?

YES >> GO TO 4.
NO >> GO TO 7.

P219A, P219B AIR FUEL RATIO

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

4. PERFORM DTC CONFIRMATION PROCEDURE - 1

1. Turn ignition switch ON.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine.
4. Make sure that "COOLAN TEMP/S" indicates more than 66°C (151°F).

>> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE - 2

Ⓜ With CONSULT

1. Select "SYSTEM 1 DIAGNOSIS B B1", "SYSTEM 1 DIAGNOSIS A B1", "SYSTEM 1 DIAGNOSIS B B2", "SYSTEM 1 DIAGNOSIS A B2" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:

- Always drive vehicle at a safe speed.

ENG SPEED	1,450 – 2,050rpm
COOLAN TEMP/S	More than 66°C (151°F)
B/FUEL SCHDL	6 – 12 msec
Selector lever	D position
• SYSTEM 1 DIAGNOSIS B B1 • SYSTEM 1 DIAGNOSIS B B2	PRSENT

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during cruising.

3. Check "SYSTEM 1 DIAGNOSIS A B1" or "SYSTEM 1 DIAGNOSIS A B2" indication.

Is "CMPLT" displayed?

- YES >> GO TO 6.
NO >> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE - 3

Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-834, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

7. PERFORM DTC CONFIRMATION PROCEDURE - 4

Ⓧ Without CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:

- Always drive vehicle at a safe speed.

Engine speed	1,450 – 2,050rpm
Calculated load value	45 – 62 %
Selector lever	D position

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during cruising.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-834, "Diagnosis Procedure"](#).

P219A, P219B AIR FUEL RATIO

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591856

1.CHECK DTC PRIORITY

If DTC P219A, or P219B is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for the other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

1. Stop engine and check the following for connection.
 - Air duct
 - Vacuum hoses
 - PCV hose
 - Intake air passage between air duct to intake manifold
2. Start engine and let it idle.
3. Listen for an intake air leak after the mass air flow sensor.

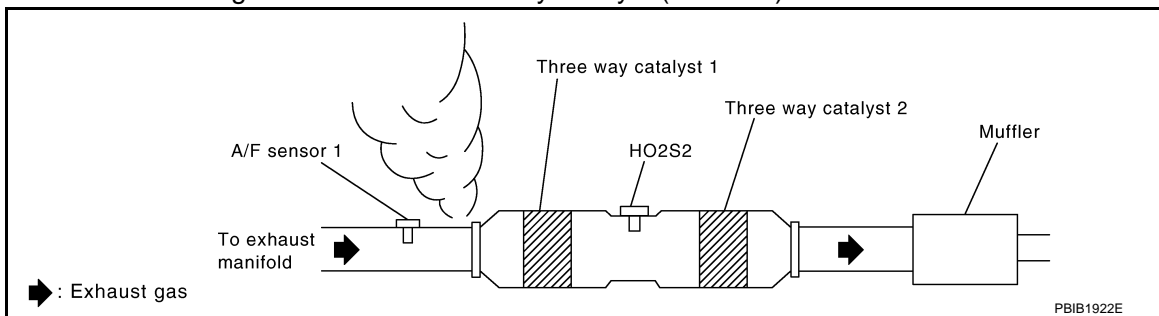
Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST GAS LEAK

1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents connection.
2. Start engine and let it idle.
3. Listen for an exhaust gas leak before three way catalyst (manifold).



Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to [EC6-279. "Work Procedure"](#).
2. Check fuel pressure. Refer to [EC6-279. "Work Procedure"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 9.

5.CHECK MASS AIR FLOW SENSOR

Ⓜ With CONSULT

Check "MASS AIR FLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

For specification, refer to [EC6-1017. "Mass Air Flow Sensor"](#).

Ⓜ With GST

Check mass air flow sensor signal in Service \$01 using GST.

For specification, refer to [EC6-1017. "Mass Air Flow Sensor"](#).

P219A, P219B AIR FUEL RATIO

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC6-380, "Diagnosis Procedure"](#).

6. CHECK FUNCTION OF FUEL INJECTOR

Ⓜ With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
3. Check that each circuit produces a momentary engine speed drop.

ⓧ Without CONSULT

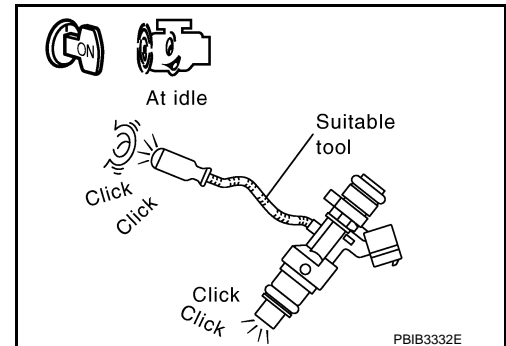
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform trouble diagnosis for fuel injector, refer to [EC6-971, "Component Function Check"](#).



7. CHECK FUNCTION OF IGNITION COIL - 1

CAUTION:

Perform the following steps in a well-ventilated area with no combustibles.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse from IPDM E/R to release fuel pressure.

NOTE:

CONSULT must not be used to release fuel pressure. It develops again during the following steps, if released by using CONSULT.

3. Start the engine.
4. After an engine stall, crank the engine two or three times to release all the fuel pressure.
5. Turn ignition switch OFF.
6. Disconnect all the harness connectors of ignition coil to prevent electric discharge from occurring in ignition coil.
7. Remove ignition coil assembly and spark plug of cylinder. Refer to [EM-193, "Exploded View"](#).
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Allow a 13 – 17mm (0.52 – 0.66 in) spacing between spark plug and grounded metal portion as shown in the figure to fix the ignition coil with a rope or an equivalent.
11. Crank the engine for approximately 3 seconds to see if sparking occurs between spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- The discharge voltage becomes 20 kV or higher. Therefore, always stay away from the spark plug and ignition coil at least 50 cm (19.7 in) during the inspection.
- Leaving a space of more than 17mm (0.66 in) may damage the ignition coil.

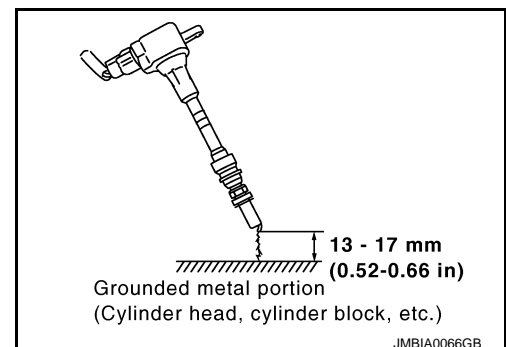
NOTE:

When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 10.



P219A, P219B AIR FUEL RATIO

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

8. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-150, "Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace fuel filter and fuel pump assembly. Refer to [FL-10, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

10. CHECK FUNCTION OF IGNITION COIL - 2

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a non-malfunctioning spark plug.
3. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Check ignition coil, power transistor and their circuits. Refer to [EC6-983, "Component Function Check"](#).

11. CHECK SPARK PLUG

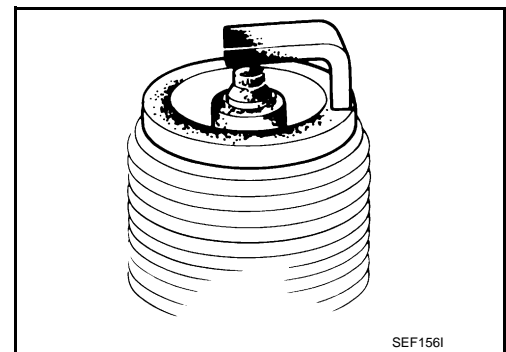
Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> 1. Repair or clean spark plug. Refer to [EM-160, "Exploded View"](#).

2. GO TO 12.

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160, "Exploded View"](#).



12. CHECK FUNCTION OF IGNITION COIL - 3

1. Reconnect the initial spark plugs.
2. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160, "Exploded View"](#).

P23E9 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P23E9 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013600745

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P23E9	A camshaft posi signal B2 ("A" camshaft position signal output circuit/ open bank 2)	When the signal voltage of Intake Camshaft Position Sensor is less than 1.0 V or more than 5.8 V for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 2) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 2)

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Start the engine and wait at least 5 seconds.
3. Check DTC.

Is DTC P23E9 detected?

- YES >> Proceed to [EC6-838, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P23E9 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Diagnosis Procedure

INFOID:000000013600746

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F97	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	1	F143	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	2	F143	82	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	3	F143	77	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

P23E9 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

5. CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-839, "Component Inspection \(Camshaft Position Sensor\)"](#).

Is the inspection result normal?

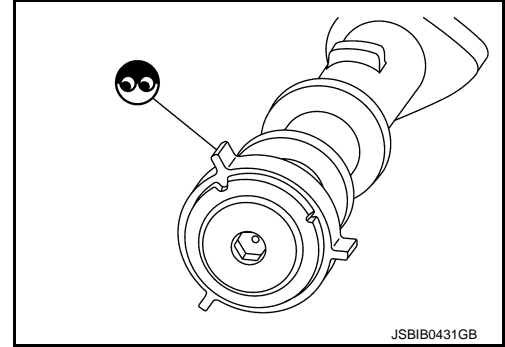
YES >> GO TO 6.

NO >> Replace intake CMP sensor. Refer to [EM-250, "Exploded View"](#).

6. CHECK INTAKE CAMSHAFT (BANK 2)

Check the following items:

- Accumulation of debris to the signal plate intake camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:0000000013600747

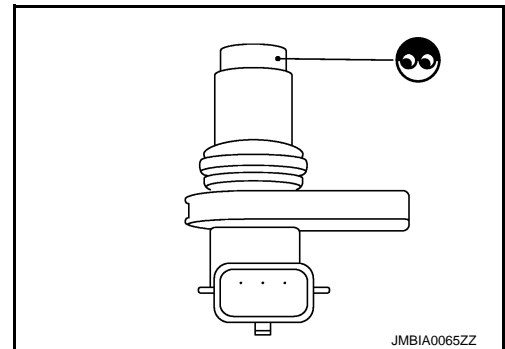
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

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EC6
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P23EA INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P23EA INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013600751

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P23EA	A camshaft posi signal B2 ("A" camshaft position signal output circuit low bank 2)	When the intake camshaft position sensor signal edge count is less than 2 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 2) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 2)

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P23EA detected?

- YES >> Proceed to [EC6-840. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600752

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

P23EA INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F97	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	1	F143	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	2	F143	82	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	3	F143	77	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-842, "Component Inspection \(Camshaft Position Sensor\)"](#).

EC6

P23EA INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

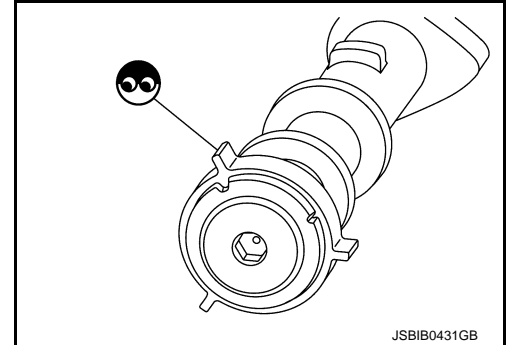
YES >> GO TO 6.

NO >> Replace intake CMP sensor. Refer to [EM-250, "Exploded View"](#).

6.CHECK INTAKE CAMSHAFT (BANK 2)

Check the following items:

- Accumulation of debris to the signal plate intake camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:0000000013600753

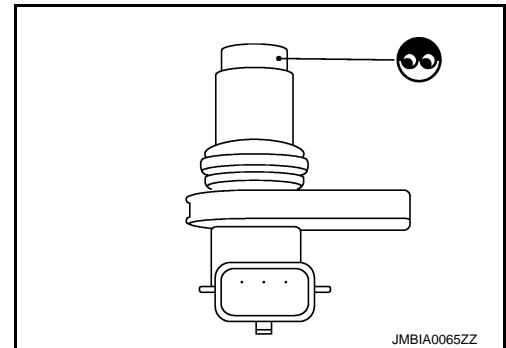
1.CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2.CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P23EB INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P23EB INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013600757

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P23EB	A camshaft posi signal B2 ("A" camshaft position signal output circuit high bank 2)	When the intake camshaft position sensor signal edge count is more than 4 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 2) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 2)
- Electric intake valve timing control actuator (bank 2) circuit is open or shorted.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P23EB is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0021
- P34B0
- P34A8
- P34A9
- P34AA
- P34AB
- P34B1

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

P23EB INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is DTC P23EB detected?

- YES >> Proceed to [EC6-844, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600758

1.CHECK DTC PRIORITY

If DTC P26EB is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0021
- P34B0
- P34A8
- P34A9
- P34AA
- P34AB
- P34B1

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- NO >> GO TO 2.

2.CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F97	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

3.CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	1	F143	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

4.CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

P23EB INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	2	F143	82	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	3	F143	77	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-846. "Component Inspection \(Camshaft Position Sensor\)".](#)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace intake CMP sensor. Refer to [EM-250. "Exploded View".](#)

7. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR (BANK 2) CIRCUIT

1. Disconnect electric IVT control actuator (bank 2) harness connector.

2. Disconnect electric IVT control module harness connector.

3. Check the continuity between electric IVT control actuator (bank 2) harness connector and ECM harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F145	1	E153	4	Existed
	2		6	
	3		2	
F147	4		31	
	5		23	
	6		32	
	7		24	
	8		25	
	9		33	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK INTAKE CAMSHAFT (BANK 2)

Check the following items:

A

EC6

C

D

E

F

G

H

I

J

K

L

M

N

O

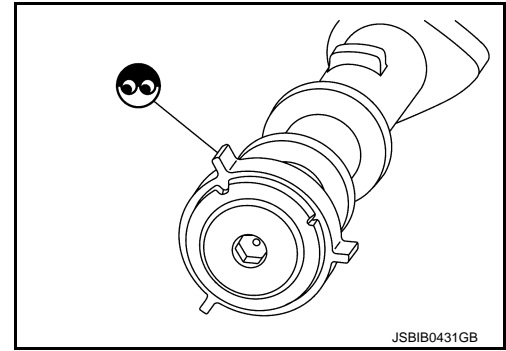
P

P23EB INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate intake camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:000000013600759

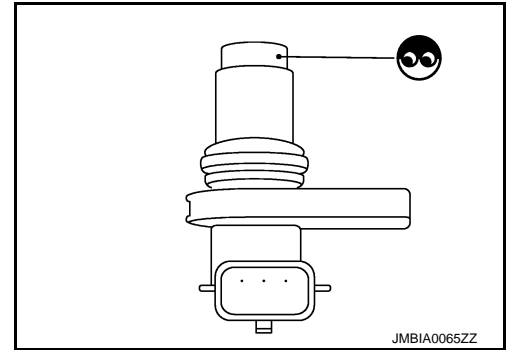
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:0000000013591857

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2562	TC BOOST CONTROL POSITN SEN A (Turbocharger boost control position sensor A circuit)	A voltage signal transmitted from the electric wastegate control valve position sensor (bank 1) is 4.7 V or more continuously for 5 seconds.
P2566	TC BOOST CONTROL POSITN SEN A (Turbocharger boost control position sensor A circuit intermittent)	A voltage signal transmitted from the electric wastegate control valve position sensor (bank 1) is 0.25 V or less continuously for 5 seconds.

POSSIBLE CAUSE

- Electric wastegate control valve position sensor
- Harness and connectors
(Electric wastegate control valve position sensor circuit is open or shorted.)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric wastegate actuator control. (Wastegate valve opens)

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2562 or P2566 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

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

1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-848, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Diagnosis Procedure

INFOID:000000013665282

1. CHECK DTC PRIORITY

If DTC P2562 or P2566 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric wastegate control actuator (bank 1)			
Connector	Terminal		
F139	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F139	2	F143	45	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 WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F139	1	F143	57	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.

P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

5. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

Check the electric wastegate control actuator (bank 1). Refer to [EC6-849, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 1\)\]"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

Component Inspection [Electric Wastegate Control Actuator (Bank 1)]

INFOID:0000000013665283

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

With CONSULT

- Turn ignition switch ON.
- On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
- Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
- Perform the test.
- Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

Without CONSULT

- Turn ignition switch OFF.
- Disconnect Wastegate control actuator harness connector.
- While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

P2563 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2563 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013591860

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2563	TC BOOST CONTROL POSITN SEN A (Turbocharger boost control position sensor A circuit range/performance)	ECM detects the following status when ECM operates the fully closed position learning of a wastegate control valve immediately after engine cold start: A voltage signal transmitted from the wastegate control valve position sensor (bank 1) is higher than 1.95 V, or lower than 0.60 V.

POSSIBLE CAUSE

Electric wastegate control actuator (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2563 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2. 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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

- Start the engine, and warm it up until the following condition is satisfied.

Engine coolant temperature	65°C (149°F) or more
Engine oil temperature	80°C (176°F) or more

- Move the vehicle to a cool place.
- Stop the engine, and cool it down until the following condition is satisfied.

Engine coolant temperature	50°C (122°F) or less
Engine oil temperature	

P2563 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

CAUTION:

Never turn ignition switch ON during soaking.

- Start engine and let it idle for 5 seconds or more.

CAUTION:

Never turn ignition switch OFF during idling.

- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-851, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591861

1.CHECK DTC PRIORITY

If DTC P2563 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric wastegate control actuator (bank 1) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric wastegate control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F139	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between electric wastegate control actuator (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Connector	Terminal	Connector	Terminal	
F139	2	F143	45	Existed

- 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 WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

- Check the continuity between electric wastegate control actuator (bank 1) harness connector and ECM harness connector.

P2563 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-		Continuity
Electric wastegate control actuator (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F139	1	F143	57	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 ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

Check the electric wastegate control actuator (bank 1). Refer to [EC6-856, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 1\)\]"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

Component Inspection [Electric Wastegate Control Actuator (Bank 1)]

INFOID:000000013591862

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
3. Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
4. Perform the test.
5. Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

P2563 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

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P2564, P2565 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2564, P2565 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013591863

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2564	TC BOOST CONTROL POSITN SEN A (Turbocharger boost control position sensor A circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the wastegate control valve position sensor (bank 1) is 0.25 V or less.
P2565	TC BOOST CONTROL POSITN SEN A (Turbocharger boost control position sensor A circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the wastegate control valve position sensor (bank 1) is 4.63 V or more.

POSSIBLE CAUSE

- Harness or connectors [Wastegate control valve position sensor (bank 1) circuit is open or shorted.]
- Electric wastegate control actuator (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2564 or P2565 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. 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 [EC6-855, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P2564, P2565 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Diagnosis Procedure

INFOID:000000013591864

1. CHECK DTC PRIORITY

If DTC P2564 or P2565 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric wastegate control actuator (bank 1)			
Connector	Terminal		
F139	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F139	2	F143	45	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 WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F139	1	F143	57	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.

P2564, P2565 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

5. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

Check the electric wastegate control actuator (bank 1). Refer to [EC6-856, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 1\)\]"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

Component Inspection [Electric Wastegate Control Actuator (Bank 1)]

INFOID:000000013591865

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
3. Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
4. Perform the test.
5. Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

P2578 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2578 TURBOCHARGER SPEED SENSOR

DTC Description

INFOID:000000013599880

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2578	Turbocharger/Supercharger speed sensor A (Turbocharger/Supercharger speed sensor "A" circuit)	Sensor signal is not inputted for 2 consecutive seconds while the following condition is satisfied: <ul style="list-style-type: none">• Engine speed: more than 1,400 rpm• Boost pressure is applied enough.

C

D

POSSIBLE CAUSE

- Turbocharger speed sensor (bank 1)
- Harness and connectors
(Turbocharger speed sensor circuit is open or shorted.)

E

FAIL-SAFE

F

Fail safe mode	Vehicle behavior
Others	Torque have to be limited to the operating range that does not generate the over speed of the turbocharger.

G

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

H

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.

I

J

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

K

NOTE:

Before performing this procedure, check that the battery voltage is more than 10 V at idle.

1. Start engine.
2. Drive the vehicle at least 2 seconds under the following conditions:

L

Engine speed	More than 1,400 rpm
Accelerator pedal	Depressed more than 50%

M

NOTE:

The above conditions can be satisfied by accelerating from low speed to full throttle.

3. Check 1st trip DTC.

N

Is DTC detected?

O

- YES >> Proceed to [EC6-857, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

P

Diagnosis Procedure

INFOID:000000013599881

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Data monitor" >> "TC/SC SPEED B1".

P2578 TURBOCHARGER SPEED SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3. Check that the values displayed on "TC/SC SPEED B1" is 14,000 – 26,000 rpm when maintaining 3,000 rpm with no load condition.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK TURBOCHARGER SPEED SENSOR (BANK 1) INSTALLATION CONDITION

Check that the turbocharger speed sensor (bank 1) is installed correctly with no float and disconnection.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Install the sensor correctly.

3.CHECK TURBOCHARGER SPEED SENSOR

Check the turbocharger speed sensor. Refer to [EC6-859, "Component Inspection \(Turbocharger Speed Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Replace turbocharger speed sensor (bank 1). Refer to [EM-231, "Exploded View"](#).

4.CHECK TURBOCHARGER SPEED SENSOR (BANK 1) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger speed sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger speed sensor (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F141	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

5.CHECK TURBOCHARGER SPEED SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger speed sensor (bank 1) harness connector and ECM harness connector.

Turbocharger speed sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F141	1	F142	109	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

6.CHECK TURBOCHARGER SPEED SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger speed sensor (bank 1) harness connector and ECM harness connector.

P2578 TURBOCHARGER SPEED SENSOR

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Turbocharger speed sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F141	3	F142	116	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 SPEED SENSOR (BANK 1) INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger speed sensor (bank 1) harness connector and ECM harness connector.

Turbocharger speed sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F141	2	F142	119	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK ECM GROUND CIRCUIT

1. Disconnect ECM harness connectors.

2. Check the continuity between ECM harness connector and ground.

ECM		-	Continuity
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Speed Sensor)

INFOID:0000000013599882

1.CHECK TURBOCHARGER SPEED SENSOR-1

1. Turn ignition switch OFF.

2. Disconnect turbocharger speed sensor harness connector.

3. Remove turbocharger speed sensor. Refer to [EM-231, "Exploded View"](#).

4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace turbocharger speed sensor. Refer to [EM-231, "Exploded View"](#).

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P2578 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

2. CHECK SENSOR-2

Check resistance between sensor terminals as follows.

Terminals (Polarity)	Resistance (Ω)
1 - 2	Except 0 or ∞ [at 25°C (77°F)]
1 - 3	
2 - 3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace sensor. Refer to [EM-231. "Exploded View"](#).

P2586, P2590 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2586, P2590 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013637668

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2586	TC BOOST CONTROL POSITN SEN B (Turbocharger boost control position sensor B circuit)	A voltage signal transmitted from the electric wastegate control valve position sensor (bank 2) is 4.7 V or more continuously for 5 seconds.
P2590	TC BOOST CONTROL POSITN SEN B (Turbocharger boost control position sensor B circuit intermittent/erratic)	A voltage signal transmitted from the electric wastegate control valve position sensor (bank 2) is 0.25 V or less continuously for 5 seconds.

POSSIBLE CAUSE

- Electric wastegate control valve position sensor
- Harness and connectors
(Electric wastegate control valve position sensor circuit is open or shorted.)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric wastegate actuator control. (Wastegate valve opens)

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2586 or P2590 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
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

1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-862, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P2586, P2590 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

INFOID:000000013665284

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P2586 or P2590 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric wastegate control actuator (bank 2)			
Connector	Terminal		
F138	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F138	2	F143	66	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 WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F138	1	F143	61	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.

P2586, P2590 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

5. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

Check the electric wastegate control actuator (bank 2). Refer to [EC6-863. "Component Inspection \[Electric Wastegate Control Actuator \(Bank 2\)\]"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231. "Exploded View"](#).

Component Inspection [Electric Wastegate Control Actuator (Bank 2)]

INFOID:000000013665285

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

With CONSULT

- Turn ignition switch ON.
- On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
- Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
- Perform the test.
- Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231. "Exploded View"](#).

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

Without CONSULT

- Turn ignition switch OFF.
- Disconnect Wastegate control actuator harness connector.
- While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231. "Exploded View"](#).

P2587 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2587 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013637671

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2587	TC BOOST CONTROL POSITN SEN B (Turbocharger boost control position sensor B circuit range/performance)	ECM detects the following status when ECM operates the fully closed position learning of a wastegate control valve immediately after engine cold start: A voltage signal transmitted from the wastegate control valve position sensor (bank 2) is higher than 1.95 V, or lower than 0.60 V.

POSSIBLE CAUSE

Electric wastegate control actuator (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2587 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

2. 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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

- Start the engine, and warm it up until the following condition is satisfied.

Engine coolant temperature	65°C (149°F) or more
Engine oil temperature	80°C (176°F) or more

- Move the vehicle to a cool place.
- Stop the engine, and cool it down until the following condition is satisfied.

Engine coolant temperature	50°C (122°F) or less
Engine oil temperature	

P2587 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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CAUTION:

Never turn ignition switch ON during soaking.

- Start engine and let it idle for 5 seconds or more.

CAUTION:

Never turn ignition switch OFF during idling.

- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-865, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013637672

1.CHECK DTC PRIORITY

If DTC P2587 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric wastegate control actuator (bank 2) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric wastegate control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F138	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between electric wastegate control actuator (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Connector	Terminal	Connector	Terminal	
F138	2	F143	66	Existed

- 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 WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

- Check the continuity between electric wastegate control actuator (bank 2) harness connector and ECM harness connector.

P2587 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-		Continuity
Electric wastegate control actuator (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F138	1	F143	61	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 ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

Check the electric wastegate control actuator (bank 2). Refer to [EC6-870, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 2\)\]"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231, "Exploded View"](#).

Component Inspection [Electric Wastegate Control Actuator (Bank 2)]

INFOID:000000013637673

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
3. Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
4. Perform the test.
5. Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231, "Exploded View"](#).

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

P2587 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231, "Exploded View"](#).

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P2588, P2589 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2588, P2589 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013637674

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2588	TC BOOST CONTROL POSITN SEN B (Turbocharger boost control position sensor B circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the wastegate control valve position sensor (bank 2) is 0.25 V or less.
P2589	TC BOOST CONTROL POSITN SEN B (Turbocharger boost control position sensor B circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the wastegate control valve position sensor (bank 2) is 4.63 V or more.

POSSIBLE CAUSE

- Harness or connectors [Wastegate control valve position sensor (bank 2) circuit is open or shorted.]
- Electric wastegate control actuator (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2588 or P2589 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. 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 [EC6-869, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P2588, P2589 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

INFOID:000000013637675

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P2588 or P2589 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric wastegate control actuator (bank 2)			
Connector	Terminal		
F138	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F138	2	F143	66	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 WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F138	1	F143	61	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.

P2588, P2589 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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5. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

Check the electric wastegate control actuator (bank 2). Refer to [EC6-870. "Component Inspection \[Electric Wastegate Control Actuator \(Bank 2\)\]"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231. "Exploded View"](#).

Component Inspection [Electric Wastegate Control Actuator (Bank 2)]

INFOID:000000013637676

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
3. Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
4. Perform the test.
5. Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231. "Exploded View"](#).

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231. "Exploded View"](#).

P2593 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2593 TURBOCHARGER SPEED SENSOR

DTC Description

INFOID:000000013599883

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2593	Turbocharger/Supercharger speed sensor B (Turbocharger speed sensor "B" circuit)	Sensor signal is not inputted for 2 consecutive seconds while the following condition is satisfied: <ul style="list-style-type: none"> • Engine speed: more than 1,400 rpm • Boost pressure is applied enough.

POSSIBLE CAUSE

- Turbocharger speed sensor (bank 2)
- Harness and connectors
(Turbocharger speed sensor circuit is open or shorted.)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Others	Torque have to be limited to the operating range that does not generate the over speed of the turbocharger.

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

NOTE:

Before performing this procedure, check that the battery voltage is more than 10 V at idle.

1. Start engine.
2. Drive the vehicle at least 2 seconds under the following conditions:

Engine speed	More than 1,400 rpm
Accelerator pedal	Depressed more than 50%

NOTE:

The above conditions can be satisfied by accelerating from low speed to full throttle.

3. Check 1st trip DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-871, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013599884

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Data monitor" >> "TC/SC SPEED B2".

P2593 TURBOCHARGER SPEED SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

3. Check that the values displayed on "TC/SC SPEED B2" is 14,000 – 26,000 rpm when maintaining 3,000 rpm with no load condition.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK TURBOCHARGER SPEED SENSOR (BANK 2) INSTALLATION CONDITION

Check that the turbocharger speed sensor (bank 2) is installed correctly with no float and disconnection.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Install the sensor correctly.

3.CHECK TURBOCHARGER SPEED SENSOR

Check the turbocharger speed sensor. Refer to [EC6-873, "Component Inspection \(Turbocharger Speed Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Replace turbocharger speed sensor (bank 2). Refer to [EM-231, "Exploded View"](#).

4.CHECK TURBOCHARGER SPEED SENSOR (BANK 2) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger speed sensor (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger speed sensor (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F140	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

5.CHECK TURBOCHARGER SPEED SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger speed sensor (bank 2) harness connector and ECM harness connector.

Turbocharger speed sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F140	1	F142	108	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

6.CHECK TURBOCHARGER SPEED SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger speed sensor (bank 2) harness connector and ECM harness connector.

P2593 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Turbocharger speed sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F140	3	F142	132	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 SPEED SENSOR (BANK 2) INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger speed sensor (bank 2) harness connector and ECM harness connector.

Turbocharger speed		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F140	2	F142	120	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK ECM GROUND CIRCUIT

1. Disconnect ECM harness connectors.

2. Check the continuity between ECM harness connector and ground.

ECM		-	Continuity
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Speed Sensor)

INFOID:0000000013599885

1.CHECK TURBOCHARGER SPEED SENSOR-1

1. Turn ignition switch OFF.

2. Disconnect turbocharger speed sensor harness connector.

3. Remove turbocharger speed sensor. Refer to [EM-231, "Exploded View"](#).

4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace turbocharger speed sensor. Refer to [EM-231, "Exploded View"](#).

2.CHECK SENSOR-2

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EC6

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P2593 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Check resistance between sensor terminals as follows.

Terminals (Polarity)	Resistance (Ω)
1 - 2	Except 0 or ∞ [at 25°C (77°F)]
1 - 3	
2 - 3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace sensor. Refer to [EM-231, "Exploded View"](#).

P2610 ECM INTERNAL TIMER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2610 ECM INTERNAL TIMER

Description

INFOID:000000013636764

This ECM contains a timer and measures time between an ignition switch OFF and the next ignition switch ON. This enables the judging of the state of engine cooling at an engine start.

EC6

DTC Description

INFOID:000000013636765

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2610	ECM/PCM INTERNAL ENG OFF TIMER (ECM/PCM internal engine off timer performance)	<ul style="list-style-type: none">ECM internal engine off timer is malfunctioning.The time calculated by ECM based on a descent allowance of engine coolant temperatures during ignition switch OFF is extremely shorter than the time counted by the Engine internal OFF timer.

POSSIBLE CAUSE

- ECM
- ECM power supply

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

It is necessary to erase permanent DTC?

- YES >> GO TO 4.
NO >> GO TO 2.

2.PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 12 V or more under ignition switch OFF condition.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 190 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-876, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

4.PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is 12 V or more under ignition switch OFF condition.
- Before performing the following procedure, check that fuel level is between 2/8 and 7/8.

P2610 ECM INTERNAL TIMER

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

>> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 190 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-876, "Diagnosis Procedure"](#).

NO >> GO TO 6.

6.PERFORM DTC CONFIRMATION PROCEDURE-II

CAUTION:

To start this self-diagnosis, the conditions listed bellow are required to be satisfied. Perform the following steps to satisfy the conditions.

- Engine coolant temperature decrease by 55°C (131°F) or more during the time between an ignition switch OFF (after engine warm-up) and the second ignition switch ON.
- A fuel temperature at the second ignition switch ON is -5°C (23°F) or more and less than 35°C (95°F).
- The temperature difference between engine coolant and fuel is 5°C (41°F) or more.

NOTE:

This self-diagnosis is not performed if the distance traveled is extremely short.

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and soak the vehicle for at least 12 hours.

CAUTION:

- Never turn ON the ignition switch during soaking.
- Never open the fuel filler cap and perform refueling during soaking.

4. Turn ignition switch ON and wait at least 190 seconds.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-876, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013636766

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to [EC6-302, "ECM : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK SELF-DIAGNOSTIC RESULT

Check that DTCs related to the fuel system and the cooling system are not detected.

Is the inspection result normal?

YES >> Check the DTC. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC Confirmation Procedure again. Refer to [EC6-875, "DTC Description"](#).

Is the 1st trip DTC P2610 displayed again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

P2614 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2614 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013600742

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2614	A camshaft posi signal B1 ("A" camshaft position signal output circuit/ open bank 1)	When the signal voltage of Intake Camshaft Position Sensor is less than 1.0 V or more than 5.8 V for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 1) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 1)

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Start the engine and wait at least 5 seconds.
3. Check DTC.

Is DTC P2614 detected?

- YES >> Proceed to [EC6-878, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

P2614 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Diagnosis Procedure

INFOID:000000013600743

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F135	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	1	F143	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	2	F143	29	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	3	F143	26	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

P2614 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

5.CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-879. "Component Inspection \(Camshaft Position Sensor\)".](#)

Is the inspection result normal?

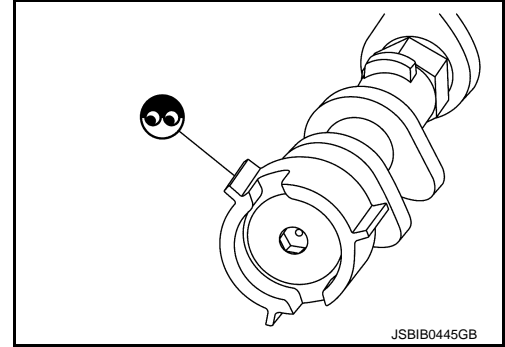
YES >> GO TO 6.

NO >> Replace intake CMP sensor. Refer to [EM-250. "Exploded View".](#)

6.CHECK INTAKE CAMSHAFT (BANK 1)

Check the following items:

- Accumulation of debris to the signal plate intake camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250. "Exploded View".](#)

Component Inspection (Camshaft Position Sensor)

INFOID:0000000013600744

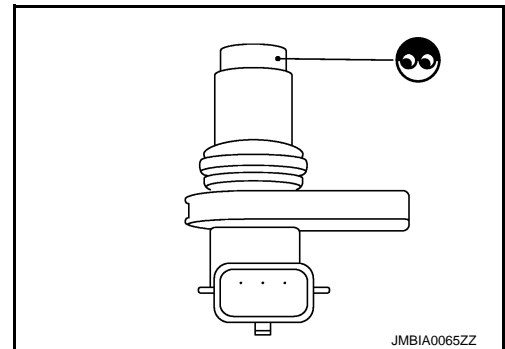
1.CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250. "Exploded View".](#)
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250. "Exploded View".](#)



2.CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250. "Exploded View".](#)

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P2615 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2615 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013600748

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2615	A camshaft posi signal B1 ("A" camshaft position signal output circuit low bank 1)	When the intake camshaft position sensor signal edge count is less than 2 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 1) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 1)

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P2615 detected?

- YES >> Proceed to [EC6-880. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013600749

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

P2615 INTAKE CAMSHAFT POSITION SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F135	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	1	F143	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	2	F143	29	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	3	F143	26	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-882, "Component Inspection \(Camshaft Position Sensor\)"](#).

P2615 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

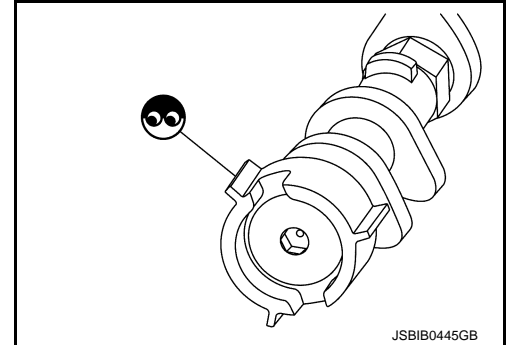
YES >> GO TO 6.

NO >> Replace intake CMP sensor. Refer to [EM-250, "Exploded View"](#).

6.CHECK INTAKE CAMSHAFT (BANK 1)

Check the following items:

- Accumulation of debris to the signal plate intake camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:0000000013600750

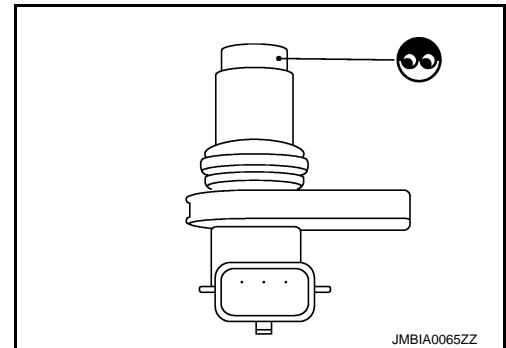
1.CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2.CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P2616 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2616 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013600754

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2616	A camshaft posi signal B1 ("A" camshaft position signal output circuit high bank 1)	When the intake camshaft position sensor signal edge count is more than 4 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 1) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 1)
- Electric intake valve timing control actuator (bank 1) circuit is open or shorted.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2616 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P34A4
- P34A5
- P34A6
- P34A7
- P34AC
- P34AD

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

P2616 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is DTC P2616 detected?

- YES >> Proceed to [EC6-884, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600755

1.CHECK DTC PRIORITY

If DTC P2616 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P34A4
- P34A5
- P34A6
- P34A7
- P34AC
- P34AD

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- NO >> GO TO 2.

2.CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F135	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

3.CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	1	F143	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

4.CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

P2616 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	2	F143	29	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	3	F143	26	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-886. "Component Inspection \(Camshaft Position Sensor\)".](#)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace intake CMP sensor. Refer to [EM-250. "Exploded View".](#)

7. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR (BANK 1) CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.

2. Disconnect electric IVT control module harness connector.

3. Check the continuity between electric IVT control actuator (bank 1) harness connector and ECM harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	
F146	4		7	
	5		15	
	6		8	
	7		16	
	8		17	
	9		9	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK INTAKE CAMSHAFT (BANK 1)

Check the following items:

A
C
D
E
F
G
H
I
J
K
L
M
N
O
P

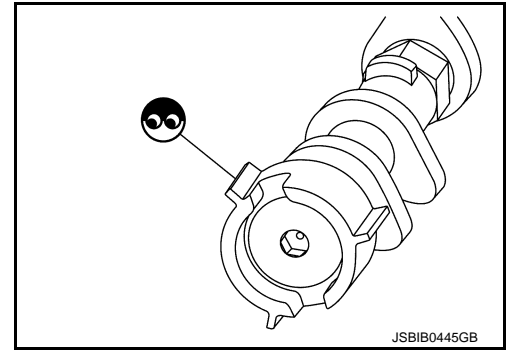
EC6

P2616 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate intake camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250. "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:0000000013600756

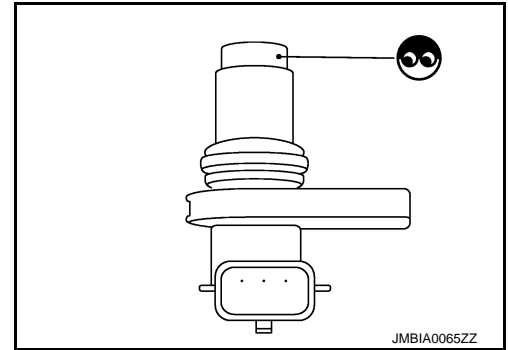
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250. "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250. "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250. "Exploded View"](#).

P2617 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2617 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:000000013600760

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2617	Crankshaft position signal (Crankshaft position signal output circuit/ open)	When the signal voltage of Crankshaft Position Sensor is less than 1.0 V or more than 5.8 V for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
(Crankshaft Position Sensor circuit is open or shorted.)
- Crankshaft Position Sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Start the engine and wait at least 5 seconds.
3. Check DTC.

Is DTC P2617 detected?

- YES >> Proceed to [EC6-887, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600761

1. CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector and ground.

P2617 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F88	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 2.

2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F143	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

3. CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F143	28	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 INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	F143	31	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace error-detected parts.

5. CHECK CKP SENSOR

Check CKP sensor . Refer to [EC6-889, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace CKP sensor . Refer to [EM-198, "Exploded View"](#).

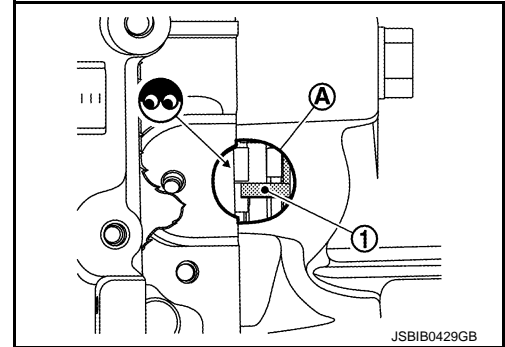
P2617 CRANKSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

6.CHECK GEAR TOOTH

1. Remove CKP sensor . Refer to [EM-198. "Exploded View"](#).
2. Look into the mounting hole (A) of the CKP sensor to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the signal plate. Refer to [EM-198. "Removal and Installation"](#).

Component Inspection (Crankshaft Position Sensor)

INFOID:000000013600762

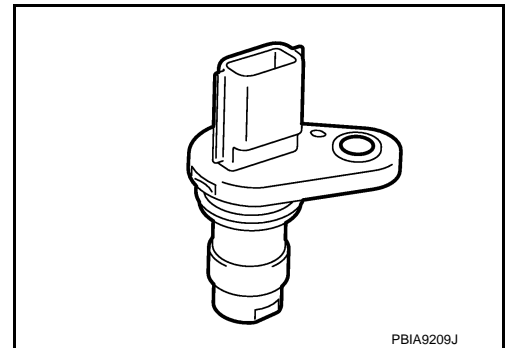
1.CHECK CRANKSHAFT POSITION (CKP) SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect CKP sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace CKP sensor. Refer to [EM-198. "Exploded View"](#).



2.CHECK CKP SENSOR-2

Check the resistance between CKP sensor terminals as per the following.

CKP sensor		Resistance [at 25°C (77°F)]
+	-	
Terminal (Polarity)		Except 0 or ∞ Ω
1	2	
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EM-198. "Exploded View"](#).

P2618 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2618 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:000000013600763

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2618	Crankshaft position signal (Crankshaft position signal output circuit low)	When the crankshaft position sensor signal edge count is less than 18 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
(Crankshaft Position Sensor circuit is open or shorted.)
- Crankshaft Position Sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2618 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P0021
- P34A4
- P34A5
- P34A6
- P34A7
- P34A8
- P34A9
- P34AA
- P34AB
- P34AC
- P34AD
- P34B0
- P34B1

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 3.

P2618 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P2618 detected?

- YES >> Proceed to [EC6-891, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600764

1. CHECK DTC PRIORITY

If DTC P2618 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P0021
- P34A4
- P34A5
- P34A6
- P34A7
- P34A8
- P34A9
- P34AA
- P34AB
- P34AC
- P34AD
- P34B0
- P34B1

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
- NO >> GO TO 2.

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector and ground.

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F88	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

3. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

P2618 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F143	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F143	28	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 CKP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	F143	31	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK CKP SENSOR

Check CKP sensor. Refer to [EC6-893, "Component Inspection \(Crankshaft Position Sensor\)"](#).

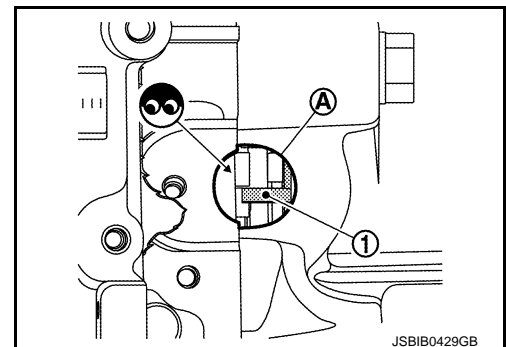
Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

7.CHECK GEAR TOOTH

1. Remove CKP sensor. Refer to [EM-198, "Exploded View"](#).
2. Look into the mounting hole (A) of the CKP sensor to check that there is no missing gear tooth in the signal plate (1).



JSBIB0429GB

Is the inspection result normal?

P2618 CRANKSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> INSPECTION END
NO >> Replace the signal plate. Refer to [EM-198, "Exploded View"](#).

Component Inspection (Crankshaft Position Sensor)

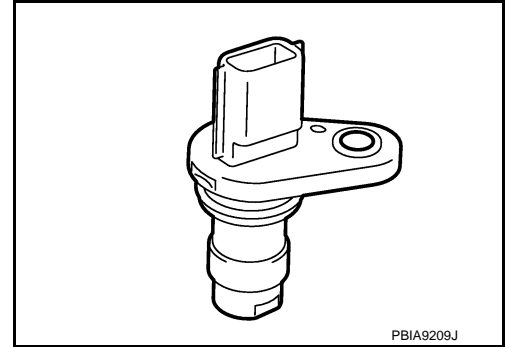
INFOID:0000000013600765

1. CHECK CRANKSHAFT POSITION (CKP) SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect CKP sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).



2. CHECK CKP SENSOR-2

Check the resistance between CKP sensor terminals as per the following.

CKP sensor		Resistance [at 25°C (77°F)]
+	-	
Terminal (Polarity)		Except 0 or ∞ Ω
1	2	
	3	
2	3	

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

A
EC6
C
D
E
F
G
H
I
J
K
L
M
N
O
P

P2619 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P2619 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:000000013600766

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2619	Crankshaft position signal (Crankshaft position signal output circuit high)	When the crankshaft position sensor signal edge count is more than 18 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 1) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 1)
- Electric intake valve timing control actuator (bank 1) circuit is open or shorted.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2619 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P0021
- P34A4
- P34A5
- P34A6
- P34A7
- P34A8
- P34A9
- P34AA
- P34AB
- P34AC
- P34AD
- P34B0
- P34B1

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

P2619 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P2619 detected?

- YES >> Proceed to [EC6-895. "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600767

1.CHECK DTC PRIORITY

If DTC P2619 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P0021
- P34A4
- P34A5
- P34A6
- P34A7
- P34A8
- P34A9
- P34AA
- P34AB
- P34AC
- P34AD
- P34B0
- P34B1

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
 NO >> GO TO 2.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector and ground.

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F88	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.

3.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

P2619 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F143	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F143	28	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 CKP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	F143	31	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK CKP SENSOR

Check CKP sensor. Refer to [EC6-897, "Component Inspection \(Crankshaft Position Sensor\)"](#).

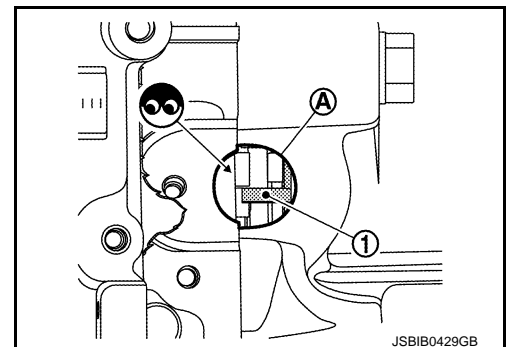
Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

7.CHECK GEAR TOOTH

1. Remove CKP sensor. Refer to [EM-198, "Exploded View"](#).
2. Look into the mounting hole (A) of the CKP sensor to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

P2619 CRANKSHAFT POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 8.

NO >> Replace the signal plate. Refer to [EM-198. "Exploded View"](#).

8.CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR (BANK 1) CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and ECM harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	
F146	4		7	
	5		15	
	6		8	
	7		16	
	8		17	
	9		9	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Crankshaft Position Sensor)

INFOID:000000013600768

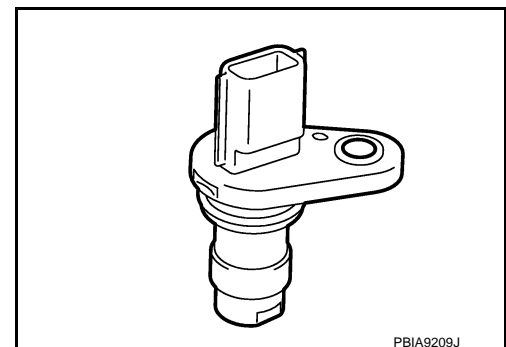
1.CHECK CRANKSHAFT POSITION (CKP) SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect CKP sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace CKP sensor. Refer to [EM-198. "Exploded View"](#).



2.CHECK CKP SENSOR-2

Check the resistance between CKP sensor terminals as per the following.

P2619 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

CKP sensor		Resistance [at 25°C (77°F)]
+	-	
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

P26A3 MULTI-WAY CONTROL VALVE MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P26A3 MULTI-WAY CONTROL VALVE MOTOR

DTC Description

INFOID:0000000013591875

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P26A3	ENGINE COOLANT BYPASS VALVE (Engine coolant bypass valve A range/performance)	ECM detects the following status continuously for 10 seconds or more: Target valve angle - actual valve angle $\geq \pm 5^\circ$

POSSIBLE CAUSE

- Harness or connectors (Multi-way control valve motor circuit is open or shorted.)
- Multi-way control valve

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

- If DTC P26A3 is displayed with DTC P0643 first perform the trouble diagnosis for DTC P0643.
- If DTC P26A3 is displayed with DTC P26A5, P26A6, and/or P26A7 first perform the trouble diagnosis for DTC P26A5, P26A6, and/or P26A7.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0643: Refer to [EC6-636, "DTC Description"](#).
 - DTC P26A5: Refer to [EC6-902, "DTC Description"](#).
 - DTC P26A6: Refer to [EC6-905, "DTC Description"](#).
 - DTC P26A7: Refer to [EC6-905, "DTC Description"](#).

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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is between more than 10 V and less than 16 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and let it idle for 60 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-899, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013591876

1.CHECK DTC PRIORITY

- If DTC P26A3 is displayed with DTC P0643 first perform the trouble diagnosis for DTC P0643.

P26A3 MULTI-WAY CONTROL VALVE MOTOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- If DTC P26A3 is displayed with DTC P26A5, P26A6, and/or P26A7 first perform the trouble diagnosis for DTC P26A5, P26A6, and/or P26A7.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0643: Refer to [EC6-636, "DTC Description"](#).
 - DTC P26A5: Refer to [EC6-902, "DTC Description"](#).
 - DTC P26A6: Refer to [EC6-905, "DTC Description"](#).
 - DTC P26A7: Refer to [EC6-905, "DTC Description"](#).
- NO >> GO TO 2.

2.CHECK MULTI-WAY CONTROL VALVE MOTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect multi-way control valve harness connector and ECM harness connector.
3. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		-		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	
F117	1	F142	141	Existed
	2		146	

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK MULTI-WAY CONTROL VALVE MOTOR

Check the multi-way control valve motor. Refer to [EC6-900, "Component Inspection \(Multi-way Control Valve\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

Component Inspection (Multi-way Control Valve)

INFOID:0000000013591877

1.CHECK MULTI-WAY CONTROL VALVE-1

With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "ENGINE COOLANT BYPASS VALVE".
3. Check that indication of "ENGINE COOLANT B/V POSI".

Is "205°" or more displayed on CONSULT screen?

- YES >> GO TO 2.
NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

2.CHECK MULTI-WAY CONTROL VALVE-2

With CONSULT

1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check "ENGINE COOLANT B/V POSI" approximately 2 seconds after engine start.

P26A3 MULTI-WAY CONTROL VALVE MOTOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is "40°" or less displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Replace multi-way control valve. Refer to [CO-63. "Exploded View"](#).

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P26A5 MULTI-WAY CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P26A5 MULTI-WAY CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013591878

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P26A5	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve A position sensor circuit range/performance)	ECM detects the following status: <ul style="list-style-type: none">A voltage signal transmitted from the multi-way control valve position sensor is 4.76 V or more/4.3 V or less. Outside the above threshold when the valve is moved to the upper side stopper after ignition OFF.A voltage signal transmitted from the multi-way control valve position sensor is 0.8 V or more/0.34 or less. Outside the threshold when the valve is moved to the lower side stopper after engine start.

POSSIBLE CAUSE

- Harness or connectors (Multi-way control valve position sensor circuit is open or shorted.)
- Multi-way control valve position sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P26A5 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. 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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at ignition switch ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-1

- Start the engine and let it idle.
- Maintain the following conditions for at least 10 consecutive seconds.

Engine outlet coolant temperature (engine coolant temperature sensor 1)	10°C (50°F) or more
Engine oil temperature	135°C (275°F) or less
Engine speed	4,500 rpm or less
Accelerator pedal	Fully released

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-903, "Diagnosis Procedure"](#).

NO >> GO TO 4.

P26A5 MULTI-WAY CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

4. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start the engine and let it idle.
3. Maintain the following conditions for at least 10 consecutive seconds.

Engine outlet coolant temperature (engine coolant temperature sensor 1)	10°C (50°F) or more
Engine oil temperature	135°C (275°F) or less
Engine speed	4,500 rpm or less

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-903. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013591879

1. CHECK DTC PRIORITY

If DTC P26A5 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205. "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).
NO >> GO TO 2.

2. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect multi-way control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between multi-way control valve harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F117	5	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		-		Continuity
Connector	Terminal	Connector	Terminal	
F117	3	F142	97	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.

P26A5 MULTI-WAY CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

4. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		-		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	
F117	4	F143	69	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 MULTI-WAY CONTROL VALVE POSITION SENSOR

Check the multi-way control valve position sensor. Refer to [EC6-904, "Component Inspection \(Multi-way Control Valve\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

Component Inspection (Multi-way Control Valve)

INFOID:0000000013591880

1. CHECK MULTI-WAY CONTROL VALVE-1

Ⓜ With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "ENGINE COOLANT BYPASS VALVE".
3. Check that indication of "ENGINE COOLANT B/V POSI".

Is "205°" or more displayed on CONSULT screen?

YES >> GO TO 2.

NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

2. CHECK MULTI-WAY CONTROL VALVE-2

Ⓜ With CONSULT

1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check "ENGINE COOLANT B/V POSI" approximately 2 seconds after engine start.

Is "40°" or less displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013591881

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P26A6	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve A position sensor circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the multi-way control valve position sensor is 0.34 V or less.
P26A7	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve A position sensor circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the multi-way control valve position sensor is 4.76 V or more.

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POSSIBLE CAUSE

- Harness or connectors (Multi-way control valve position sensor circuit is open or shorted.)
- Multi-way control valve position sensor

F

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P26A6 or P26A7 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

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Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-636, "DTC Description"](#).
NO >> GO TO 2.

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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.

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TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

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>> GO TO 3.

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3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and let it idle for 20 seconds.
3. Check 1st trip DTC.

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Is 1st trip DTC detected?

- YES >> Proceed to [EC6-905, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

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Diagnosis Procedure

INFOID:000000013591882

1.CHECK DTC PRIORITY

If DTC P26A6 or P26A7 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Perform diagnosis of applicable. Refer to [EC6-636. "DTC Description"](#).
NO >> GO TO 2.

2. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect multi-way control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between multi-way control valve harness connector and ground.

+		-	Voltage (Approx.)
Multi-way control valve			
Connector	Terminal	Ground	5 V
F117	5		

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		-		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	Existed
F117	3	F142	97	

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 MULTI-WAY CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		-		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	Existed
F117	4	F143	69	

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 MULTI-WAY CONTROL VALVE POSITION SENSOR

Check the multi-way control valve position sensor. Refer to [EC6-906. "Component Inspection \(Multi-way Control Valve\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to [CO-63. "Exploded View"](#).

Component Inspection (Multi-way Control Valve)

INFOID:000000013591883

1. CHECK MULTI-WAY CONTROL VALVE-1

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

④ With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "ENGINE COOLANT BYPASS VALVE".
3. Check that indication of "ENGINE COOLANT B/V POSI".

Is "205°" or more displayed on CONSULT screen?

YES >> GO TO 2.

NO >> Replace multi-way control valve. Refer to [CO-63. "Exploded View"](#).

2. CHECK MULTI-WAY CONTROL VALVE-2

④ With CONSULT

1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check "ENGINE COOLANT B/V POSI" approximately 2 seconds after engine start.

Is "40°" or less displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Replace multi-way control valve. Refer to [CO-63. "Exploded View"](#).

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P26AB MULTI-WAY CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P26AB MULTI-WAY CONTROL VALVE

DTC Description

INFOID:000000013636761

DTC DETECTION LOGIC

Engine coolant temperature has not risen enough to open the multi-way control valve even though the engine has run long enough.

This is due to a leak in the seal or the multi-way control valve being stuck open.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P26AB	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve "A" stuck/ open)	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

POSSIBLE CAUSE

- Multi-way control valve
- Leakage from multi-way control valve
- Engine coolant temperature sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

NOTE:

Never refuel before and during the following procedure.

1. CHECK DTC PRIORITY

If DTC P26AB is displayed with DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2. 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.

>> GO TO 3.

3. PRECONDITIONING-2

With CONSULT

1. Turn ignition switch ON.
2. Check the following conditions:

Ambient temperature	-10°C (14°F) or more
A/C switch	OFF
Blower fan switch	OFF

3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
4. Check the following conditions:

COOLAN TEMP/S	[(-10°C) – (+52°C) (14 – 126°F)]
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P26AB MULTI-WAY CONTROL VALVE

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Is the condition satisfied?

- YES >> GO TO 4.
- NO >> 1. Satisfy the condition.
2. GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-1

④ With CONSULT

1. Start engine.
2. Drive the vehicle until the following condition is satisfied.

CAUTION:

Always drive vehicle at safe speed.

- **STEP 1**

Drive the vehicle under the conditions instructed below until the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" becomes at least 23°C (73°F).

COOLAN TEMP/S	68°C (154°F) or less
FUEL T/TMP SE	Less than the value calculated by subtracting 28°C (82°F) from "COOLAN TEMP/S".*

*: Example

COOLAN TEMP/S	FUEL T/TMP SE
65°C (149°F)	37°C (99°F) or less
60°C (140°F)	32°C (89°F) or less

- **STEP 2**

Drive the vehicle at 60 km/h (37 MPH) or more with the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" maintained at 28°C (82°F) or more.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

- **STEP 3**

Drive the vehicle at 60 km/h (37 MPH) or more until "COOLAN TEMP/S" increases by 6°C (43°F).

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

- YES >> GO TO 5.
- NO >> GO TO 1.

5. PERFORM DTC CONFIRMATION PROCEDURE-2

④ With CONSULT

1. Drive the vehicle until the following condition is satisfied.

COOLAN TEMP/S	68°C (154°F) or more
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CAUTION:

Always drive vehicle at safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-909, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013636762

1. CHECK DTC PRIORITY

If DTC P26AB is displayed with DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306.

Is applicable DTC detected?

P26AB MULTI-WAY CONTROL VALVE

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#) (For turbo high pressure model) or [EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index"](#) (For turbo low pressure model).

NO >> GO TO 2.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Check the engine coolant temperature sensor 1. Refer to [EC6-910, "Component Inspection \(Engine Coolant Temperature Sensor 1\)"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).

3.CHECK MULTI-WAY CONTROL VALVE

Check the multi-way control valve. Refer to [EC6-910, "Component Inspection \(Multi-way Control Valve\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace multi-way control valve. Refer to [CO-63, "Removal and Installation"](#).

Component Inspection (Engine Coolant Temperature Sensor 1)

INFOID:000000013684443

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

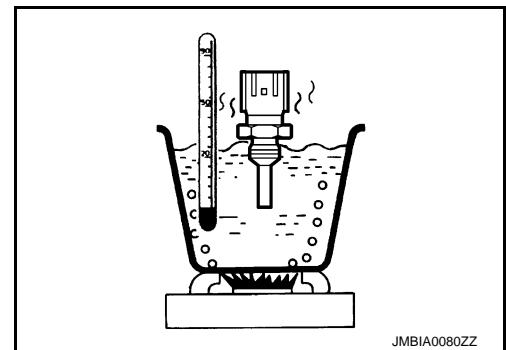
1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 1 harness connector.
3. Remove engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).
4. Check resistance between engine coolant temperature sensor 1 terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90 kΩ
		50 (122)	0.68 – 1.00 kΩ
		90 (194)	0.236 – 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor 1. Refer to [CO-39, "Exploded View"](#).



Component Inspection (Multi-way Control Valve)

INFOID:000000013684471

1.CHECK MULTI-WAY CONTROL VALVE-1

Ⓜ With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "ENGINE COOLANT BYPASS VALVE".
3. Check that indication of "ENGINE COOLANT B/V POSI".

Is "205°" or more displayed on CONSULT screen?

YES >> GO TO 2.

NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

2.CHECK MULTI-WAY CONTROL VALVE-2

Ⓜ With CONSULT

1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

P26AB MULTI-WAY CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check "ENGINE COOLANT B/V POSI" approximately 2 seconds after engine start.

Is "40°" or less displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Replace multi-way control valve. Refer to [CO-63. "Exploded View"](#).

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P34A4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34A4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600789

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A4	A camshaft posi actuator temp sens B1 ("A" camshaft position actuator temperature sensor circuit bank1)	<ul style="list-style-type: none">• An excessively low voltage from the temperature sensor is sent to the electric intake valve timing (IVT) control module.• An excessively high voltage from the temperature sensor is sent to the electric intake valve timing (IVT) control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34A4 is detected with DTC P34A7, first perform the confirmation procedure (trouble diagnosis) for P34A7.

Is DTC P34A7 detected?

YES >> Perform diagnosis for DTC P34A7. Refer to [EC6-921, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P31A4 detected?

YES >> Proceed to [EC6-913, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P34A4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

INFOID:000000013600790

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P34A4 is detected with DTC P34A7, first perform the confirmation procedure (trouble diagnosis) for P34A7.

Is DTC P34A7 detected?

- YES >> Perform diagnosis for DTC P34A7. Refer to [EC6-921, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34A4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	9	E153	9	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-915, "DTC Description"](#).

Is the DTC P34A4 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P34A5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34A5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600801

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A5	A camshaft posi actuator temp sens B1 ("A" camshaft position actuator temperature sensor range/performance bank1)	The temperature difference between the electric intake valve timing control actuator temperature and the engine oil temperature is more than the threshold.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34A5 is detected with DTC P0196, P0197 or P0198, perform the confirmation procedure (trouble diagnosis) for DTC P0196, P0197 or P0198.

Is DTC P0196, P0197 or P0198 detected?

YES >> Perform diagnosis of applicable.

- DTC P0196: Refer to [EC6-485, "DTC Description"](#).
- DTC P0197: Refer to [EC6-489, "DTC Description"](#).
- DTC P0198: Refer to [EC6-489, "DTC Description"](#).

NO >> GO TO 2.

2. 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

- Turn ignition switch ON.
- On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "ENG OIL TEMP".
- Start the engine and warm it up until "ENG OIL TEMP" indicates more than 60°C (140°F).
- Wait at least 7 minutes with engine running.
- Check DTC.

Is DTC P34A5 detected?

P34A5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-916, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600802

1. CHECK DTC PRIORITY

If DTC P34A5 is detected with DTC P0196, P0197 or P0198, perform the confirmation procedure (trouble diagnosis) for DTC P0196, P0197 or P0198.

Is DTC P0196, P0197 or P0198 detected?

- YES >> Perform diagnosis of applicable.
- DTC P0196: Refer to [EC6-485, "DTC Description"](#).
 - DTC P0197: Refer to [EC6-489, "DTC Description"](#).
 - DTC P0198: Refer to [EC6-489, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.

P34A5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

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< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	9	E153	9	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-915, "DTC Description"](#).

Is the DTC P34A5 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

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P34A6 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34A6 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600793

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A6	A camshaft posi actuator temp sens B1 ("A" camshaft position actuator temperature sensor circuit low bank1)	An excessively low temperature from the sensor is sent to the electric intake valve timing control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34A6 detected?

YES >> Proceed to [EC6-918, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600794

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric IVT control actuator (bank 1) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

P34A6 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	9	E153	9	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

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P34A6 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-915, "DTC Description"](#).

Is the DTC P34A6 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P34A7 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34A7 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600797

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A7	A camshaft posi actuator temp sens B1 ("A" camshaft position actuator temperature sensor circuit high bank1)	An excessively high temperature from the sensor is sent to the electric intake valve timing control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34A7 detected?

- YES >> Proceed to [EC6-921, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600798

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR TEMPERATURE SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric IVT control actuator (bank 1) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

P34A7 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal	Ground	5 V
F146	9		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	9	E153	9	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.REPLACE ELECTRIC IVT CONTROL ACTUATOR

P34A7 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-921, "DTC Description"](#).

Is the DTC P34A7 detected?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> INSPECTION END

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P34A8 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34A8 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600791

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A8	A camshaft posi actuator temp sens B2 ("A" camshaft position actuator temperature sensor circuit bank2)	<ul style="list-style-type: none">• An excessively low voltage from the temperature sensor is sent to the electric intake valve timing (IVT) control module.• An excessively high voltage from the temperature sensor is sent to the electric intake valve timing (IVT) control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34A8 is detected with DTC P34AB, first perform the confirmation procedure (trouble diagnosis) for P34AB.

Is DTC P34AB detected?

YES >> Perform diagnosis for DTC P34AB. Refer to [EC6-933, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P34A8 detected?

YES >> Proceed to [EC6-925, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P34A8 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Diagnosis Procedure

INFOID:000000013600792

1. CHECK DTC PRIORITY

If DTC P34A8 is detected with DTC P34AB, first perform the confirmation procedure (trouble diagnosis) for P34A8.

Is DTC P34AB detected?

- YES >> Perform diagnosis for DTC P34AB. Refer to [EC6-933, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal		
F147	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

P34A8 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	25	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	9	E153	33	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-927, "DTC Description"](#).

Is the DTC P34A8 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P34A9 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34A9 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600803

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A9	A camshaft posi actuator temp sens B2 ("A" camshaft position actuator temperature sensor range/performance bank2)	The temperature difference between the electric intake valve timing control actuator temperature and the engine oil temperature is more than the threshold.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34A9 is detected with DTC P0196, P0197 or P0198, perform the confirmation procedure (trouble diagnosis) for DTC P0196, P0197 or P0198.

Is DTC P0196, P0197 or P0198 detected?

YES >> Perform diagnosis of applicable.

- DTC P0196: Refer to [EC6-485, "DTC Description"](#).
- DTC P0197: Refer to [EC6-489, "DTC Description"](#).
- DTC P0198: Refer to [EC6-489, "DTC Description"](#).

NO >> GO TO 2.

2. 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

- Turn ignition switch ON.
- On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "ENG OIL TEMP".
- Start the engine and warm it up until "ENG OIL TEMP" indicates more than 60°C (140°F).
- Wait at least 7 minutes with engine running.
- Check DTC.

Is DTC P34A9 detected?

P34A9 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-928, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600804

1. CHECK DTC PRIORITY

If DTC P34A7 is detected with DTC P0196, P0197 or P0198, perform the confirmation procedure (trouble diagnosis) for DTC P0196, P0197 or P0198.

Is DTC P0196, P0197 or P0198 detected?

- YES >> Perform diagnosis of applicable.
- DTC P0196: Refer to [EC6-485, "DTC Description"](#).
 - DTC P0197: Refer to [EC6-489, "DTC Description"](#).
 - DTC P0198: Refer to [EC6-489, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal		
F147	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.

P34A9 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	25	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	9	E153	33	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-927, "DTC Description"](#).

Is the DTC P34A9 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

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P34AA ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34AA ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600795

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34AA	A camshaft posi actuator temp sens B2 ("A" camshaft position actuator temperature sensor circuit low bank2)	An excessively low temperature from the sensor is sent to the electric intake valve timing control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34AA detected?

YES >> Proceed to [EC6-930. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600796

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric IVT control actuator (bank 2) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

P34AA ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal	Ground	5 V
F147	4		

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	25	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

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P34AA ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	9	E153	33	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-927, "DTC Description"](#).

Is the DTC P34AA detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P34AB ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34AB ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600799

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34AB	A camshaft posi actuator temp sens B2 ("A" camshaft position actuator temperature sensor circuit high bank2)	An excessively high temperature from the sensor is sent to the electric intake valve timing control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34AB detected?

- YES >> Proceed to [EC6-933, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600800

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR TEMPERATURE SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric IVT control actuator (bank 2) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

P34AB ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage (Approx.)
Connector	Terminal		
F147	9	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	9	E153	33	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	25	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. REPLACE ELECTRIC IVT CONTROL ACTUATOR

P34AB ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-933, "DTC Description"](#).

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Is the DTC P34AB detected?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> INSPECTION END

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P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600781

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34AC	A camshaft posi actuator posi sens B1 ("A" camshaft position actuator position sensor circuit bank1)	<ul style="list-style-type: none">• An excessively low voltage from the sensor is sent to the electric intake valve timing (IVT) control module.• An excessively high voltage from the sensor is sent to the electric IVT control module.

POSSIBLE CAUSE

- Harness or connectors
[Electric intake valve timing (IVT) control actuator position sensor (bank 1) circuit is open or shorted.]
- Electric IVT control actuator position sensor (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34AC is displayed with P34AD, first perform the confirmation procedure (trouble diagnosis) for P34AD.

Is DTC P34AD detected?

- YES >> Perform diagnosis for P34AD. Refer to [EC6-940, "DTC Description"](#).
NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P34AC detected?

- YES >> Proceed to [EC6-937, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Diagnosis Procedure

INFOID:000000013600782

1. CHECK DTC PRIORITY

If DTC P34AC is displayed with P34AD, first perform the confirmation procedure (trouble diagnosis) for P34AD.

Is DTC P34AD detected?

- YES >> Perform diagnosis for P34AD. Refer to [EC6-940, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	25	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	5	E153	15	Existed
	6		8	
	7		16	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK ELECTRIC IVT CONTROL ACTUATOR PHASE SIGNAL CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.
2. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	

3. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-940, "DTC Description"](#).

Is the DTC P34AC detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> INSPECTION END

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P34AD ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34AD ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600785

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34AD	A camshaft posi actuator posi sens B1 ("A" camshaft position actuator position sensor range/performance bank1)	The correlation between position signal and phase signal of electric intake valve timing control actuator motor is incorrect.

POSSIBLE CAUSE

- Harness or connectors
[Electric intake valve timing (IVT) control actuator (bank 1)]
- Electric IVT control actuator (bank 1)
- Electric IVT control module

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P34AD detected?

- YES >> Proceed to [EC6-940, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600786

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector.
3. Turn ignition switch ON.

P34AD ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

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4. Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

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Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	5	E153	15	Existed
	6		8	
	7		16	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR PHASE SIGNAL CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.

2. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	

3. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-940, "DTC Description"](#).

Is the DTC P34AD detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600783

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34B0	A camshaft posi actuator posi sens B2 ("A" camshaft position actuator position sensor circuit bank2)	<ul style="list-style-type: none">An excessively low voltage from the sensor is sent to the electric intake valve timing (IVT) control module.An excessively high voltage from the sensor is sent to the electric IVT control module.

POSSIBLE CAUSE

- Harness or connectors
[Electric intake valve timing (IVT) control actuator position sensor (bank 2) circuit is open or shorted.]
- Electric IVT control actuator position sensor (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34B0 is displayed with P34B1, first perform the confirmation procedure (trouble diagnosis) for P34B1.

Is DTC P34B1 detected?

- YES >> Perform diagnosis for P34B1. Refer to [EC6-947, "DTC Description"](#).
NO >> GO TO 2.

2. 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34B0 detected?

- YES >> Proceed to [EC6-944, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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INFOID:000000013600784

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P34B0 is displayed with P34B1, first perform the confirmation procedure (trouble diagnosis) for P34B1.

Is DTC P34B1 detected?

YES >> Perform diagnosis for P34B1. Refer to [EC6-947. "DTC Description"](#).

NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal		
F147	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305. "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015. "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	17	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	5	E153	23	Existed
	6		32	
	7		24	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK ELECTRIC IVT CONTROL ACTUATOR PHASE SIGNAL CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.
2. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F145	1	E153	4	Existed
	2		6	
	3		2	

3. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-943, "DTC Description"](#).

Is the DTC P34B0 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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NO >> INSPECTION END

P34B1 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34B1 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600787

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34B1	A camshaft posi actuator posi sens B2 ("A" camshaft position actuator position sensor range/performance bank2)	The correlation between position signal and phase signal of electric intake valve timing control actuator motor is incorrect.

POSSIBLE CAUSE

- Harness or connectors
[Electric intake valve timing (IVT) control actuator (bank 2)]
- Electric IVT control actuator (bank 2)
- Electric IVT control module

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P34B1 detected?

- YES >> Proceed to [EC6-947. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600788

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector.

P34B1 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

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< DTC/CIRCUIT DIAGNOSIS >

3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F147	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-305, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	17	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

P34B1 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	5	E153	23	Existed
	6		32	
	7		24	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR PHASE SIGNAL CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.
2. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F145	1	E153	4	Existed
	2		6	
	3		2	

3. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238. "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-947. "DTC Description"](#).

Is the DTC P34B1 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015. "Removal and Installation"](#).

NO >> INSPECTION END

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P34C4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34C4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600769

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34C4	A camshaft posi actuator control B1 ("A" camshaft position actuator control circuit driver current/temperature too high bank 1)	The electric intake valve timing (IVT) control module detects malfunction of the electric IVT control actuator internal temperature sensor.
		The electric IVT control module detects malfunction of the electric IVT control actuator internal temperature sensor.

POSSIBLE CAUSE

- Electric intake valve timing (IVT) control actuator (bank 1)
 - Internal temperature is too high.
 - Internal temperature sensor has malfunction.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC P34C4 detected?

- YES >> Proceed to [EC6-950, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600770

1. REPLACE ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR

Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

>> INSPECTION END

P34C5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

P34C5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013600771

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34C5	A camshaft posi actuator control B2 ("A" camshaft position actuator control circuit driver current/temperature too high bank 2)	The electric intake valve timing (IVT) control module detects malfunction of the electric IVT control actuator internal temperature sensor.
		The electric IVT control module detects malfunction of the electric IVT control actuator internal temperature sensor.

POSSIBLE CAUSE

- Electric intake valve timing (IVT) control actuator (bank 2)
 - Internal temperature is too high.
 - Internal temperature sensor has malfunction.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC P34C5 detected?

YES >> Proceed to [EC6-951, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600772

1. REPLACE ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR

Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

>> INSPECTION END

P34C8 ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

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P34C8 ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

DTC Description

INFOID:000000013600773

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34C8	Camshaft position control module (Camshaft position control module performance)	Internal CPU error is detected.

POSSIBLE CAUSE

Electric intake valve timing (IVT) control module

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">Stops feedback control of idle speed and controls with specified speed.Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON and wait at least 5 seconds.
- Check DTC.

Is DTC P34C8 detected?

- YES >> Proceed to [EC6-952, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013600774

1. REPLACE ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL MODULE

Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

P34C8 ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

>> INSPECTION END

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BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

BRAKE PEDAL POSITION SWITCH

Component Function Check

INFOID:000000013591884

1. CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
	Brake pedal	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (V)
Connector	+	-			
	Terminal	Terminal			
E152	192 (Brake pedal position switch signal)	204	Brake pedal	Slightly depressed	Approx. 0
			Brake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-954, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013591885

1. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

Brake pedal position switch		Ground	Voltage
Connector	Terminal		
E44	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Brake pedal position switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E44	1	E65	11F	Existed

BRAKE PEDAL POSITION SWITCH

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< DTC/CIRCUIT DIAGNOSIS >

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK FUSE

1. Disconnect 10A fuse (No. 12) from fuse block (J/B).

2. Check 10A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform trouble diagnosis for power supply circuit.

4.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

Brake pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E44	2	E152	192	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK BRAKE PEDAL POSITION SWITCH

Refer to [EC6-955. "Component Inspection \(Brake Pedal Position Switch\)"](#)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace brake pedal position switch. Refer to [BR-24. "Exploded View"](#).

6.CHECK INTERMITTENT INCIDENT

Refer to [GI-45. "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection (Brake Pedal Position Switch)

INFOID:000000013591886

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect brake pedal position harness connector.

3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly depressed Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

BRAKE PEDAL POSITION SWITCH

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2. CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to [BR-12. "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly de-pressed Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-24. "Exploded View"](#).

ASCD INDICATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ASCD INDICATOR

Component Function Check

INFOID:0000000013591887

1.CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	<ul style="list-style-type: none">Ignition switch: ON	<ul style="list-style-type: none">MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	<ul style="list-style-type: none">MAIN switch: ONWhen vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	<ul style="list-style-type: none">ASCD: Operating	ON
		<ul style="list-style-type: none">ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-957, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013591888

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

2.CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70, "CONSULT Function"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace combination meter. Refer to [MWI-141, "Removal and Installation"](#).

NO >> Repair or replace.

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COOLING FAN

Component Function Check

INFOID:000000013591889

1. CHECK COOLING FAN FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to [PCS-12. "Diagnosis Description"](#).
2. Make sure that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-958. "Diagnosis Procedure \(Cooling Fan Motor 1\)"](#) or [EC6-960. "Diagnosis Procedure \(Cooling Fan Motor 2\)"](#).

Diagnosis Procedure (Cooling Fan Motor 1)

INFOID:000000013591890

1. CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Voltage
Connector	Terminal		
E167	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2. CHECK COOLING FAN CONTROL MODULE 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Continuity
Connector	Terminal		
E167	1	Ground	Existed

3. 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 IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors.
2. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E120	7	Ground	Existed
E121	41		

COOLING FAN

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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 COOLING FAN CONTROL SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.

2. Check the continuity between IPDM E/R harness connector and cooling fan control module 1 harness connector.

IPDM E/R		Cooling fan control module 1		Continuity
Connector	Terminal	Connector	Terminal	
E126	93	E167	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK COOLING FAN CONTROL MODULE 1 OUTPUT SIGNAL CIRCUIT

1. Reconnect all harness connectors disconnected.

2. Disconnect cooling fan control module 1 harness connectors.

3. Turn ignition switch ON.

4. Check the voltage between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Voltage
Connector	Terminal		
E301	4	Ground	Battery voltage
E302	6		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module 1. Refer to [CO-44, "Exploded View"](#).

6.CHECK COOLING FAN MOTOR 1

Refer to [EC6-967, "Component Inspection \(Cooling Fan Motor\)"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace cooling fan motor 1. Refer to [CO-44, "Exploded View"](#).

7.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY-2

1. Turn ignition switch OFF.

2. Disconnect cooling fan relay 1.

3. Turn ignition switch ON.

4. Check the voltage between cooling fan relay 1 harness connector and ground.

Cooling fan relay 1		Ground	Voltage
Connector	Terminal		
E103	2	Ground	Battery voltage
	3		

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 8.

8.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-1

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1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	2	E121	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK FUSE

1. Disconnect 50 A fuse (No. T) from fuse and fusible link holder.
2. Check 50 A fuse for blown.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> Perform the trouble diagnosis for power supply circuit.

10.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	1	E121	27	Existed

4. Check the continuity between cooling fan relay 1 harness connector and cooling fan control module 1 harness connector.

Cooling fan relay 1		Cooling fan control module 1		Continuity
Connector	Terminal	Connector	Terminal	
E103	5	E167	3	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11.CHECK COOLING FAN RELAY 1

Refer to [EC6-967. "Component Inspection \(Cooling Fan Relay\)".](#)

Is the inspection result normal?

- YES >> GO TO 12.
NO >> Replace cooling fan relay 1.

12.CHECK INTERMITTENT INCIDENT

Perform [GI-45. "Intermittent Incident".](#)

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to [PCS-44. "Removal and Installation".](#)
NO >> Repair or replace error-detected parts.

Diagnosis Procedure (Cooling Fan Motor 2)

INFOID:0000000013591891

TURBO HIGH PRESSURE MODELS

COOLING FAN

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1. CHECK COOLING FAN CONTROL MODULE 2 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module 2 harness connector and ground.

Cooling fan control module 2		Ground	Voltage
Connector	Terminal		
E168	3	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> GO TO 7.

2. CHECK COOLING FAN CONTROL MODULE 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan control module 2 harness connector and ground.

Cooling fan control module 2		Ground	Continuity
Connector	Terminal		
E168	1	Ground	Existed

3. 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 IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors.
2. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E120	7	Ground	Existed
E121	41		

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 COOLING FAN CONTROL SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan control module 2 harness connector.

IPDM E/R		Cooling fan control module 2		Continuity
Connector	Terminal	Connector	Terminal	
E126	93	E168	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair or replace error-detected parts.

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COOLING FAN

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5. CHECK COOLING FAN CONTROL MODULE 2 OUTPUT SIGNAL CIRCUIT

1. Reconnect all harness connectors disconnected.
2. Disconnect cooling fan control module 2 harness connectors.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module 2 harness connector and ground.

Cooling fan control module 2		Ground	Voltage
Connector	Terminal		
E303	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module 2. Refer to [CO-44, "Exploded View"](#).

6. CHECK COOLING FAN MOTOR 2

Refer to [EC6-967, "Component Inspection \(Cooling Fan Motor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Replace cooling fan motor 2. Refer to [CO-44, "Exploded View"](#).

7. CHECK COOLING FAN CONTROL MODULE 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay 2.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relay 2 harness connector and ground.

Cooling fan relay 2		Ground	Voltage
Connector	Terminal		
E169	2	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 8.

8. CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay 1.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relay 1 harness connector and ground.

Cooling fan relay 1		Ground	Voltage
Connector	Terminal		
E103	2	Ground	Battery voltage
	3		

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 9.

9. CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

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Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	2	E121	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace error-detected parts.

10.CHECK FUSE

Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
Fusible link holder	#T	50A
	#U	50A

Is the fuse blown (open)?

YES >> Replace malfunctioning the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform the trouble diagnosis for power supply circuit.

11.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	1	E121	27	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

12.CHECK COOLING FAN CONTROL MODULE 2 POWER SUPPLY CIRCUIT-1

1. Check the continuity between cooling fan relay 1 harness connector and cooling fan relay 2 harness connector.

Cooling fan relay 1		Cooling fan relay 2		Continuity
Connector	Terminal	Connector	Terminal	
E103	5	E169	2	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace error-detected parts.

13.CHECK COOLING FAN RELAY 1

Refer to [EC6-967, "Component Inspection \(Cooling Fan Relay\)".](#)

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace cooling fan relay 1.

14.CHECK INTERMITTENT INCIDENT

Perform [GI-45, "Intermittent Incident".](#)

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Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).

NO >> GO TO 15.

15.CHECK COOLING FAN CONTROL MODULE 2 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 2		Cooling fan control module 2		Continuity
Connector	Terminal	Connector	Terminal	
E169	3	E168	3	Existed

3. Check the continuity between cooling fan relay 2 harness connector and ground.

Cooling fan relay 2		—	Continuity
Connector	Terminal		
E169	1	Ground	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace error-detected parts.

16.CHECK COOLING FAN RELAY 2

Refer to [EC6-967, "Component Inspection \(Cooling Fan Relay\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Replace cooling fan relay 2.

TURBO LOW PRESSURE MODELS

1.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Voltage
Connector	Terminal		
E167	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Continuity
Connector	Terminal		
E167	1	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

COOLING FAN

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

3.CHECK IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors.
2. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E120	7	Ground	Existed
E121	41		

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 COOLING FAN CONTROL SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan control module 1 harness connector.

IPDM E/R		Cooling fan control module 1		Continuity
Connector	Terminal	Connector	Terminal	
E126	93	E167	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK COOLING FAN CONTROL MODULE 1 OUTPUT SIGNAL CIRCUIT

1. Reconnect all harness connectors disconnected.
2. Disconnect cooling fan control module 1 harness connectors.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Voltage
Connector	Terminal		
E302	6	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module 1. Refer to [CO-44, "Exploded View"](#).

6.CHECK COOLING FAN MOTOR 2

Refer to [EC6-967, "Component Inspection \(Cooling Fan Motor\)"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace cooling fan motor 2. Refer to [CO-44, "Exploded View"](#).

7.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay 1.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relay 1 harness connector and ground.

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Cooling fan relay 1		Ground	Voltage
Connector	Terminal		
E103	2	Ground	Battery voltage
	3		

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> GO TO 8.

8. CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	2	E121	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9. CHECK FUSE

1. Disconnect 50 A fuse (No. T) from fuse and fusible link holder.
2. Check 50 A fuse for blown.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
- NO >> Perform the trouble diagnosis for power supply circuit.

10. CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	1	E121	27	Existed

4. Check the continuity between cooling fan relay 1 harness connector and cooling fan control module 1 harness connector.

Cooling fan relay 1		Cooling fan control module 1		Continuity
Connector	Terminal	Connector	Terminal	
E103	5	E167	3	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> Repair or replace error-detected parts.

11. CHECK COOLING FAN RELAY 1

Refer to [EC6-967, "Component Inspection \(Cooling Fan Relay\)"](#).

Is the inspection result normal?

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- YES >> GO TO 12.
- NO >> Replace cooling fan relay 1.

12.CHECK INTERMITTENT INCIDENT

Perform [GI-45. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to [PCS-44. "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Cooling Fan Motor)

INFOID:0000000013591892

VR30DDTT TURBO HIGH PRESSURE MODELS

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module harness connectors.
3. Supply cooling fan control module terminals with battery voltage and check operation.

Cooling fan control module				Operation
Motor	Connector	Terminal		
		+	-	
1	E301	4	5	Cooling fan operates.
2	E303			

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning cooling fan motor. Refer to [CO-44. "Exploded View"](#).

VR30DDTT TURBO LOW PRESSURE MODELS

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module harness connectors.
3. Supply cooling fan control module terminals with battery voltage and check operation.

Cooling fan control module				Operation
Motor	Connector	Terminal		
		+	-	
1	E301	4	5	Cooling fan operates.
2	E302	6	7	

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning cooling fan motor. Refer to [CO-44. "Exploded View"](#).

Component Inspection (Cooling Fan Relay)

INFOID:0000000013591893

1.CHECK COOLING FAN RELAY

1. Turn ignition switch OFF.
2. Remove cooling fan relay.

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COOLING FAN

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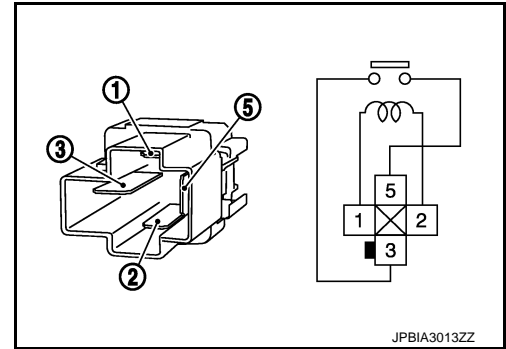
3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 malfunctioning cooling fan relay.



ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ELECTRICAL LOAD SIGNAL

Description

INFOID:000000013591894

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

EC6

Component Function Check

INFOID:000000013591895

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT and select "DATA MONITOR" mode.
3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to [EC6-969, "Diagnosis Procedure"](#).

2. CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to [EC6-969, "Diagnosis Procedure"](#).

3. CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Monitor item	Condition	Indication	
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-969, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013591896

1. INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to [EC6-969, "Component Function Check"](#).

Which circuit is related to the incident?

Rear window defogger>>GO TO 2.

Headlamp>>GO TO 3.

Heater fan>>GO TO 4.

2. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [DEF-23, "Work Flow"](#).

ELECTRICAL LOAD SIGNAL

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>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to [EXL-125, "Work Flow"](#).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to [HAC-70, "Work Flow"](#).

>> INSPECTION END

FUEL INJECTOR

Component Function Check

INFOID:000000013591897

1.INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

- YES >> GO TO 2.
- NO >> Proceed to [EC6-971, "Diagnosis Procedure"](#).

2.CHECK FUEL INJECTOR FUNCTION

With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

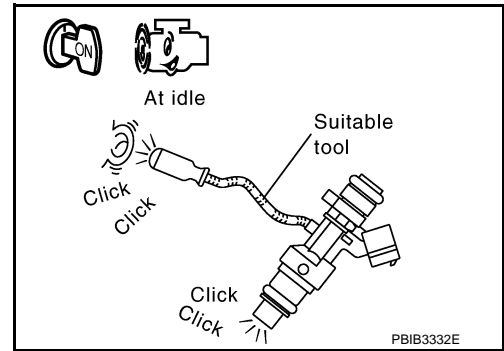
Without CONSULT

1. Start engine.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to [EC6-971, "Diagnosis Procedure"](#).



Diagnosis Procedure

INFOID:000000013591898

1.CHECK FUEL INJECTOR DRIVER 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 and ground.

+		-	Voltage
ECM			
Connector	Terminal		
F143	3	Ground	Battery voltage
	4		
	5		
	6		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blowing.

A
EC6
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FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

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Location	Fuse No.	Capacity
fuse and fusible link holder - 3	#80	15A
	#81	15A

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> GO TO 3.

3. CHECK FUEL INJECTOR DRIVER POWER SUPPLY CIRCUIT

1. Disconnect fuel injector relay harness connector.
2. Check the continuity between ECM harness connector and fuel injector relay harness connector.

+		-		Continuity
ECM		Fuel injector relay		
Connector	Terminal	Connector	Terminal	
F143	3	E150	5	Existed
	5		7	
	4			
	6			

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts

4. CHECK FUEL INJECTOR RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between fuel injector relay harness connector and ground.

+		-	Voltage
Fuel injector relay			
Connector	Terminal		
E150	3	Ground	Battery voltage
	6		

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform the trouble diagnosis for power supply circuit.

5. CHECK FUEL INJECTOR RELAY POWER SUPPLY (EXCITATION COIL SIDE)

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between fuel injector relay harness connector and ground.

+		-	Voltage
Fuel injector relay			
Connector	Terminal		
E150	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. CHECK FUEL INJECTOR RELAY POWER SUPPLY CIRCUIT (EXCITATION COIL SIDE)

1. Turn ignition switch OFF.

FUEL INJECTOR

[VR30DDTT FOR USA AND CANADA]

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2. Disconnect fuel injector relay harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and fuel injector harness connector.

+		-		Continuity
IPDM E/R		Fuel injector relay		
Connector	Terminal	Connector	Terminal	
E123	59	E150	1	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 FUEL INJECTOR RELAY GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector relay harness connector.
3. Check the continuity between fuel injector relay harness connector and ground.

+		-	Continuity
Fuel injector relay			
Connector	Terminal		
E150	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 8.
 NO >> Repair or replace error-detected parts.

8.CHECK FUEL INJECTOR RELAY

Check the fuel injector relay. Refer to [EC6-975, "Component Inspection \(Fuel Injector Relay\)".](#)

Is the inspection result normal?

- YES >> GO TO 9.
 NO >> Replace fuel injector relay. Refer to [PG-10, "VR30DDTT : Standardized Relay".](#)

9.CHECK FUEL INJECTOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F205	1	Ground	Battery voltage
2	F206	1		
3	F207	1		
4	F208	1		
5	F209	1		
6	F210	1		

Is the inspection result normal?

- YES >> GO TO 11.
 NO >> GO TO 10.

10.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F205	1	F143	11	Existed
2	F206	1		15	
3	F207	1		12	
4	F208	1		16	
5	F209	1		13	
6	F210	1		19	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

11. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F205	2	F143	17	Existed
2	F206	2		20	
3	F207	2		14	
4	F208	2		21	
5	F209	2		18	
6	F210	2		22	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

12. CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC6-974, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Replace malfunctioning fuel injector. Refer to [EM-182, "Removal and Installation"](#).

Component Inspection (Fuel Injector)

INFOID:0000000013591899

1. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance (Ω)
1 and 2	11.1 - 14.3 [at 10 - 60°C (60 - 140°F)]

Is the inspection result normal?

FUEL INJECTOR

[VR30DDTT FOR USA AND CANADA]

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YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to [EM-182, "Exploded View"](#).

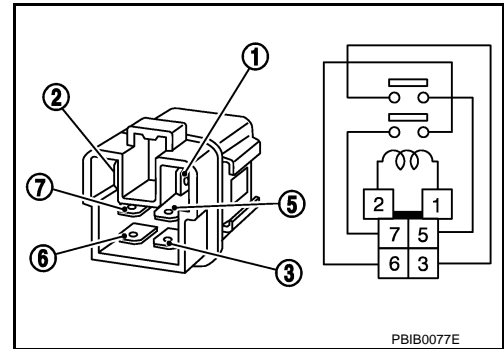
Component Inspection (Fuel Injector Relay)

INFOID:000000013930435

1. CHECK FUEL INJECTOR RELAY

1. Turn ignition switch OFF.
2. Remove fuel injector relay.
3. Check the continuity between fuel heater relay terminals as per the following conditions.

Fuel injector relay		Conditions	Continuity
+	-		
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed
6	7	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 fuel injector relay.

A
EC6
C
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FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

FUEL PUMP

Component Function Check

INFOID:000000013591900

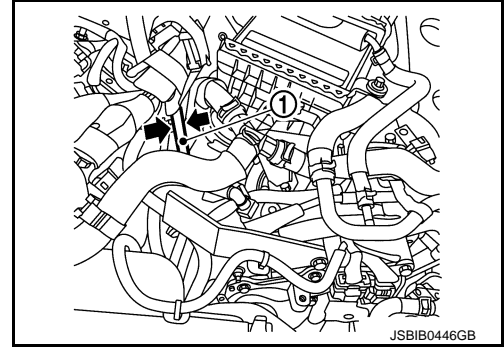
1. CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose ① with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> [EC6-976, "Diagnosis Procedure"](#).



Diagnosis Procedure

INFOID:000000013591901

1. CHECK FUEL PUMP CONTROL MODULE POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect Fuel pump control module harness connector.
3. Turn ignition switch ON.
4. Check the voltage between Fuel pump control module harness connector and ground.

Fuel pump control module		Ground	Voltage
Connector	Terminal		
B11	6	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> GO TO 2.

2. CHECK FUEL PUMP CONTROL MODULE POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and Fuel pump control module harness connector.

IPDM E/R		Fuel pump control module		Continuity
Connector	Terminal	Connector	Terminal	
E120	15	B11	6	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace error-detected parts.

3. CHECK FUSE

1. Disconnect 15 A fuse (No. 52) from IPDM E/R.
2. Check 15 A fuse.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Replace 15 A fuse.

4. CHECK INTERMITTENT INCIDENT

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

5.CHECK FUEL PUMP CONTROL MODULE GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between Fuel pump control module harness connector and ground.

Fuel pump control module		Ground	Continuity
Connector	Terminal		
B11	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK FUEL PUMP CONTROL MODULE INPUT AND OUTPUT CIRCUITS FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between Fuel pump control module harness connector and ECM harness connector.

Fuel pump control module		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B11	4	E152	182	Existed
	5		188	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK FUEL PUMP CONTROL CIRCUIT FOR OPEN AND SHORT

1. Disconnect "fuel level sensor unit" harness connector.
2. Check the continuity between Fuel pump control module harness connector and "fuel level sensor unit" harness connector.

Fuel pump control module		Fuel level sensor unit		Continuity
Connector	Terminal	Connector	Terminal	
B11	1	B101	5	Existed
	2		6	

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK FUEL PUMP

Check fuel pump. Refer to [EC6-978, "Component Inspection \(Fuel Pump\)"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace fuel pump. Refer to [FL-9, "Exploded View"](#).

9.CHECK FUEL PUMP CONTROL MODULE

Check fuel pump control module. Refer to [EC6-978, "Component Inspection \(Fuel Pump Control Module\)"](#).

Is the inspection result normal?

FUEL PUMP

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- YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).
NO >> Replace fuel pump. Refer to [FL-9, "Exploded View"](#).

Component Inspection (Fuel Pump)

INFOID:0000000013591902

1. CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Check resistance between "fuel level sensor unit and fuel pump" terminals as follows.

Terminals	Resistance (Ω)
5 and 6	0.2 - 5.0 [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace "fuel level sensor unit and fuel pump". Refer to [FL-9, "Exploded View"](#).

Component Inspection (Fuel Pump Control Module)

INFOID:0000000013591903

1. CHECK FUEL PUMP CONTROL MODULE

1. Check the voltage between Fuel pump control module terminals under the following conditions.

FUEL PUMP CONTROL MODULE			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
B11	1	2	For 1 second after turning ignition switch ON	Approx. 9.9 V
			More than 1 second after turning ignition switch ON	Approx. 0 V
			Idle speed	Approx. 9.9 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace Fuel pump control module. Refer to [EC6-1016, "Removal and Installation"](#).

HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

HIGH PRESSURE FUEL PUMP

Component Function Check

INFOID:0000000013663714

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
FUEL PRES SEN V	Engine speed: Idle	730 – 1,000 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,000 – 2,900 mV

Without CONSULT

1. Start engine.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

Connector	ECM		Condition	Voltage
	+	-		
Terminal				
F137	53	83	Engine speed: idle	0.73 – 1.0 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Proceed to [EC6-979, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013663715

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #82 fuse (10A) and check that the fuse is not blown (open).

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Replace the fuse or fusible link after repairing the applicable circuit.

2. CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (COIL SIDE)-1

1. Reinsert the fuse.
2. Remove high pressure fuel pump relay.
3. Turn ignition switch ON.
4. Check the voltage between high pressure fuel pump relay harness connector and ground.

+		-	Voltage
High pressure fuel pump relay	Terminal		
Connector	Terminal		
E149	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> GO TO 3.

3. CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (COIL SIDE)-1

Check the voltage between IPDM E/R harness connector and ground.

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HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

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+		-	Voltage
IPDM E/R			
Connector	Terminal		
E123	59	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Check ECM power supply. Refer to [EC6-302. "ECM : Diagnosis Procedure"](#).

4. CHECK HIGH PRESSURE FUEL PUMP RELAY 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 high pressure fuel pump relay harness connector.

IPDM E/R		High pressure fuel pump relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E149	1	Existed

4. Check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45. "Intermittent Incident"](#).

NO >> Repair or replace error-detected parts.

5. CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (CONTACTOR SIDE)

Check the voltage between high pressure fuel pump relay harness connector and ground.

+		-	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E149	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform diagnosis for power supply circuit.

6. CHECK HIGH PRESSURE FUEL PUMP RELAY GROUND CIRCUIT

Check the continuity between high pressure fuel pump relay harness connector and ground.

High pressure fuel pump relay		-	Continuity
Connector	Terminal		
E149	2	Ground	Existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK HIGH PRESSURE FUEL PUMP RELAY

Check the high pressure fuel pump relay. Refer to [EC6-982. "Component Inspection \(High Pressure Fuel Pump Relay\)"](#).

Is inspection result normal?

YES >> GO TO 8.

NO >> Replace high pressure fuel pump relay.

8. CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY CIRCUIT

HIGH PRESSURE FUEL PUMP

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and high pressure fuel pump relay harness connector.

ECM		High pressure fuel pump relay		Continuity
Connector	Terminal	Connector	Terminal	
F143	1	E149	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts

9.CHECK HIGH PRESSURE FUEL PUMP

Check the high pressure fuel pump. Refer to [EC6-981. "Component Inspection \(High Pressure Fuel Pump\)".](#)

Is inspection result normal?

YES >> GO TO 10.

NO >> Replace high pressure fuel pump. Refer to [EM-178. "Removal and Installation".](#)

10.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

1. Check the continuity between ECM harness connector and high pressure fuel pump harness connector.

ECM		High pressure fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
F143	9	F120	2	Existed
	10		1	

2. Also check harness for short to ground and short to power.

Is inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace error-detected parts.

11.CHECK HIGH PRESSURE FUEL PUMP INSTALLATION CONDITION

Check that the high pressure fuel pump is installed with no backlash and looseness.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

12.CHECK CAMSHAFT

1. Remove camshaft. Refer to [EM-251. "Removal and Installation".](#)
2. Check camshaft. Refer to [EM-255. "Inspection".](#)

Is inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45. "Intermittent Incident".](#)

NO >> Replace camshaft. Refer to [EM-251. "Removal and Installation".](#)

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000013663718

1.CHECK HIGH PRESSURE FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

HIGH PRESSURE FUEL PUMP

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+	-	Condition		Resistance
High pressure fuel pump				
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 – 86)	0.47 – 0.53 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to [EM-178. "Removal and Installation"](#).

Component Inspection (High Pressure Fuel Pump Relay)

INFOID:000000013663717

1. CHECK HIGH PRESSURE FUEL PUMP RELAY

1. Turn ignition switch OFF.
2. Remove high pressure fuel pump relay.
3. Check the continuity between high pressure fuel pump relay terminals as per the following conditions.

+	-	Conditions	Continuity
High pressure fuel pump relay			
Terminal			
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 high pressure fuel pump relay.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

IGNITION SIGNAL

Component Function Check

INFOID:000000013610738

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

No >> Proceed to [EC6-983, "Diagnosis Procedure"](#).

2.CHECK IGNITION SIGNAL FUNCTION

With CONSULT

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

2. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-983, "Diagnosis Procedure"](#).

3.CHECK IGNITION SIGNAL FUNCTION

Without CONSULT

1. Let engine idle.

2. Read the voltage signal between ECM harness connector terminals under the following conditions with an oscilloscope.

ECM				Voltage signal
+		-		
Connector	Terminal	Connector	Terminal	
F142	153	E152	204	<p>50mSec/div 2V/div JMBIA0035GB</p>
	154			
	161			
	162			
	164			
	168			

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-983, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013610739

1.CHECK IGNITION COIL POWER SUPPLY-1

1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.

2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Voltage
Connector	+	-	
	Terminal	Terminal	
E152	185	204	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NO >> Proceed to [EC6-302. "ECM : Diagnosis Procedure"](#).

2.CHECK IGNITION COIL POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F85	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E123	55	F85	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Proceed to [GI-45. "Intermittent Incident"](#).

NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal		
F85	2	Ground	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 CONDENSER

Refer to [EC6-987. "Component Inspection \(Condenser\)"](#)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace condenser.

6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-3

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

IGNITION SIGNAL

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Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F111	3	Ground	Battery voltage
2	F112	3		
3	F113	3		
4	F114	3		
5	F115	3		
6	F116	3		

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform the trouble diagnosis for power supply circuit.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F111	2	Ground	Existed
2	F112	2		
3	F113	2		
4	F114	2		
5	F115	2		
6	F116	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ignition coil harness connector and ECM harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F111	1	F142	161	Existed
2	F112	1		164	
3	F113	1		153	
4	F114	1		162	
5	F115	1		168	
6	F116	1		154	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC6-986. "Component Inspection \(Ignition Coil with Power Transistor\)".](#)

Is the inspection result normal?

IGNITION SIGNAL

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[VR30DDTT FOR USA AND CANADA]

- YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).
NO >> Replace malfunctioning ignition coil with power transistor. Refer to [EM-193, "Exploded View"](#).

Component Inspection (Ignition Coil with Power Transistor)

INFOID:000000013610740

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.

Terminals	Resistance (Ω) [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor. Refer to [EM-193, "Exploded View"](#).

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

- For the fuse number, refer to [EC6-224, "Wiring Diagram"](#).
- For the fuse arrangement, refer to [PG-203, "Fuse, Connector and Terminal Arrangement"](#).
- Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

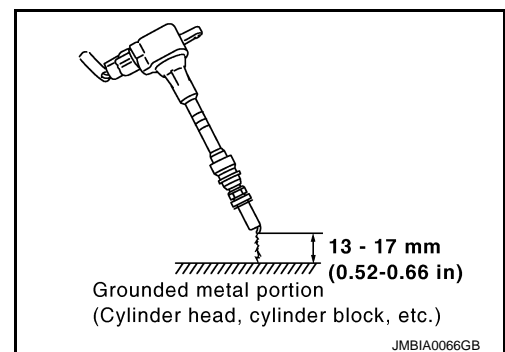
- **Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.**

NOTE:

When the gap is less than 13 mm (0.52 in), 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-193, "Exploded View"](#).



IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Component Inspection (Condenser)

INFOID:000000013610741

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as per the following.

Terminals	Resistance (MΩ)
1 and 2	Above 1 [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace condenser.

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MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

MALFUNCTION INDICATOR LAMP

Component Function Check

INFOID:000000013591908

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Make sure that MIL illuminates.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC6-988. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013591909

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC UXXXX.

2.CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70. "CONSULT Function"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to [GI-45. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace combination meter. Refer to [MWI-141. "Removal and Installation"](#).
NO >> Repair or replace.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Component Function Check

INFOID:000000013591910

1.CHECK ORVR FUNCTION

Check whether the following symptoms are present.

- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Are any symptoms present?

- YES >> Proceed to [EC6-989, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000013591911

1.INSPECTION START

Check whether the following symptoms are present.

- A: Fuel odor from EVAP canister is strong.
B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

- A >> GO TO 2.
B >> GO TO 7.

2.CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 4.

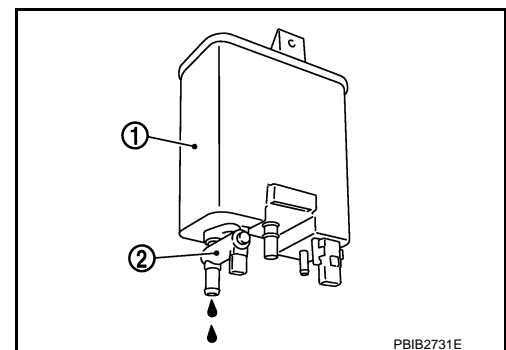
3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister ①.

② : EVAP canister vent control valve

Does water drain from the EVAP canister?

- YES >> GO TO 4.
NO >> GO TO 6.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

6.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC6-991, "Component Inspection"](#).

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ON BOARD REFUELING VAPOR RECOVERY (ORVR)

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to [FL-15. "Exploded View"](#).

7. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 9.

8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

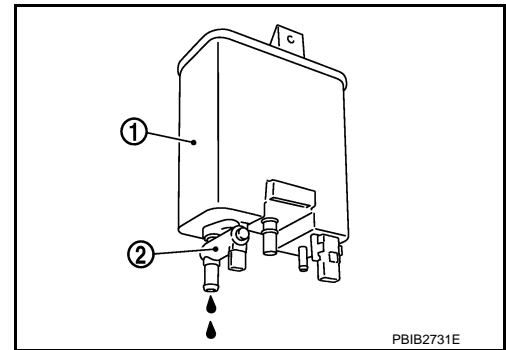
Check if water will drain from EVAP canister ①.

② : EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 9.

NO >> GO TO 11.



9. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

11. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kinks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace hoses and tubes.

12. CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace filler neck tube.

13. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC6-991. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to [FL-15. "Exploded View"](#).

14. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel filler tube. Refer to [FL-15, "Exploded View"](#).

15.CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace one-way fuel valve with fuel tank. Refer to [FL-15, "Exploded View"](#).

16.CHECK ONE-WAY FUEL VALVE-II

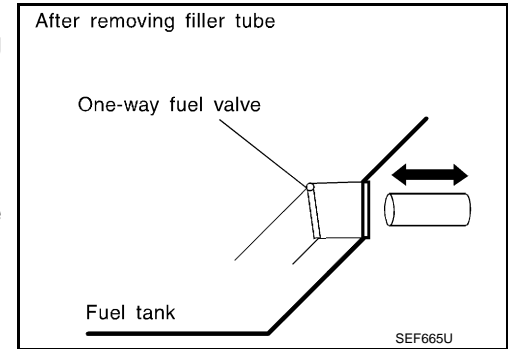
1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
When a stick is inserted, the valve should open, when removing stick it should close.

Do not drop any material into the tank.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank. Refer to [FL-15, "Exploded View"](#).



INFOID:0000000013591912

Component Inspection

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK REFUELING EVAP VAPOR CUT VALVE

Ⓜ **With CONSULT**

1. Turn ignition switch OFF.
2. Remove fuel tank. Refer to [FL-15, "Removal and Installation"](#).
3. Drain fuel from the tank as follows:
 - Remove fuel feed hose located on the fuel gauge retainer.
 - Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT.
4. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
5. Check refueling EVAP vapor cut valve for being stuck to open as follows.
 - Connect vacuum pump to hose end.
 - Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

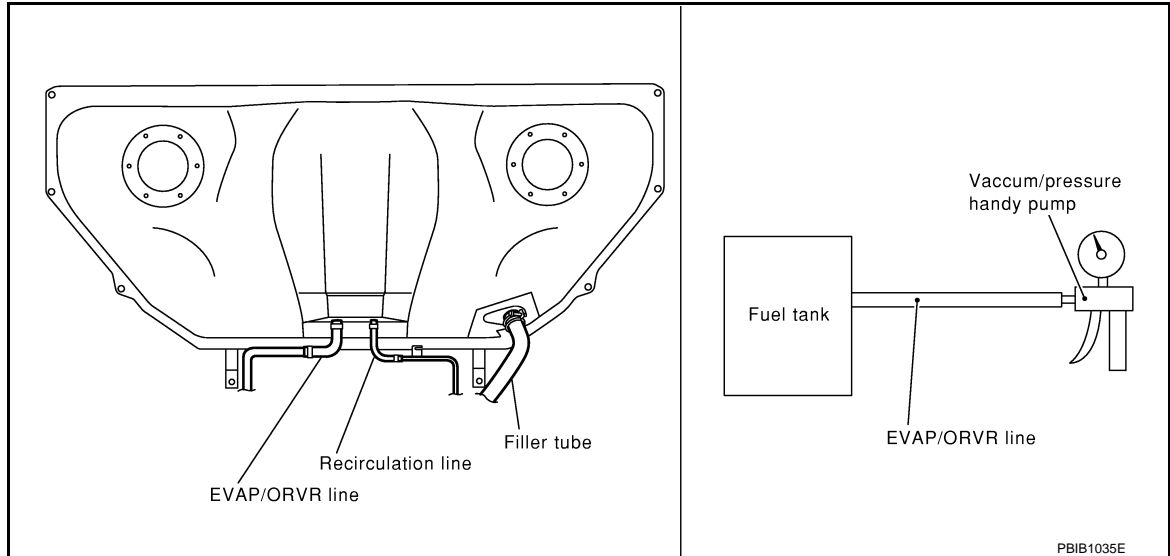
 - Turn fuel tank upside down.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

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- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



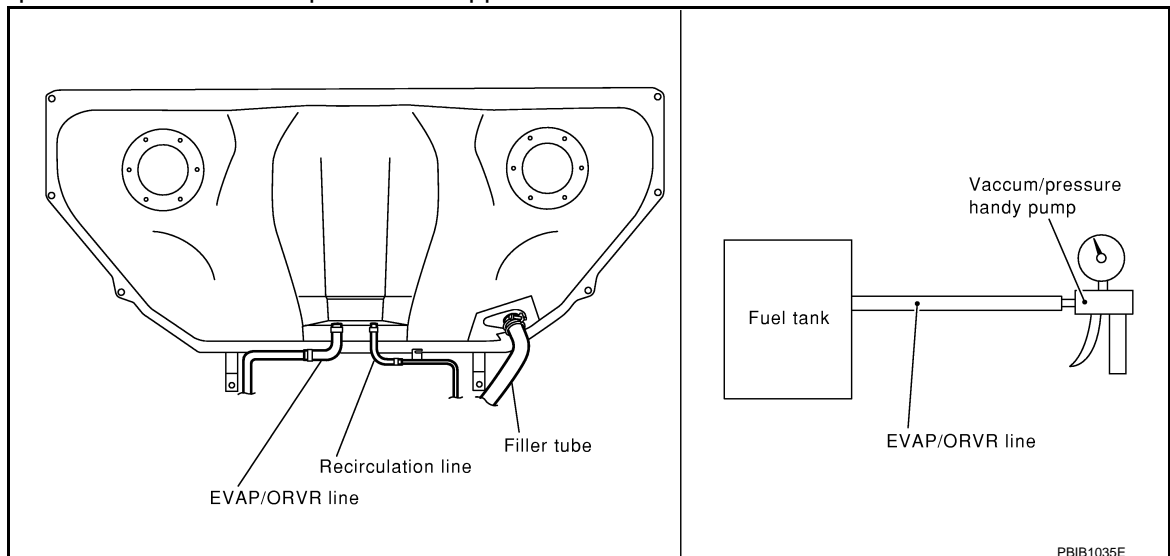
Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

3. CHECK REFUELING EVAP VAPOR CUT VALVE

⊗ Without CONSULT

1. Turn ignition switch OFF.
 2. Remove fuel tank. Refer to [FL-15. "Removal and Installation"](#).
 3. Drain fuel from the tank as follows:
 - Remove fuel gauge retainer.
 - Drain fuel from the tank using a handy pump into a fuel container.
 4. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
 5. Check refueling EVAP vapor cut valve for being stuck to open as follows.
 - Connect vacuum pump to hose end.
 - Remove fuel gauge retainer with fuel gauge unit.
- Always replace O-ring with new one.**
- Turn fuel tank upside down.
 - Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



ON BOARD REFUELING VAPOR RECOVERY (ORVR)

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to [FL-15. "Exploded View"](#).

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SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

SENSOR POWER SUPPLY 2 CIRCUIT

TURBO HIGH PRESSURE MODEL

TURBO HIGH PRESSURE MODEL : Description

INFOID:0000000013591913

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor (bank 2)
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

Sensor power supply 3

- Turbocharger speed sensor (bank 1)
- Turbocharger speed sensor (bank 2)
- EVAP control system pressure sensor

TURBO LOW PRESSURE MODEL

TURBO LOW PRESSURE MODEL : Description

INFOID:0000000013924207

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor (bank 2)

SENSOR POWER SUPPLY 2 CIRCUIT

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

Sensor power supply 3

EVAP control system pressure sensor

Diagnosis Procedure

INFOID:000000013591914

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	Ground	5 V
M124*1	10		
M126*2	6		

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	Existed
M124*1	10	E152	194	
M126*2	6			

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

1. Disconnect following sensors harness connector.
2. Check harness for short to power and short to ground, between the following terminals.

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SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F142	105	Throttle position sensor (bank 2)	F119	5
F143	76	Mass air flow sensor (bank 2)	F98	2
	80	Engine oil pressure sensor	E42	3
		Fuel rail pressure sensor	F137	3
	81	Battery current sensor	E7	4
85	Intake camshaft position sensor (bank 2)	F97	1	
E152	194	Accelerator pedal position sensor 2	M124*1	10
			M126*2	6

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.

- Throttle position sensor (bank 2) (Refer to [EC6-417, "Component Inspection \(Throttle Position Sensor\)".](#))
- Mass air flow sensor (bank 2) (Refer to [EC6-383, "Component Inspection \(Mass Air Flow Sensor\)".](#))
- Engine oil pressure sensor (Refer to [EC6-603, "Component Inspection".](#))
- Fuel rail pressure sensor (Refer to [EC6-480, "Component Inspection \(Fuel Rail Pressure Sensor\)".](#))
- Battery current sensor (Refer to [EC6-754, "Component Inspection".](#))
- Intake camshaft position sensor (bank 2) (Refer to [EC6-533, "Component Inspection".](#))
- Accelerator pedal position sensor 2 (Refer to [EC6-826, "Component Inspection \(Accelerator Pedal Position Sensor\)".](#))

Is the inspection result normal?

YES >> Perform [GI-45, "Intermittent Incident".](#)

NO >> Replace malfunctioning component.

SENSOR POWER SUPPLY 3 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

SENSOR POWER SUPPLY 3 CIRCUIT

TURBO HIGH PRESSURE MODEL

TURBO HIGH PRESSURE MODEL : Description

INFOID:0000000013591915

A

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

EC6

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor (bank 2)
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

Sensor power supply 3

- Turbocharger speed sensor (bank 1)
- Turbocharger speed sensor (bank 2)
- EVAP control system pressure sensor

TURBO HIGH PRESSURE MODEL : Diagnosis Procedure

INFOID:0000000013591916

1. CHECK SENSOR POWER SUPPLY 3 CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect following sensors harness connector.
3. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F142	109	Turbocharger speed sensor (bank 1)	F141	1
	108	Turbocharger speed sensor (bank 2)	F140	
E152	177	EVAP control system pressure sensor	B108	3

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair short to ground or short to power in harness or connectors.

2. CHECK COMPONENTS

Check the following.

- Turbocharger speed sensor (bank 1) (Refer to [EC6-859, "Component Inspection \(Turbocharger Speed Sensor\)"](#).)

SENSOR POWER SUPPLY 3 CIRCUIT

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

- Turbocharger speed sensor (bank 2) (Refer to [EC6-859. "Component Inspection \(Turbocharger Speed Sensor\)."](#))
- EVAP control system pressure sensor (Refer to [EC6-572. "Component Inspection."](#))

Is the inspection result normal?

YES >> Perform [GI-45. "Intermittent Incident."](#)

NO >> Replace malfunctioning component.

TURBO LOW PRESSURE MODEL

TURBO LOW PRESSURE MODEL : Description

INFOID:0000000013924208

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor (bank 2)
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

Sensor power supply 3

EVAP control system pressure sensor

TURBO LOW PRESSURE MODEL : Diagnosis Procedure

INFOID:0000000013924209

1. CHECK SENSOR POWER SUPPLY 3 CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect following sensors harness connector.
3. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E152	177	EVAP control system pressure sensor	B108	3

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair short to ground or short to power in harness or connectors.

2. CHECK COMPONENTS

Check the following.

EVAP control system pressure sensor (Refer to [EC6-572. "Component Inspection."](#))

SENSOR POWER SUPPLY 3 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

Is the inspection result normal?

YES >> Perform [GI-45, "Intermittent Incident"](#).

NO >> Replace malfunctioning component.

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REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:000000013591917

1. CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector terminals as per the following.

ECM				Voltage (V)
+		-		
Connector	Terminal	Connector	Terminal	
F143	70 (Refrigerant pressure sensor signal)	F142	97	1.0 - 4.0

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC6-1000, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013591918

1. CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Turn ignition switch OFF.
3. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage (V)
Connector	Terminal		
E162	3	Ground	Approx. 5

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E162	3	F143	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

REFRIGERANT PRESSURE SENSOR

[VR30DDTT FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

YES >> Check sensor power supply 2 circuit. Refer to [EC6-995. "Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E162	1	F142	97	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E162	2	F143	70	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK INTERMITTENT INCIDENT

Refer to [GI-45. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to [HA-38. "Exploded View"](#).

NO >> Repair or replace error-detected parts.

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000013591919

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Low pressure fuel pump circuit	1	1	2	3	2		2	2			3		2	EC6-976
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC6-279
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC6-971
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC6-88
	FRP sensor circuit	1	1	2	2	2		2	2			2			EC6-477
	High pressure fuel pump circuit			4		3									EC6-361
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC6-1013
	Incorrect idle speed adjustment						1	1	1	1		1			EC6-262
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC6-675, EC6-680
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC6-262
	Ignition circuit	1	1	2	2	2		2	2			2			EC6-983
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC6-302

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Mass air flow sensor circuit	1			2										EC6-379 , EC6-386
Engine coolant temperature sensor circuit							3			3				
Air fuel ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC6-423 , EC6-427 , EC6-430 , EC6-809
Throttle position sensor circuit						2			2					EC6-414 , EC6-492 , EC6-671 , EC6-673 , EC6-682
Accelerator pedal position sensor circuit			3	2	1									EC6-824 , EC6-827 , EC6-830
Heated oxygen sensor 2 circuit			6		6		6	6			5			EC6-523
Knock sensor circuit			2								3			EC6-523
Engine oil temperature sensor circuit			4		2						3			EC6-485 , EC6-489
Engine oil pressure sensor circuit			4		4	3	3	3			3			EC6-604
Crankshaft position sensor circuit	2	2												EC6-526
Intake camshaft position sensor circuit			3		2	3								EC6-645 , EC6-648
Exhaust valve timing control position sensor circuit	2	2			3		3	3						EC6-535 , EC6-538
Turbocharger boost sensor circuit			3		3									EC6-530
Manifold absolute pressure sensor circuit					2									EC6-530
Vehicle speed signal circuit		2	3		3						3			EC6-592
ECM	2	2	3	3	3	3	3	3	3	3	3			EC6-621 , EC6-623 , EC6-625 , EC6-626 , EC6-628 , EC6-629 , EC6-630 , EC6-632

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Electric intake valve timing control module circuit			3		3	3								EC6-305 , EC6-310 , EC6-312 , EC6-314
Electric intake valve timing control actuator circuit					3									EC6-913 , EC6-916 , EC6-918 , EC6-921 , EC6-925 , EC6-928 , EC6-930 , EC6-933 , EC6-937 , EC6-940 , EC6-944 , EC6-947
Exhaust valve timing control solenoid valve circuit	2	2	2		2		2	2						EC6-322 , EC6-351
PNP signal circuit			3		3		3	3			3			EC6-642
Refrigerant pressure sensor circuit		2				3			3		4			EC6-1000
Electric wastegate control actuator circuit					1									EC6-847
Battery current sensor circuit						4	5	5					3	EC6-752 , EC6-755 , EC6-759 , EC6-762
Electrical load signal circuit							3							EC6-969
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-70
ABS actuator and electric unit (control unit)			4											BRC-87

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-17
	Fuel piping			5	5	5		5	5	5					
	Vapor lock														—
	Valve deposit														—
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5				5		—
Air	Air duct		5												EM-166
	Air cleaner														EM-159
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)			5	5		5		5	5			5		EM-166
	Electric throttle control actuator	5			5		5			5					EM-167
	Air leakage from intake manifold/Collector/Gasket														
Cranking	Battery		1												PG-245
	Generator circuit	1		1					1	1					CHG-41, CHG-45
	Starter circuit	3											1		STR-36, STR-39
	Signal plate	6													EM-200
	PNP signal circuit	4													TM-176
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-267
	Cylinder head gasket										4		3		
	Cylinder block														
	Piston												4		
	Piston ring														
	Connecting rod	6	6	6	6	6		6	6			6		EM-279	
	Bearing														
Crankshaft															

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain														EM-248
	Camshaft														EM-255
	Intake valve timing control														EC6-90
	Exhaust valve timing control	5	5	5	5	5		5	5			5			EC6-91
	Intake valve												3		EM-267
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-226 , EX-5
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			EM-189 , EM-190 , EM-217 , EM-221 , LU-31 , LU-40
	Oil level (Low)/Filthy oil														LU-27
	Variable displacement oil pump	5	5		4							4			EC6-604
Cooling	Radiator/Hose/Radiator filler cap														CO-39 , CO-65
	Water pump														CO-47
	Water gallery											5			CO-26
	Cooling fan	5	5	5	5	5		5	5		4				CO-44
	Coolant level (Low)/Contaminated coolant										5				CO-33
	Multi-way control valve												4		EC6-899 , EC6-902 , EC6-905
IVIS (INFINITI Vehicle Immobilizer System — NATS)		1	1												SEC-92

1 - 6: The numbers refer to the order of inspection.

INFINITI DRIVE MODE SELECTOR

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

INFINITI DRIVE MODE SELECTOR

Symptom Table

INFOID:000000013591920

SYSTEM - DRIVE MODE SELECTOR -

A

EC6

Malfunction	Check item		Probable malfunctioning part/Action
ECO pedal reaction force is not generated when in ECO mode.	Only ECO pedal reaction force is not generated. [Intelligent pedal (distance control assist) operates normally.]	The central switch of the navigation system operates normally.	Perform self-diagnosis of the engine control system. Refer to EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index" (For turbo high pressure model) or EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index" (For turbo low pressure model).
		The central switch of the navigation system malfunctions.	Perform self-diagnosis of the navigation system. Refer to AV-397, "Symptom Table" .
	Intelligent pedal (distance control assist) reaction force is not generated as well.		Perform self-diagnosis of the ADAS control unit, ICC sensor, and Accelerator pedal actuator. <ul style="list-style-type: none"> • ADAS C/U: Refer to CCS-67, "DTC Index". • ICC SENSOR: Refer to CCS-71, "DTC Index". • ACCELERATOR PEDAL ACTUATOR: Refer to DAS-345, "DTC Index".
When in ECO mode, settings of ECO pedal reaction force cannot be changed or vehicle behavior does not agree to the settings.	Intelligent pedal (distance control assist) reaction force has a malfunction as well.		Perform self-diagnosis of the ADAS control unit, ICC sensor, and Accelerator pedal actuator. <ul style="list-style-type: none"> • ADAS C/U: Refer to CCS-67, "DTC Index". • ICC SENSOR: Refer to CCS-71, "DTC Index". • ACCELERATOR PEDAL ACTUATOR: Refer to DAS-345, "DTC Index".
	Intelligent pedal (distance control assist) reaction force is normal.	The central switch of the navigation system operates normally.	Perform self-diagnosis of the engine control system. Refer to EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index" (For turbo high pressure model) or EC6-205, "TURBO LOW PRESSURE MODEL : DTC Index" (For turbo low pressure model).
		The central switch of the navigation system malfunctions.	Perform self-diagnosis of the navigation system. Refer to AV-397, "Symptom Table" .

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NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR USA AND CANADA]

NORMAL OPERATING CONDITION

Description

INFOID:000000013591921

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under direct Injection gasoline System, [EC6-77](#), "[DIRECT INJECTION GASOLINE SYSTEM : System Description](#)".

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:0000000013591922

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EC6

CHECK IDLE SPEED

 **With CONSULT**

Check idle speed in “DATA MONITOR” mode of “ENGINE” using CONSULT.

C

 **With GST**

Check idle speed with Service \$01 of GST.

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IGNITION TIMING

< PERIODIC MAINTENANCE >

[VR30DDTT FOR USA AND CANADA]

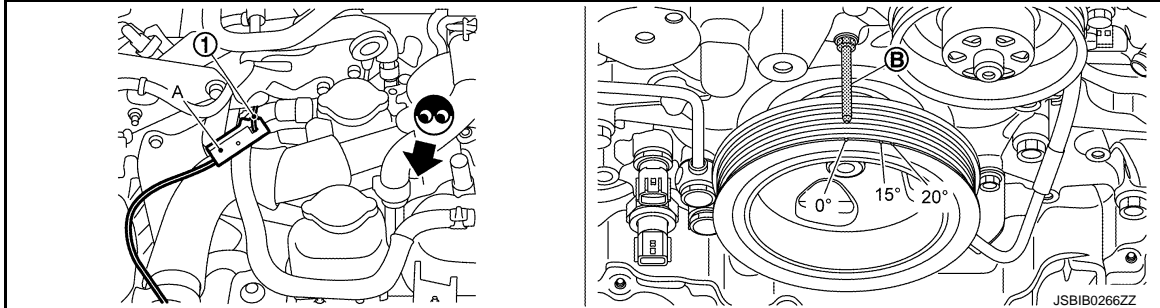
IGNITION TIMING

Inspection

INFOID:000000013591923

CHECK IGNITION TIMING

1. Attach timing light (A) to loop wire as shown.



- ①. Loop wire
- ②. Timing indicator

2. Check ignition timing.

EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

[VR30DDTT FOR USA AND CANADA]

EVAP LEAK CHECK

Inspection

INFOID:000000013591924

CAUTION:

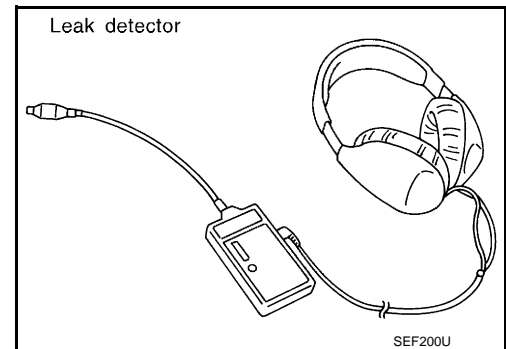
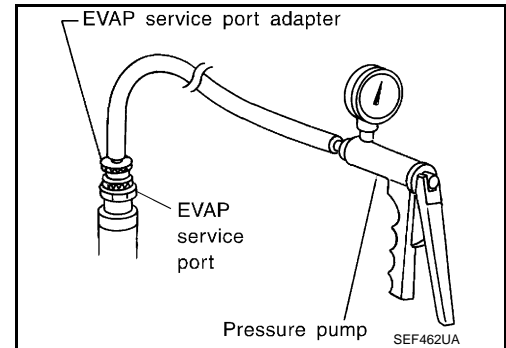
- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

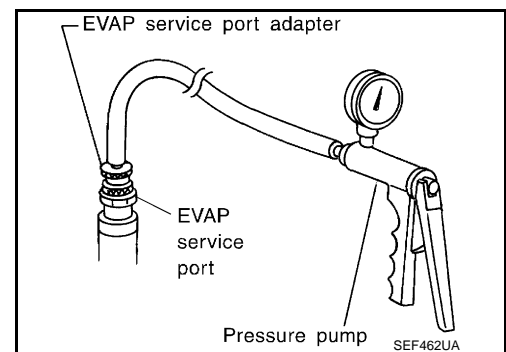
Ⓟ WITH CONSULT

1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
2. Turn ignition switch ON.
3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
6. Remove EVAP service port adapter and hose with pressure pump.
7. Locate the leak using a leak detector. Refer to [EC6-88, "EVAP-ORATIVE EMISSION SYSTEM : System Description"](#).



ⓧ WITHOUT CONSULT

1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
4. Remove EVAP service port adapter and hose with pressure pump.



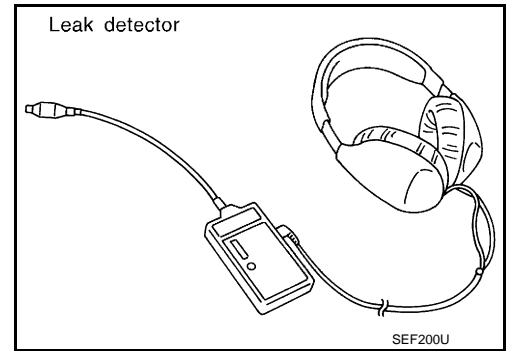
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EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

[VR30DDTT FOR USA AND CANADA]

5. Locate the leak using a leak detector. Refer to [EC6-88. "EVAP-ORATIVE EMISSION SYSTEM : System Description"](#).



POSITIVE CRANKCASE VENTILATION

< PERIODIC MAINTENANCE >

[VR30DDTT FOR USA AND CANADA]

POSITIVE CRANKCASE VENTILATION

Inspection

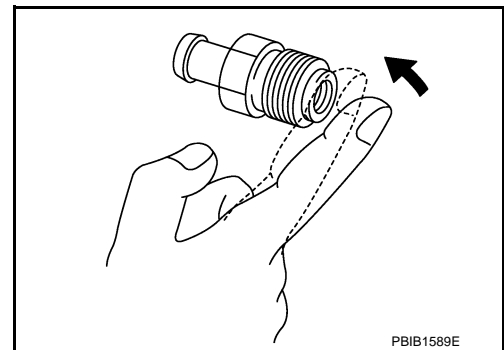
INFOID:000000013591925

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.



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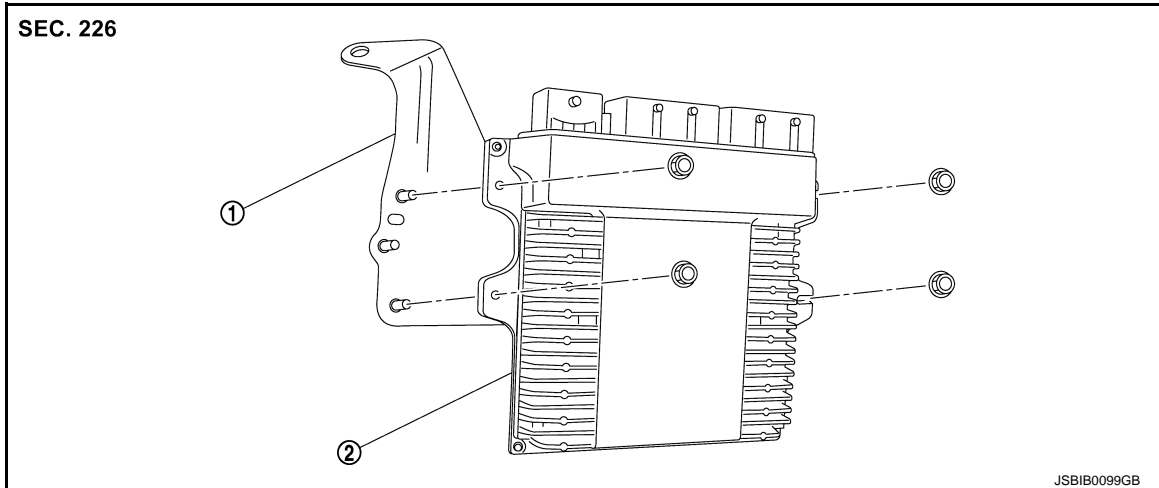
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REMOVAL AND INSTALLATION

ECM

Exploded View

INFOID:000000013591926



① ECM bracket

② ECM

Removal and Installation

INFOID:000000013591927

CAUTION:

Perform **ADDITIONAL SERVICE WHEN REPLACING ECM**. Refer to [EC6-267, "Description"](#).

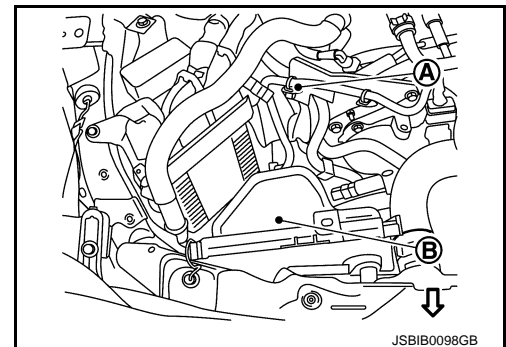
REMOVAL

1. Remove air duct (inlet). Refer to [EM-165, "Exploded View"](#).
2. Remove hoodledge cover (RH) and cowl top cover (RH). Refer to [EXT-27, "Exploded View"](#).
3. Remove air cleaner body (bank 1). Refer to [EM-165, "Exploded View"](#).
4. Remove clip of water hose 1 installed to ECM bracket.
5. Disconnect the ECM harness connectors. Refer to HARNESS CONNECTOR (LEVER LOCKING TYPE) in [PG-8, "VR30DDTT : Harness Connector"](#).
6. Disconnect harness (A) installed to air cleaner cover (bank 1) (B) and move air cleaner cover (bank 1) to secure work space.
7. Remove bracket nut of water pipe installed to ECM bracket.

NOTE:

Do not bend water hose 1 forcibly.

8. Remove the bolts of the ECM bracket.
9. Remove the ECM assembly from the vehicle.
10. Remove the ECM from the bracket.



INSTALLATION

Install in the reverse order of removal.

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< REMOVAL AND INSTALLATION >

[VR30DDTT FOR USA AND CANADA]

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

Removal and Installation

INFOID:0000000013591928

REMOVAL

1. Remove hoodledge cover (RH) and cowl top cover (RH). Refer to [EXT-27. "Exploded View"](#).
2. Remove the battery and battery tray. Refer to [PG-259. "VR30DDTT : Exploded View"](#).
3. Move IPDM E/R and relay box to a location that does not inhibit work. Refer to [PCS-44. "Removal and Installation"](#).
4. Remove the bracket. Refer to [PCS-44. "Removal and Installation"](#).
5. Disconnect electric intake valve timing control module harness connector. Refer to HARNESS CONNECTOR (LEVER LOCKING TYPE) in [PG-8. "VR30DDTT : Harness Connector"](#).
6. Remove electric intake valve timing control module from the vehicle.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Perform **ELECTRIC IVT CONTROL ACTUATOR POSITION LEARNING**. Refer to [EC6-276. "Description"](#)

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FUEL PUMP CONTROL MODULE (FPCM)

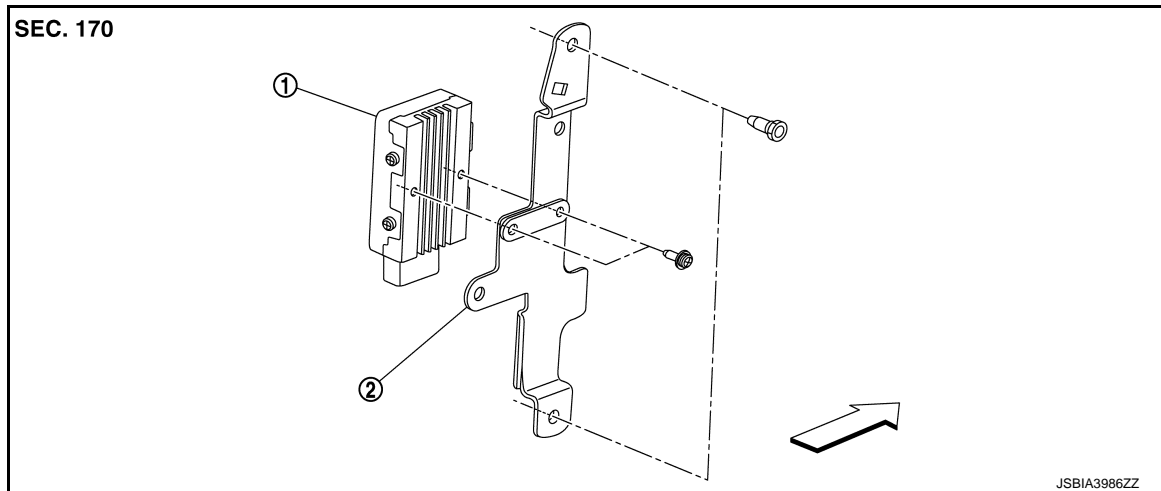
< REMOVAL AND INSTALLATION >

[VR30DDTT FOR USA AND CANADA]

FUEL PUMP CONTROL MODULE (FPCM)

Exploded View

INFOID:000000013591929



① Fuel pump control module

② Bracket

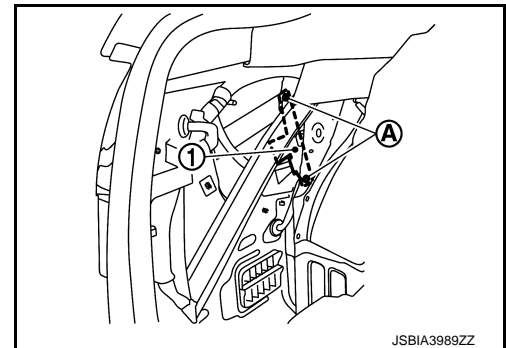
↔ : Vehicle front

Removal and Installation

INFOID:000000013591930

REMOVAL

1. Remove the trunk side finisher LH. Refer to [INT-53, "TRUNK SIDE FINISHER : Removal and Installation"](#).
2. Disconnect fuel pump control module (FPCM) connector.
3. Remove mounting bolts (A) and then remove fuel pump control module (FPCM) (1).



INSTALLATION

Install in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VR30DDTT FOR USA AND CANADA]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000013591931

EC6

Condition	Specification
No load* (in P or N position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000013591932

Condition	Specification
No load* (in P or N 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

INFOID:0000000013591933

Condition	Specification (Using CONSULT or GST)
At idle	5 – 35 %
At 2,500 rpm	5 – 35 %

Mass Air Flow Sensor

INFOID:0000000013591934

Supply voltage	Approx. 5 V
Output frequency at idle	2.8 – 3.1 kHz*
Mass air flow (Using CONSULT or GST)	1.2 – 2.0 g/s at idle* 4.6 – 7.6 g/s at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000013844036

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, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, 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:

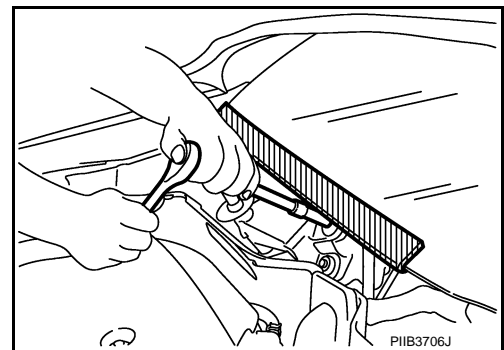
Always observe the following items for preventing accidental activation.

- 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 or batteries, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

INFOID:000000013844037

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions for Removing Battery Terminal

INFOID:000000013844038

When disconnecting the battery terminal, pay attention to the following.

- Always use a 12V battery as power source.
- Never disconnect battery terminal while engine is running.

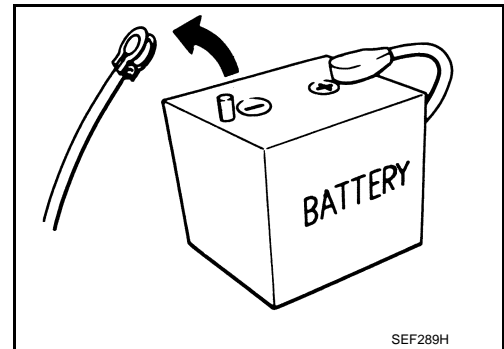
PRECAUTIONS

[VR30DDTT FOR MEXICO]

< PRECAUTION >

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
- For vehicles with the engine listed below, remove the battery terminal after a lapse of the specified time:

BR08DE	: 4 minutes	V9X engine	: 4 minutes
D4D engine	: 20 minutes	YD25DDTi	: 2 minutes
HR09DET	: 12 minutes	YS23DDT	: 4 minutes
HRA2DDT	: 12 minutes	YS23DDTT	: 4 minutes
K9K engine	: 4 minutes	ZD30DDTi	: 60 seconds
M9R engine	: 4 minutes	ZD30DDTT	: 60 seconds
R9M engine	: 4 minutes		



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NOTE:

ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- After high-load driving, if the vehicle is equipped with the V9X engine, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery terminal.

NOTE:

- Turbocharger cooling pump may operate in a few minutes after the ignition switch is turned OFF.
- Example of high-load driving
 - Driving for 30 minutes or more at 140 km/h (86 MPH) or more.
 - Driving for 30 minutes or more on a steep slope.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

The removal of 12V battery may cause a DTC detection error.

On Board Diagnostic (OBD) System of Engine and A/T

INFOID:0000000013844039

The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- **Always turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to illuminate.**
- **Always connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to illuminate due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-8, "VR30DDTT : Harness Connector"](#).**
- **Always route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.**
- **Always connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Always erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

PRECAUTIONS

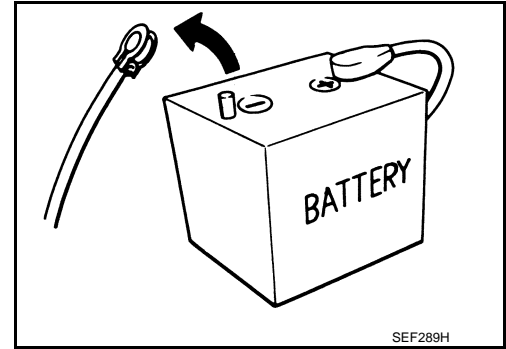
[VR30DDTT FOR MEXICO]

INFOID:000000013844040

< PRECAUTION >

General Precautions

- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.

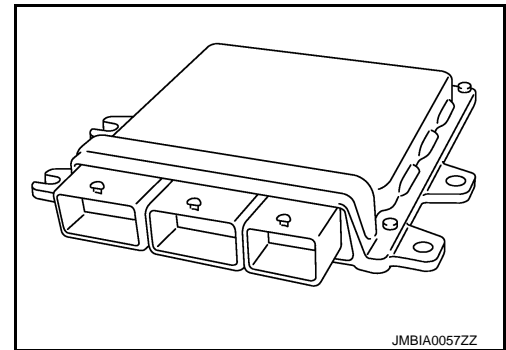


- Never disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

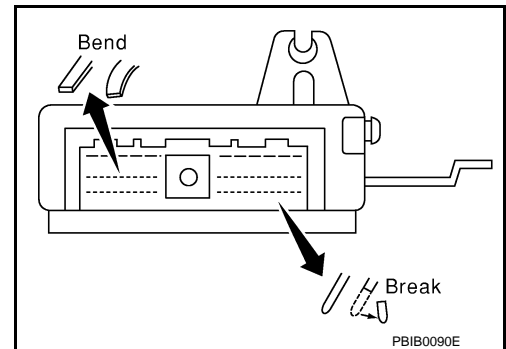


- When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- 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 [EC6-1107, "Reference Value"](#).

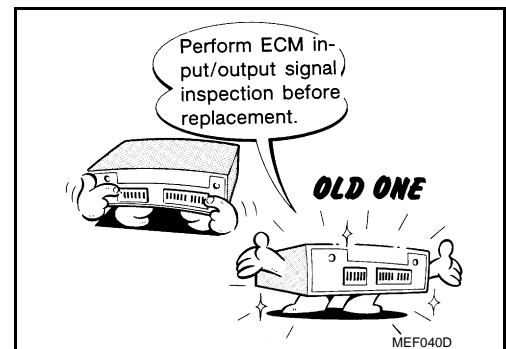
- Handle mass air flow sensor carefully to avoid damage.

- Never clean mass air flow sensor with any type of detergent.

- Never disassemble electric throttle control actuator.

- Even a slight leak in the air intake system can cause serious incidents.

- Never shock or jar the camshaft position sensor, crankshaft position sensor.

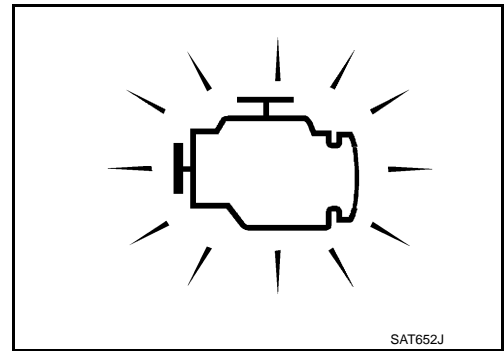


PRECAUTIONS

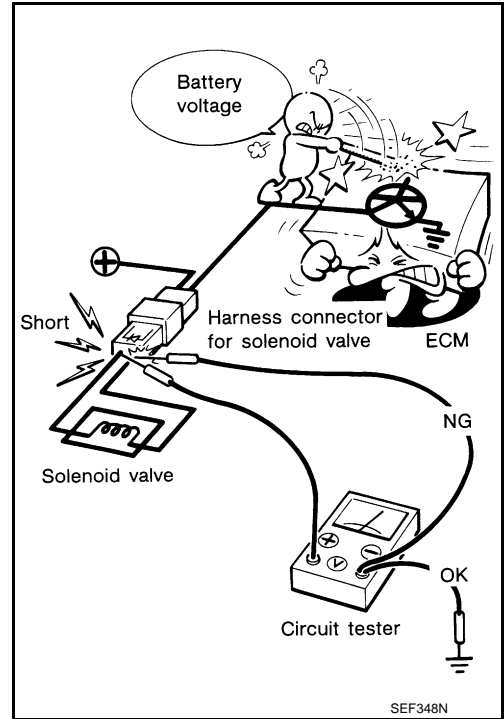
[VR30DDTT FOR MEXICO]

< PRECAUTION >

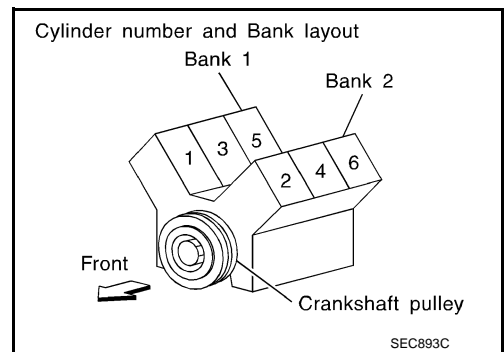
- After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



- B1 indicates bank 1, B2 indicates bank 2 as shown in the figure.
- Never operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



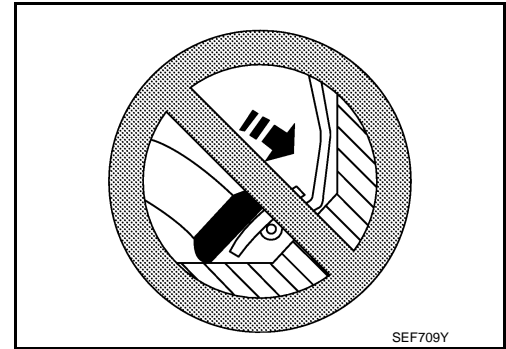
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PRECAUTIONS

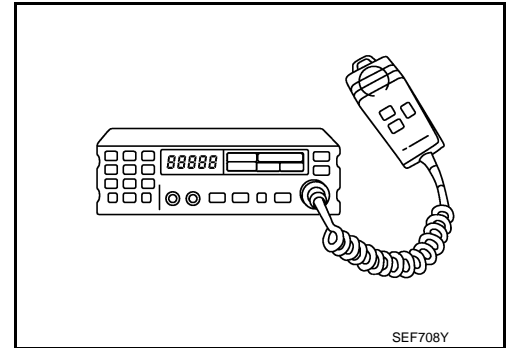
[VR30DDTT FOR MEXICO]

< PRECAUTION >

- Never depress accelerator pedal when starting.
- Immediately after starting, never rev up engine unnecessarily.
- Never rev up engine just prior to shutdown.



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
 - Keep the antenna as far as possible from the electronic control units.
 - Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Never let them run parallel for a long distance.
 - Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - Be sure to ground the radio to vehicle body.



PREPARATION

< PREPARATION >

[VR30DDTT FOR MEXICO]

PREPARATION

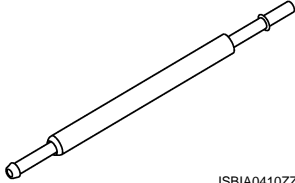
PREPARATION

Special Service Tools

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Tool number (SPX-North America No.) Tool name	Description
KV10120000 Fuel tube adapter  JSBIA0410ZZ	Measuring fuel pressure

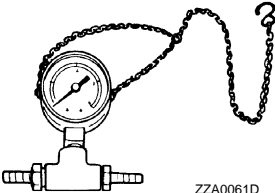
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Commercial Service Tools

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Tool name	Description
Pressure gauge  ZZA0061D	Checking fuel pressure

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COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

SYSTEM DESCRIPTION

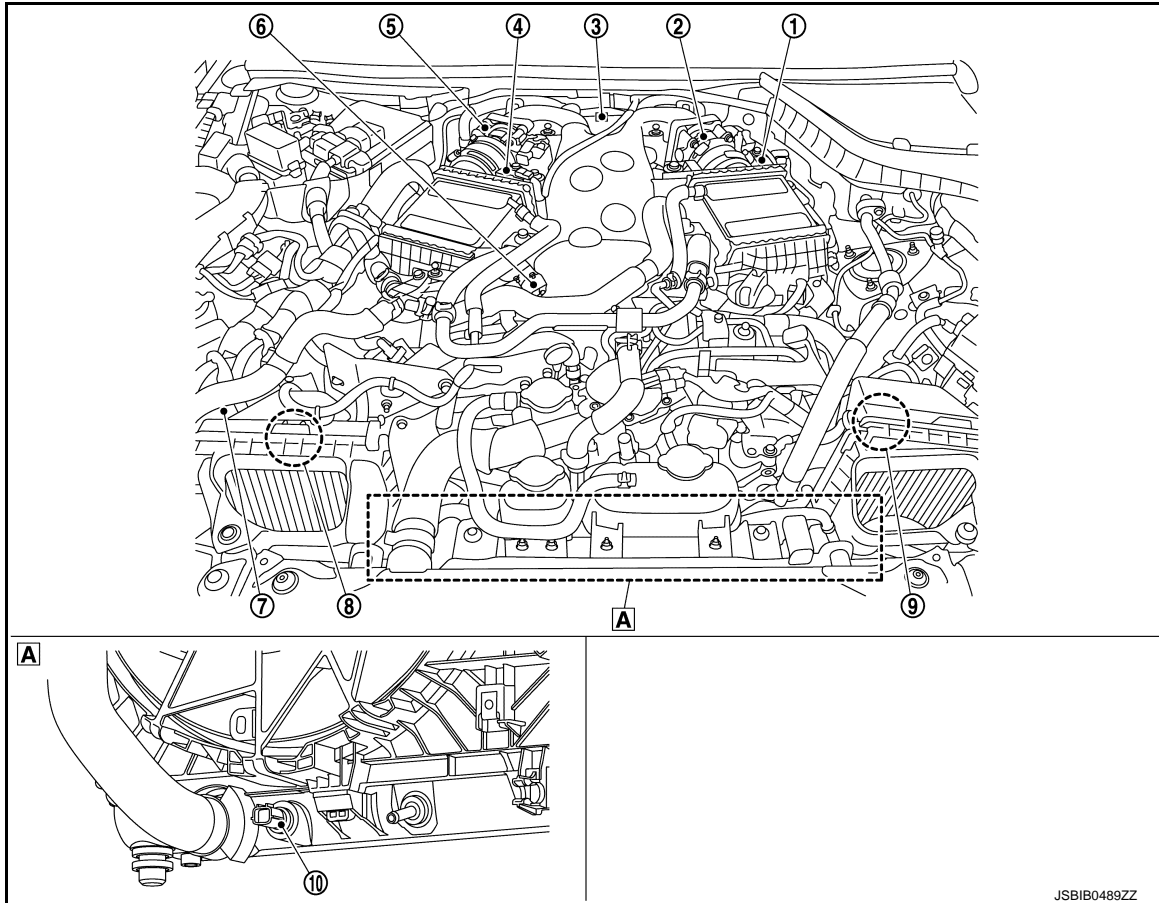
COMPONENT PARTS

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

INFOID:000000013844043

Engine Room Component



A Radiator lower side

No.	Component	Function
①	Turbocharger boost sensor (bank 2)	EC6-1043, "Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)"
②	Electric throttle control actuator (bank 2)	EC6-1034, "Electric Throttle Control Actuator"
③	EVAP canister purge volume control solenoid valve	EC6-1037, "EVAP Canister Purge Volume Control Solenoid Valve"
④	Turbocharger boost sensor (bank 1)	EC6-1043, "Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)"
⑤	Electric throttle control actuator (bank 1)	EC6-1034, "Electric Throttle Control Actuator"
⑥	Manifold absolute pressure sensor	EC6-1042, "Manifold Absolute Pressure Sensor"
⑦	ECM (with barometric pressure sensor)	EC6-1033, "ECM (With Barometric Pressure Sensor)"
⑧	Mass air flow sensor (with intake air temperature sensor) (bank 1)	EC6-1042, "Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)"

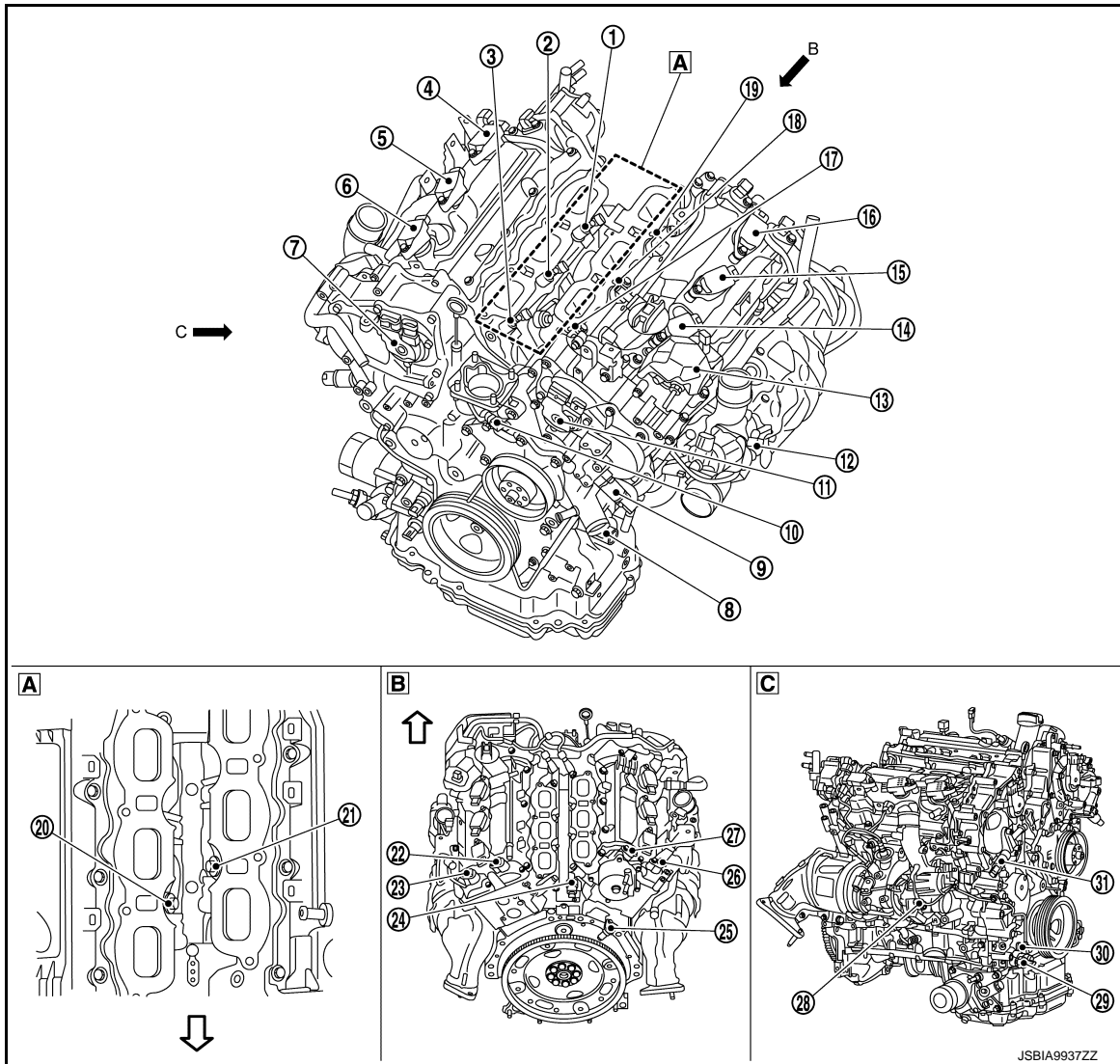
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

No.	Component	Function
⑨	Mass air flow sensor (bank 2)	EC6-1042, "Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)"
⑩	Engine coolant temperature sensor 2	EC6-1035, "Engine Coolant Temperature Sensor 2"

Engine Assembly Component



Top view of the engine

A (view with intake manifold is removed)

B Rear view of the engine

C Side view of the engine

← Engine front

No.	Component	Function
①	Fuel injector (No.5 cylinder)	EC6-1038, "Fuel Injector"
②	Fuel injector (No.3 cylinder)	
③	Fuel injector (No.1 cylinder)	

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

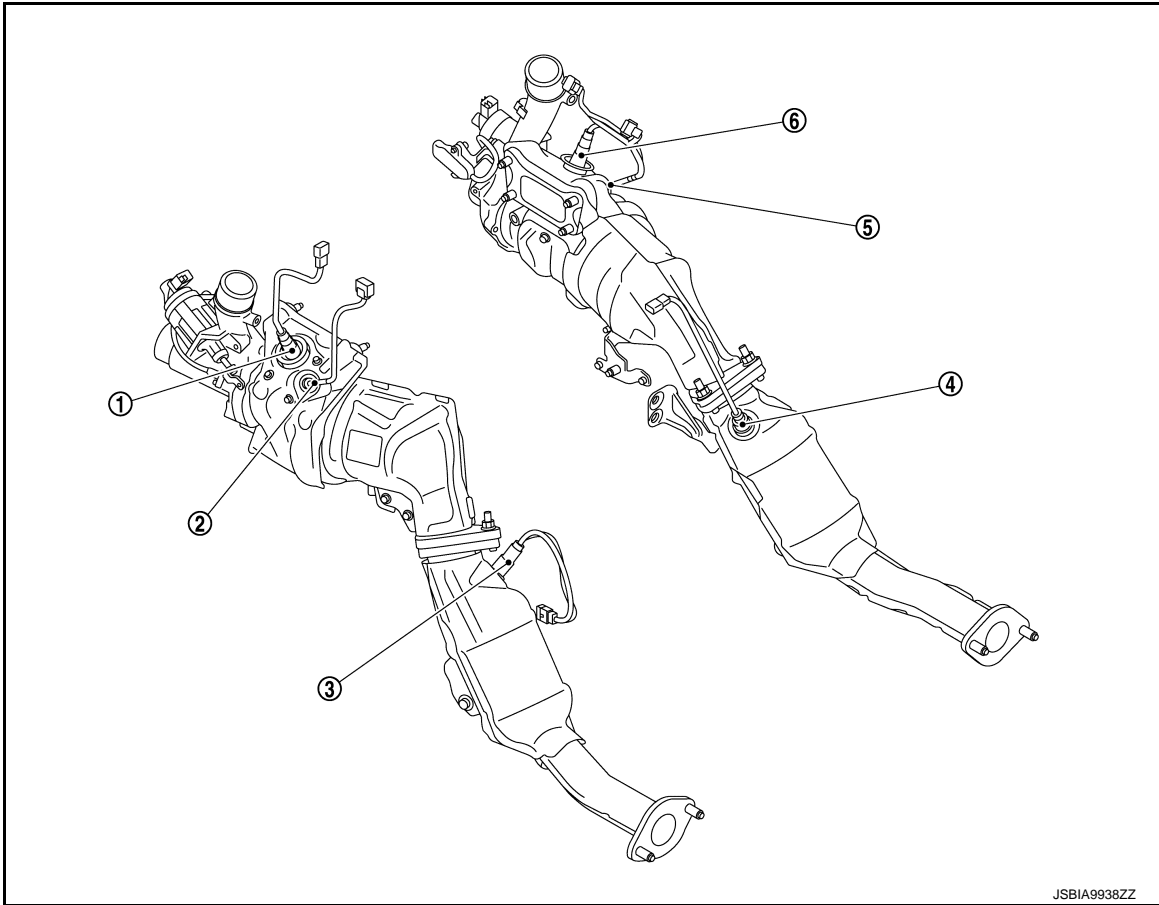
No.	Component	Function
④	Ignition coil (with power transistor) and spark plug (No.5 cylinder)	EC6-1040, "Ignition Coil and Spark Plug"
⑤	Ignition coil (with power transistor) and spark plug (No.3 cylinder)	
⑥	Ignition coil (with power transistor) and spark plug (No.1 cylinder)	
⑦	Electric intake valve timing control actuator (bank 1)	EC6-1034, "Electric Intake Valve Timing Control Actuator"
⑧	Engine oil pressure control solenoid valve	EC6-1036, "Engine Oil Pressure Control Solenoid Valve"
⑨	Exhaust valve timing control solenoid valve (bank 2)	EC6-1038, "Exhaust Valve Timing Control Solenoid Valve"
⑩	Engine coolant temperature sensor 1	EC6-1035, "Engine Coolant Temperature Sensor 1"
⑪	Electric intake valve timing control actuator (bank 2)	EC6-1034, "Electric Intake Valve Timing Control Actuator"
⑫	Turbocharger speed sensor (bank 2)	EC6-1044, "Turbocharger Speed Sensor"
⑬	High pressure fuel pump	EC6-1039, "High Pressure Fuel Pump"
⑭	Ignition coil (with power transistor) and spark plug (No.2 cylinder)	EC6-1040, "Ignition Coil and Spark Plug"
⑮	Ignition coil (with power transistor) and spark plug (No.4 cylinder)	
⑯	Ignition coil (with power transistor) and spark plug (No.6 cylinder)	
⑰	Fuel injector (No.2 cylinder)	EC6-1038, "Fuel Injector"
⑱	Fuel injector (No.4 cylinder)	
⑲	Fuel injector (No.6 cylinder)	
⑳	Knock sensor (bank 1)	EC6-1041, "Knock Sensor"
㉑	Knock sensor (bank 2)	
㉒	Intake camshaft position sensor (bank 2)	EC6-1041, "Intake Camshaft Position Sensor"
㉓	Exhaust camshaft position sensor (bank 2)	EC6-1037, "Exhaust Camshaft Position Sensor"
㉔	Fuel rail pressure sensor	EC6-1039, "Fuel Rail Pressure Sensor"
㉕	Crankshaft position sensor	EC6-1033, "Crankshaft Position Sensor"
㉖	Exhaust camshaft position sensor (bank 1)	EC6-1037, "Exhaust Camshaft Position Sensor"
㉗	Intake camshaft position sensor (bank 1)	EC6-1041, "Intake Camshaft Position Sensor"
㉘	Turbocharger speed sensor (bank 1)	EC6-1044, "Turbocharger Speed Sensor"
㉙	Engine oil pressure sensor	EC6-1036, "Engine Oil Pressure Sensor"
㉚	Engine oil temperature sensor	EC6-1037, "Exhaust Camshaft Position Sensor"
㉛	Exhaust valve timing control solenoid valve (bank 1)	EC6-1038, "Exhaust Valve Timing Control Solenoid Valve"

Exhaust System Component

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]



No.	Component	Function
①	Air fuel ratio (A/F) sensor 1 (bank 2)	EC6-1031. "Air Fuel Ratio (A/F) Sensor 1"
②	Exhaust gas temperature sensor (bank 2)	EC6-1037. "Exhaust Gas Temperature Sensor"
③	Heated oxygen sensor 2 (bank 2)	EC6-1039. "Heated Oxygen Sensor 2"
④	Heated oxygen sensor 2 (bank 1)	
⑤	Exhaust gas temperature sensor (bank 1)	EC6-1037. "Exhaust Gas Temperature Sensor"
⑥	Air fuel ratio (A/F) sensor 1 (bank 1)	EC6-1031. "Air Fuel Ratio (A/F) Sensor 1"

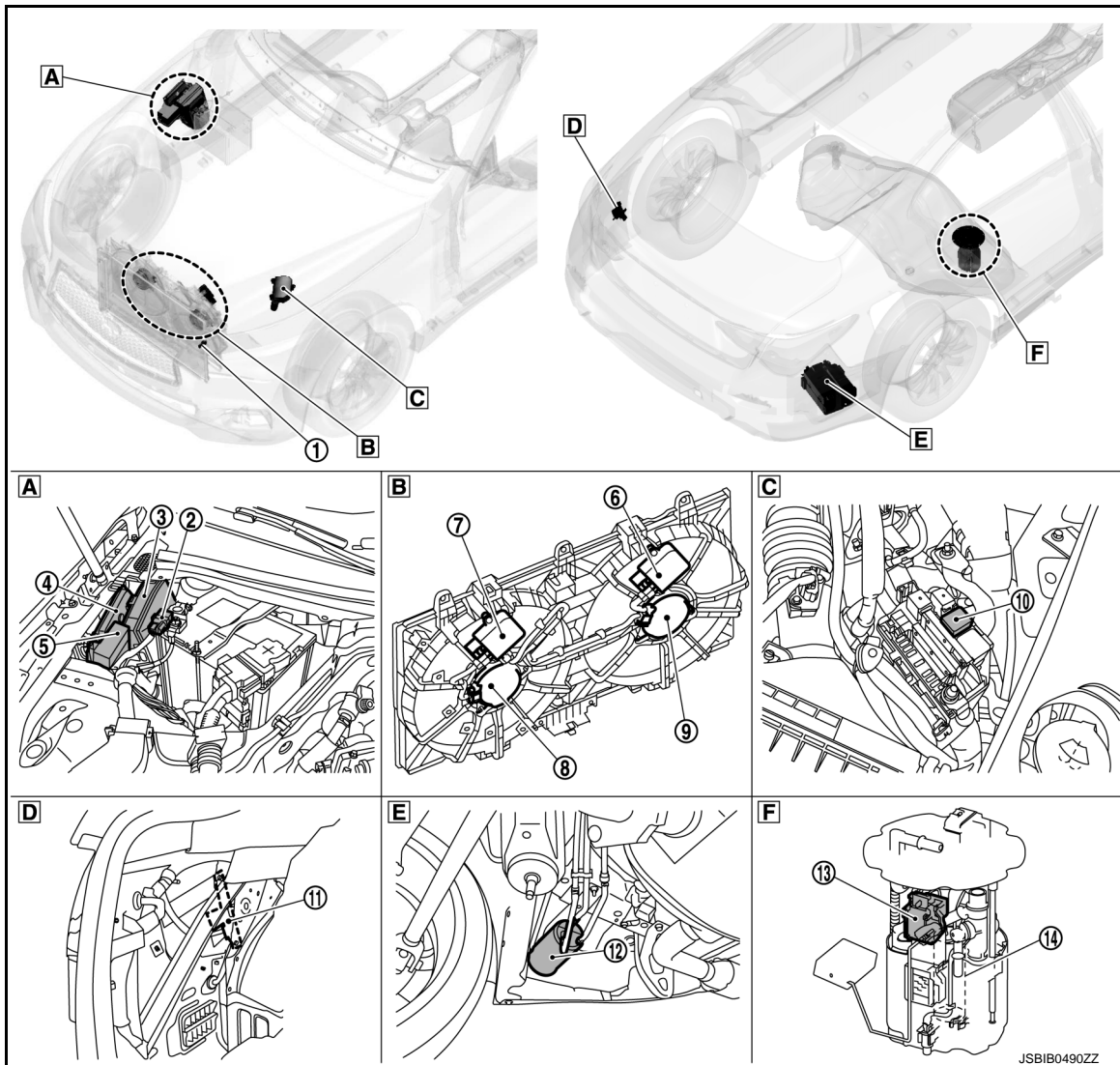
Vehicle Compartment

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COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]



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|----------------------------------|-------------------------------------|--------------------------------------|
| A Around the battery | B Around the radiator | C Fuse and fusible link block |
| D Left side of trunk room | E Right side of main muffler | F Rear seat (lower right) |

No.	Component	Function
①	Refrigerant pressure sensor	EC6-1043, "Refrigerant Pressure Sensor"
②	Battery current sensor (with battery temperature sensor)	EC6-1031, "Battery Current Sensor (With Battery Temperature Sensor)"
③	IPDM E/R	IPDM E/R controls the internal relays and the actuators. When CAN communication with ECM is impossible, IPDM E/R performs fail-safe control. <ul style="list-style-type: none"> • PCS-6, "RELAY CONTROL SYSTEM : System Description" • PCS-24, "Fail-safe" • PCS-10, "POWER CONSUMPTION CONTROL SYSTEM : System Description"
④	Electric intake valve timing control module	EC6-1034, "Electric Intake Valve Timing Control Actuator"
⑤	Cooling fan relay 2	EC6-1033, "Cooling Fan"
⑥	Cooling fan control module 2	EC6-1033, "Cooling Fan"
⑦	Cooling fan control module 1	EC6-1033, "Cooling Fan"
⑧	Cooling fan motor-1	EC6-1033, "Cooling Fan"

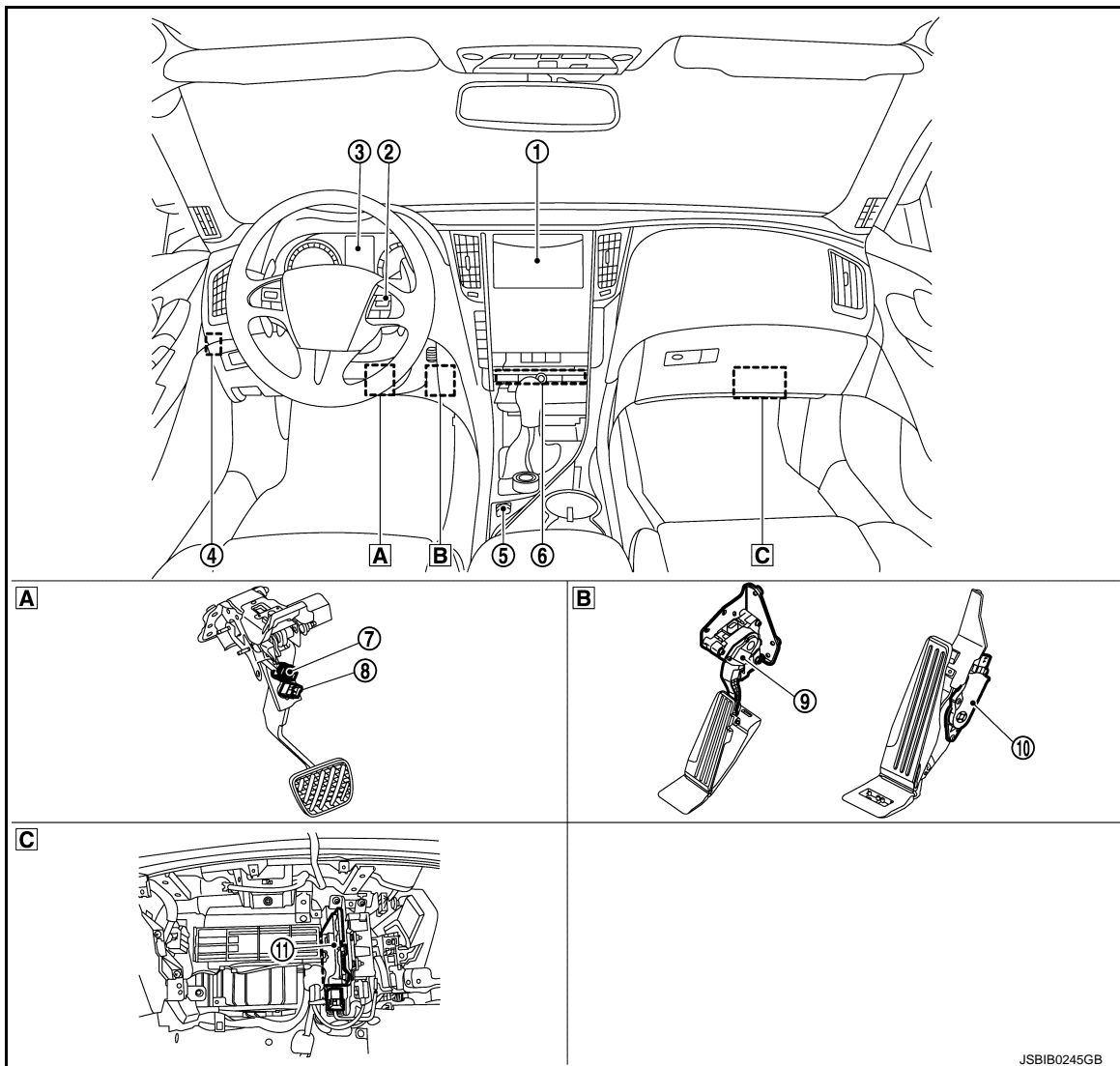
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

No.	Component	Function
⑨	Cooling fan motor-2	EC6-1033, "Cooling Fan"
⑩	Cooling fan relay 1	EC6-1033, "Cooling Fan"
⑪	Fuel pump control module	EC6-1038, "Fuel Pump Control Module"
⑫	EVAP canister	EVAP canister stores the generated fuel vapors in the sealed fuel tank to activated charcoals of EVAP canister when the engine is not operating or when refueling to the fuel tank.
⑬	Fuel level sensor	EC6-1038, "Fuel Level Sensor"
⑭	Low pressure fuel pump	EC6-1041, "Low Pressure Fuel Pump"

Interior Compartment



A Brake pedal

B Accelerator pedal

C Grove box (back side)

No.	Component	Description
①	Display control unit	Displays a drive mode status on the display screen, according to signals received from ECM. For details of installation position, refer to AV-14, "Component Parts Location" .
②	ASCD steering switch	EC6-1031, "ASCD Steering Switch"

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

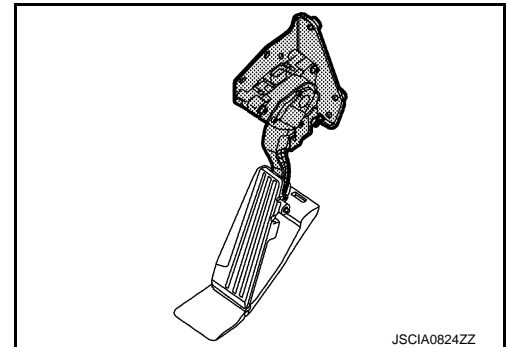
No.	Component	Description
	ICC steering switch	EC6-1040, "ICC Steering Switch"
③	Combination meter	Performs the ON/OFF control of the indicator lamp, warning lamp, and the information display, according to signals received from ECM via CAN communication.
④	Chassis control module	Chassis control module send the drive mode select switch signal to the TCM via the CAN communication line. For details of installation position, refer to DAS-16, "Component Parts Location" .
⑤	Drive mode select switch	DMS-11, "Drive Mode Select Switch"
⑥	A/C auto amp.	Controls the air-conditioning system (e.g. compressor, blower fan motor), according to a command from ECM.
⑦	Stop lamp switch	EC6-1043, "Stop Lamp Switch & Brake Pedal Position Switch"
⑧	Brake pedal position switch	EC6-1043, "Stop Lamp Switch & Brake Pedal Position Switch"
⑨	Accelerator pedal position switch (with ECO pedal)	EC6-1030, "Accelerator Pedal Position Sensor"
⑩	Accelerator pedal position switch (without ECO pedal)	
⑪	Steering force control module	For details of installation position, refer to STC-113, "Component Parts Location" .

Accelerator Pedal Position Sensor

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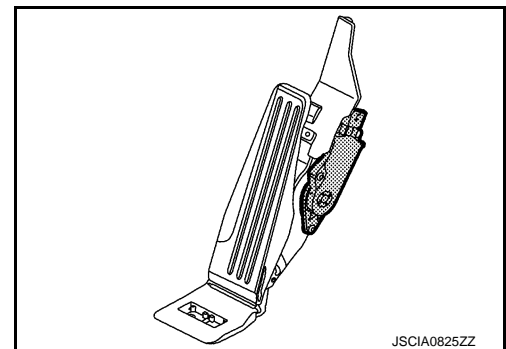
With ECO pedal

The accelerator pedal position sensor is installed on the upper section of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.



Without ECO pedal

The accelerator pedal position sensor is integrated with the accelerator pedal. The sensor detects the accelerator position and sends a signal to the ECM.



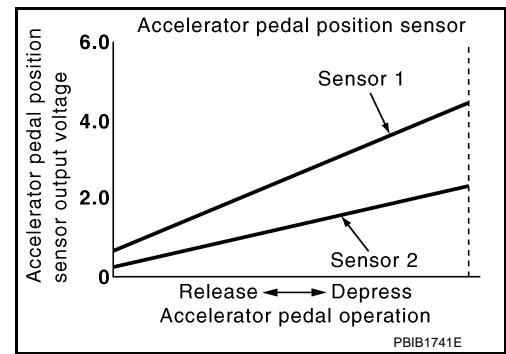
COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Accelerator pedal position sensor has 2 sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.



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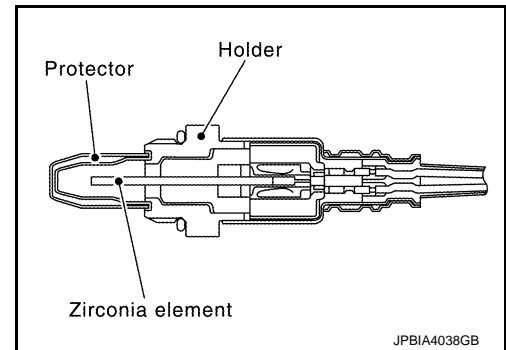
Air Fuel Ratio (A/F) Sensor 1

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.



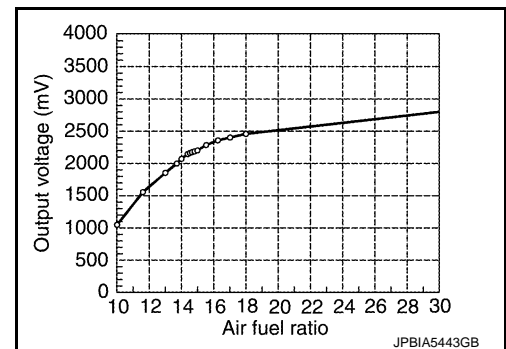
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Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately 760°C (1,400°F).



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A/F SENSOR 1 HEATER

A/F sensor 1 heater is integrated in the sensor.

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element within the specified range.

ASCD Steering Switch

INFOID:000000013844046

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Refer to [EC6-1074, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for the ASCD function.

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Battery Current Sensor (With Battery Temperature Sensor)

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OUTLINE

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COMPONENT PARTS

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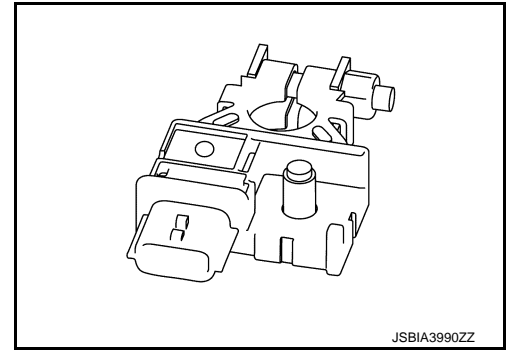
[VR30DDTT FOR MEXICO]

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 [CHG-34. "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.



JSBIA3990ZZ

BATTERY CURRENT SENSOR

The battery current sensor is installed to the battery negative cable. The sensor measures the charging/discharging current of the battery.

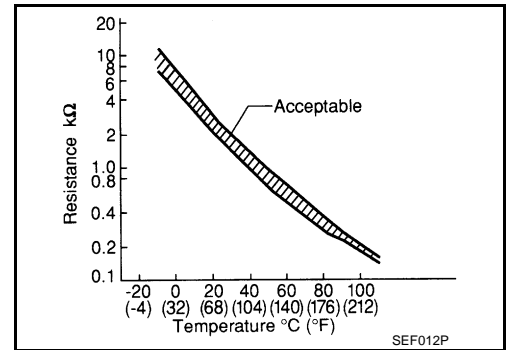
BATTERY TEMPERATURE SENSOR

Battery temperature sensor is integrated in battery current sensor. The sensor measures temperature around the battery. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.333	1.9 - 2.1
90 (194)	0.969	0.222 - 0.258

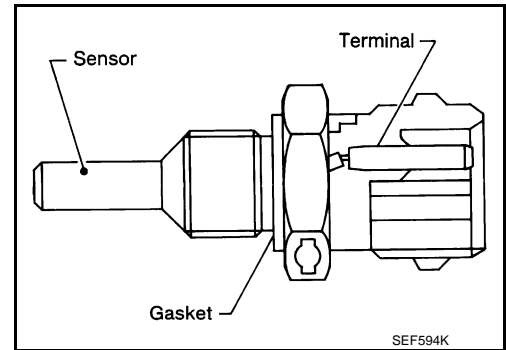
*: These data are reference values and are measured between battery temperature sensor signal terminal and sensor ground.



Charge Air Cooler Coolant Temperature Sensor

INFOID:000000013844048

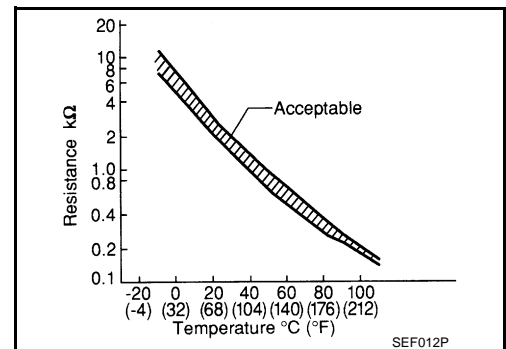
The charge air cooler coolant temperature sensor is used to detect the charge air cooler coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the charge air cooler coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

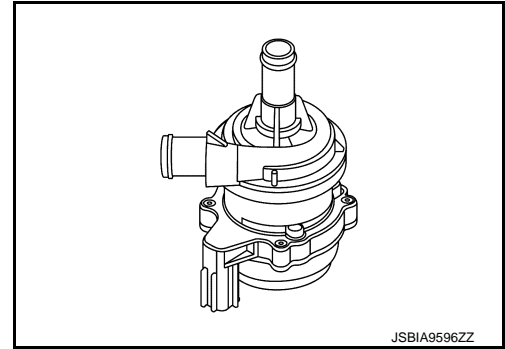
*: These data are reference values and are measured between ECM terminals and sensor ground.



Charge Air Cooler Cooling Electric Water Pump

INFOID:000000013844049

The charge air cooler cooling electric water pump is activated according to a drive duty signal transmitted from ECM and circulates charge air cooler coolant.



Cooling Fan

INFOID:000000013844050

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.

COOLING FAN RELAY

Cooling fan relay provides power supply to the cooling fan control module.

Crankshaft Position Sensor

INFOID:000000013844051

The crankshaft position sensor is located on the transmission housing facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

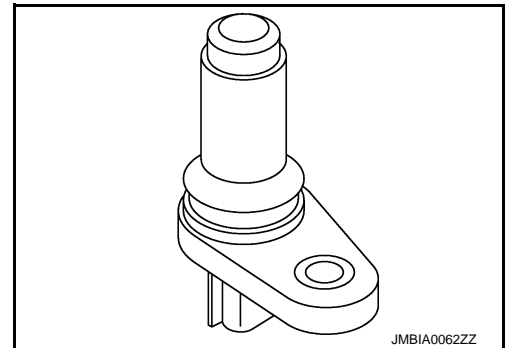
The sensor consists of a permanent magnet and Hall IC.

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.

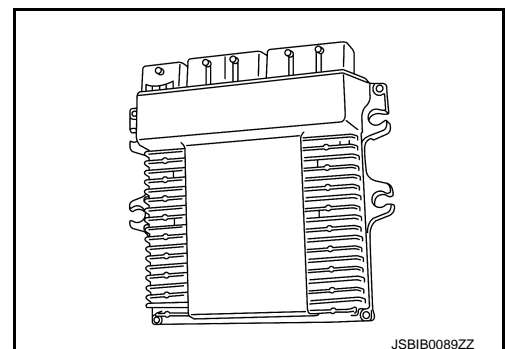


ECM (With Barometric Pressure Sensor)

INFOID:000000013844052

ECM

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



BAROMETRIC PRESSURE SENSOR

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

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COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Electric Intake Valve Timing Control Actuator

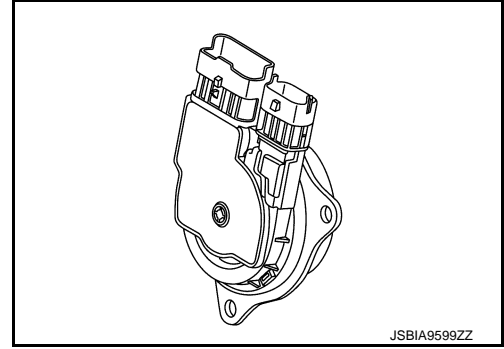
INFOID:000000013844053

The electric intake valve timing (IVT) control actuator activates the actuator motor according to a signal from the electric IVT control module to maintain the timing of intake valve timing at advance angle or retard angle.

The actuator has position sensor and transmits a motor position signal and a motor speed signal to Electric IVT Control Module.

NOTE:

The actuator is non separable.



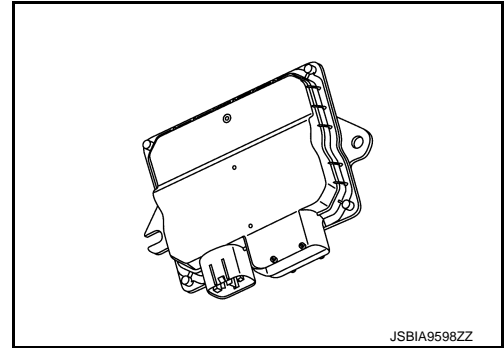
JSBIA9599ZZ

Electric Intake Valve Timing Control Module

INFOID:000000013844054

The electric intake valve timing (IVT) control module controls the electric IVT control actuator, according to signals sent from ECM and the sensor built in the electric IVT control actuator.

The target angle of valve timing is adjusted based on the engine communication signals transmitted from ECM.



JSBIA9598ZZ

Electric Throttle Control Actuator

INFOID:000000013844055

THROTTLE CONTROL MOTOR

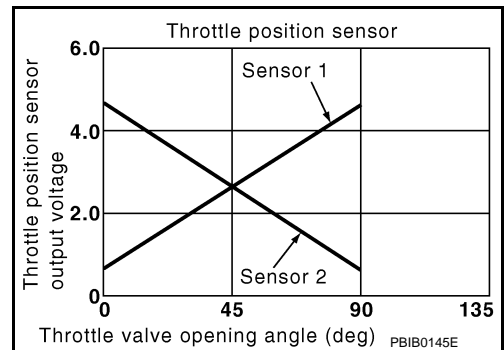
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

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

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



COMPONENT PARTS

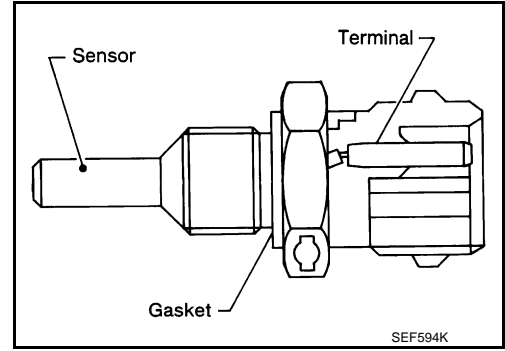
< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Engine Coolant Temperature Sensor 1

INFOID:000000013844056

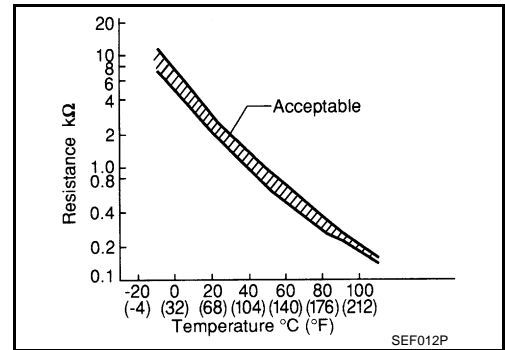
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

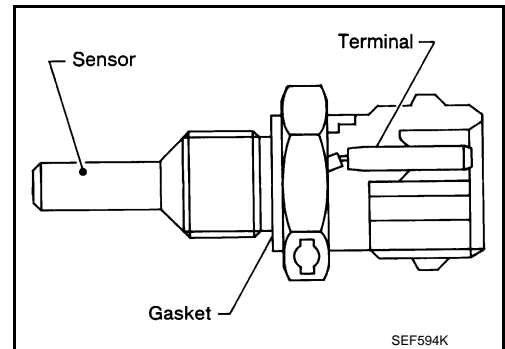
*: These data are reference values and are measured between ECM terminals and sensor ground.



Engine Coolant Temperature Sensor 2

INFOID:000000013844057

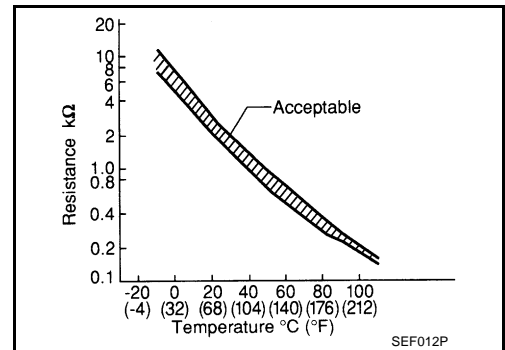
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminals and sensor ground.



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COMPONENT PARTS

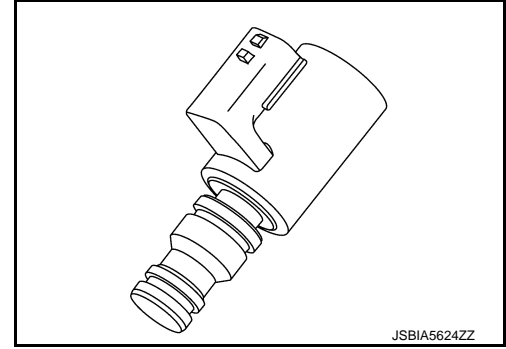
< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Engine Oil Pressure Control Solenoid Valve

INFOID:000000013844058

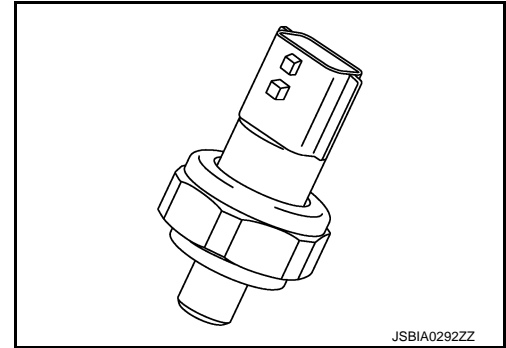
The engine oil pressure control solenoid valve performs the variable hydraulic control (low oil pressure control and high oil pressure control) according to oil temperature and engine load.



Engine Oil Pressure Sensor

INFOID:000000013844059

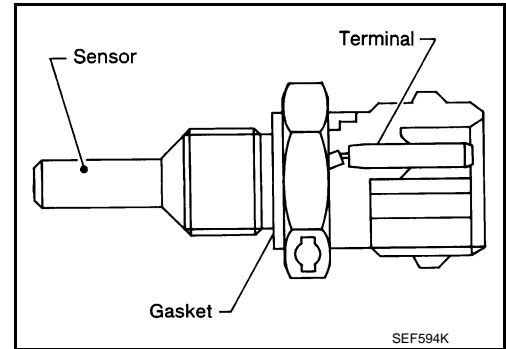
The engine oil pressure (EOP) sensor detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Temperature Sensor

INFOID:000000013844060

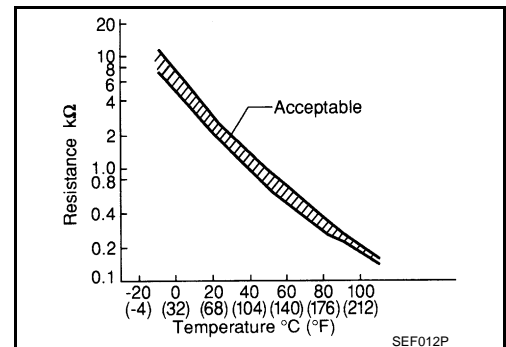
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

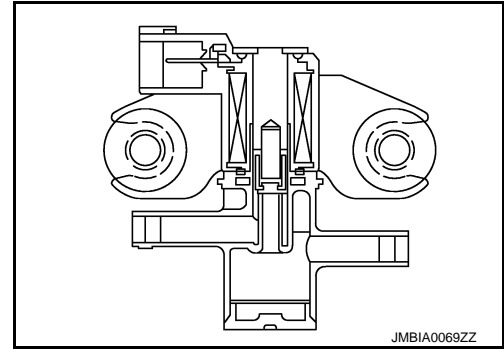
*: These data are reference values and are measured between ECM terminals and sensor ground.



EVAP Canister Purge Volume Control Solenoid Valve

INFOID:000000013844061

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



Exhaust Camshaft Position Sensor

INFOID:000000013844062

The exhaust camshaft position sensor senses the retraction of camshaft to identify a particular cylinder. The sensor senses piston position of the each cylinder for precise combustion.

When the crankshaft position sensor system becomes inoperative, the camshaft position sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

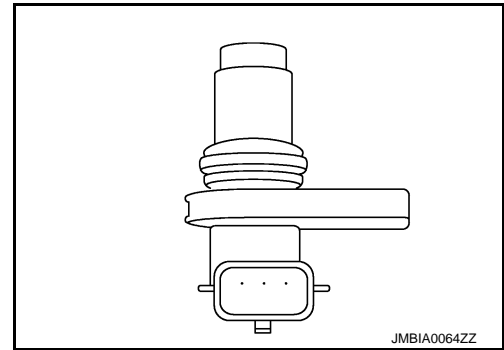
The cylinder identification is performed by the crankshaft position sensor and the camshaft position sensors (Bank 1 and Bank 2). For this reason, if one of the camshaft position sensors has a malfunction, the other camshaft position sensor can work with the crankshaft position sensor.

The sensor consists of a permanent magnet and Hall IC.

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

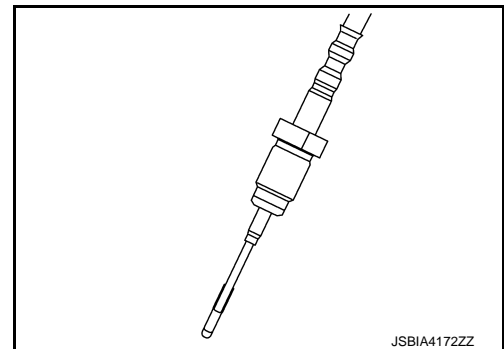
Due to the changing magnetic field, the voltage from the sensor changes.



Exhaust Gas Temperature Sensor

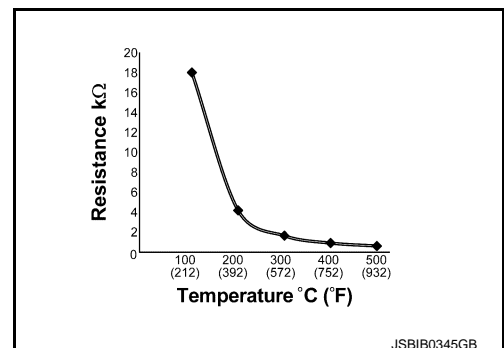
INFOID:000000013844063

The exhaust gas temperature sensor is installed to the turbine housing of turbocharger. This sensor uses a thermistor, and electric resistance changes according to temperature changes. The electrical resistance decreases with an increase in temperature.



<Reference data>

Fluid temperature [°C (°F)]	Resistance (kΩ)
100 (212)	18.2
200 (392)	4.0
300 (572)	1.4
400 (752)	0.65
500 (932)	0.35



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Exhaust Valve Timing Control Solenoid Valve

INFOID:000000013844064

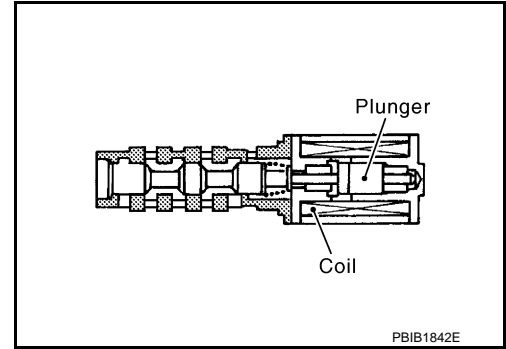
Exhaust valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The exhaust valve timing control solenoid valve changes the oil amount and direction of flow through exhaust valve timing control unit or stops oil flow.

The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.

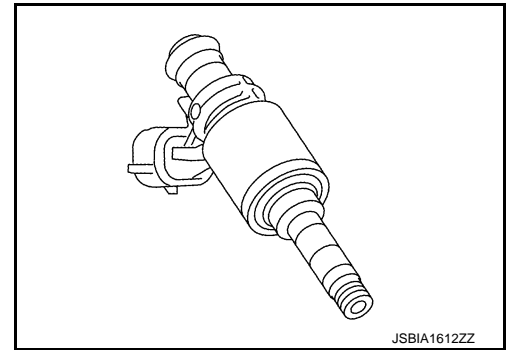
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the exhaust valve angle at the control position.



Fuel Injector

INFOID:000000013844065

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).



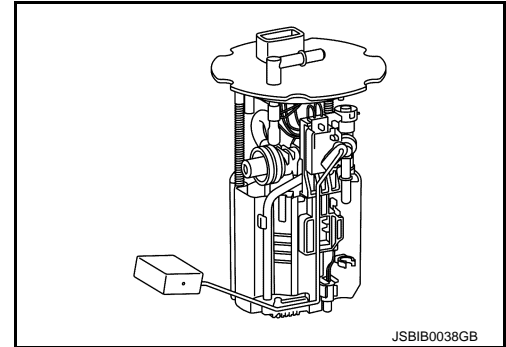
Fuel Level Sensor

INFOID:000000013844066

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.

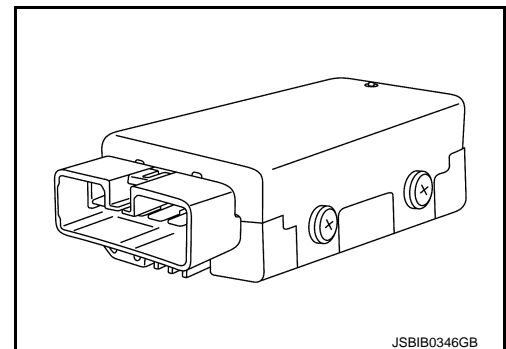
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



Fuel Pump Control Module

INFOID:000000013844067

The fuel pump control module (FPCM) controls the fuel pump to satisfy a discharge rate suitable to a driving condition, according to the control from ECM. This reduces the electricity consumption of fuel pump during low load.



COMPONENT PARTS

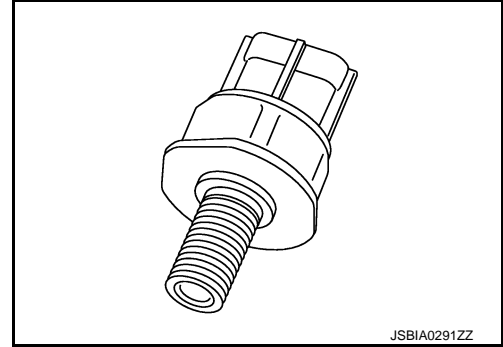
< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Fuel Rail Pressure Sensor

INFOID:000000013844068

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.



Heated Oxygen Sensor 2

INFOID:000000013844069

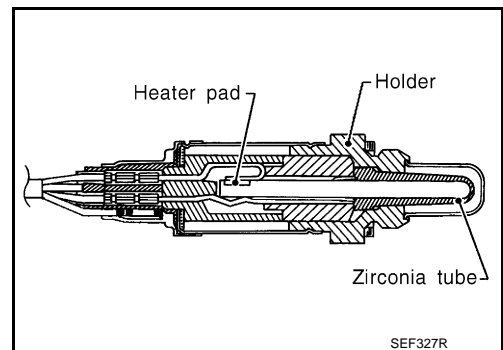
DESCRIPTION

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

If a malfunction occurs in air fuel ratio (A/F) sensor, air fuel ratio is controlled to become a theoretical air fuel ratio by heated oxygen sensor 2.

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.

Condition	Heated oxygen sensor 2 heater
Above 7,500 rpm	OFF
Below 7,500 rpm after the following conditions are met. <ul style="list-style-type: none"> • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	ON

High Pressure Fuel Pump

INFOID:000000013844070

The high pressure fuel pump is activated by the exhaust camshaft.

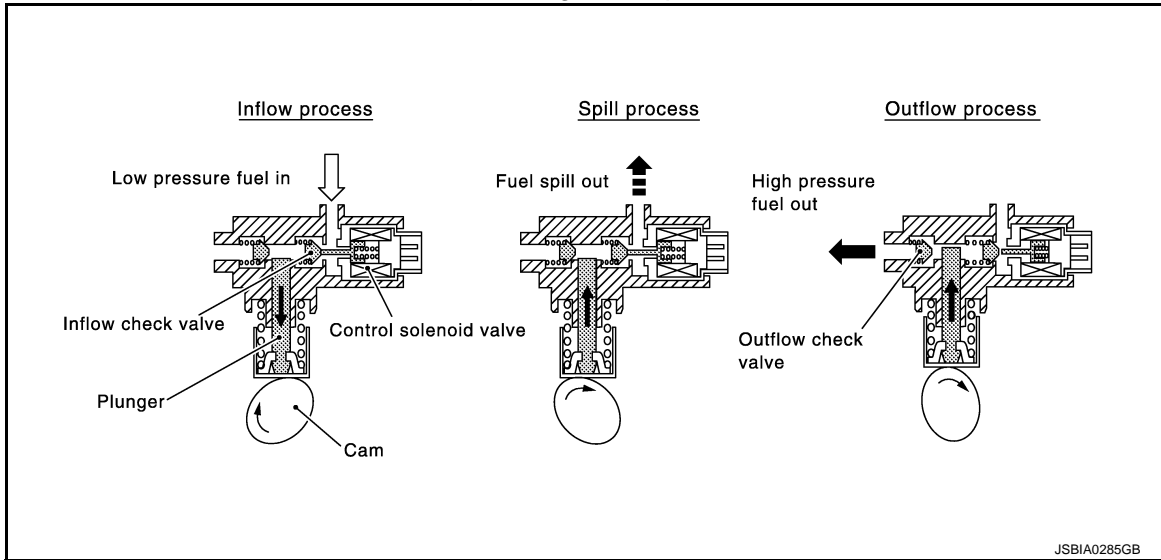
ECM controls the high pressure fuel pump control solenoid valve built into the high pressure fuel pump and adjusts the amount of discharge by changing the suction timing of the low pressure fuel.

COMPONENT PARTS

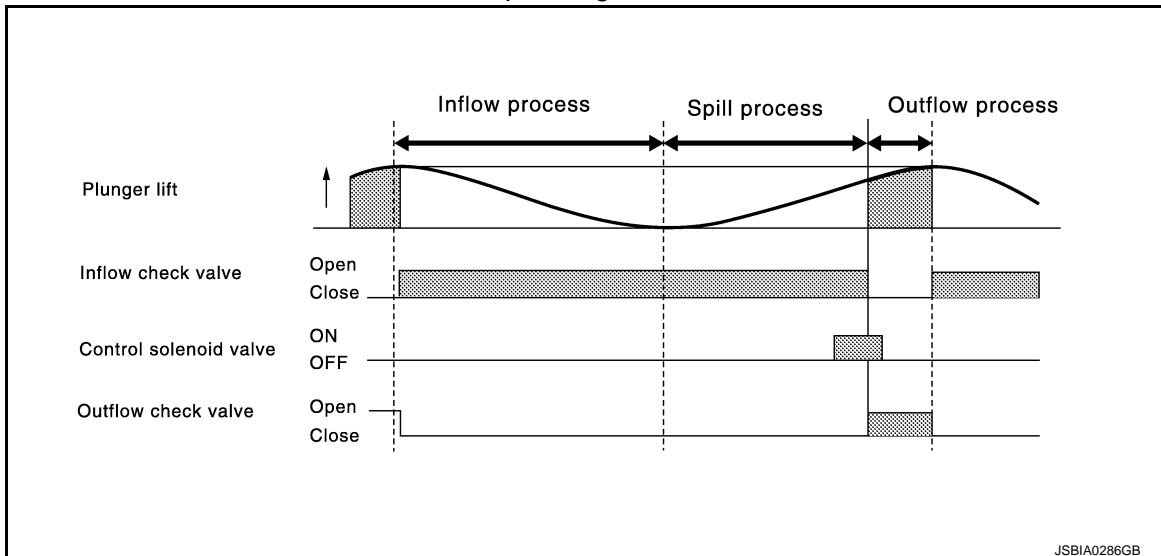
< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Operating Description



Operating Chart



ICC Steering Switch

INFOID:000000013844071

ICC steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

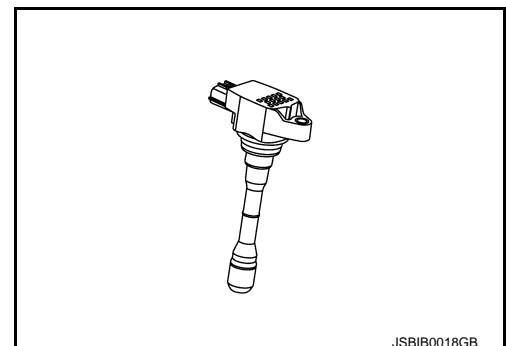
Refer to [CCS-14, "System Description"](#) for the ICC function.

Ignition Coil and Spark Plug

INFOID:000000013844072

IGNITION COIL

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.



COMPONENT PARTS

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

SPARK PLUG

The spark plug is installed to the cylinder head and performs ignitions to air-fuel mixture by discharging ignition coil-applied voltage in the gap between the center electrode and the ground electrode and generating sparks in the combustion chamber.

Intake Camshaft Position Sensor

INFOID:000000013844073

Intake camshaft position sensor detects the protrusion of the signal plate installed to the intake camshaft rear end.

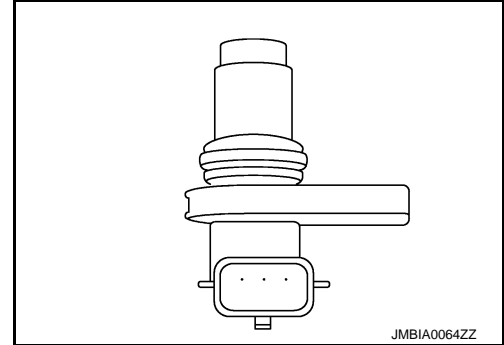
This sensor signal is used for sensing a position of the intake camshaft.

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.

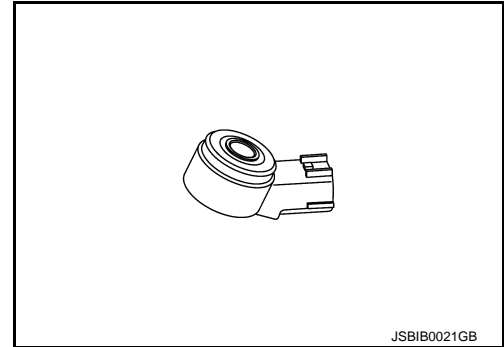
Due to the changing magnetic field, the voltage from the sensor changes.



Knock Sensor

INFOID:000000013844074

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



Low Pressure Fuel Pump

INFOID:000000013844075

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor Exhaust camshaft position sensor	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

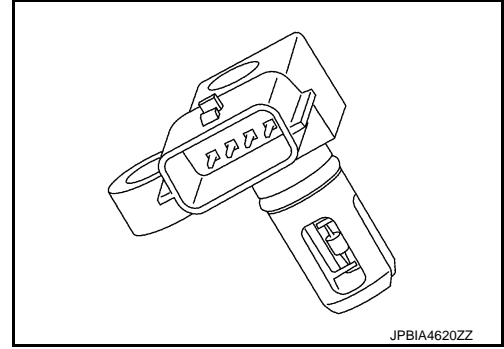
[VR30DDTT FOR MEXICO]

Manifold Absolute Pressure Sensor

INFOID:000000013844076

The manifold absolute pressure (MAP) sensor is placed at intake manifold collector. It detects intake manifold pressure and sends the voltage signal to the ECM.

The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.

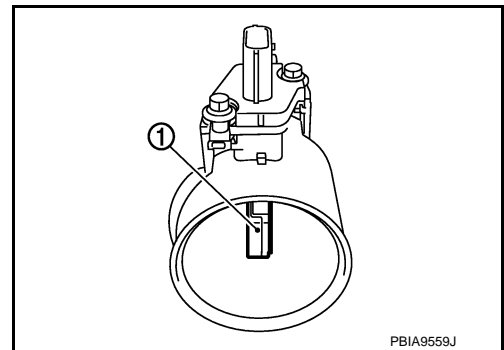


Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)

INFOID:000000013844077

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 MAF sensor controls the temperature of the heater in sensing element to a certain amount. The temperature distribution around the heater changes according to the increase in intake air volume. The change is detected by a thermistor and the air volume data is sent to ECM by the MAF sensor.



INTAKE AIR TEMPERATURE SENSOR 1

The intake air temperature sensor 1 is built-into mass air flow sensor (bank1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature.

<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)
25 (77)	1.7 – 2.0
80 (176)	0.3 – 0.5

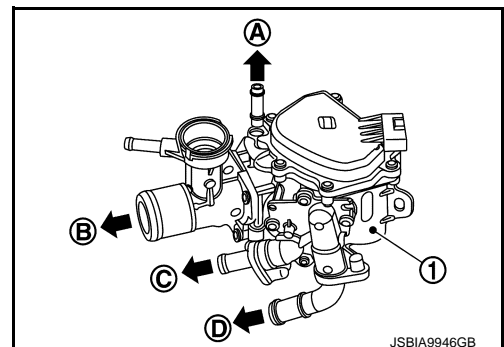
*: These data are reference values on the diagnosis tool.

Multi-way Control Valve

INFOID:000000013844078

A motor-driven valve that integrates the thermostat and water control valve and that can open and close the flow of water to radiator, heater, and ATF warmer according to the coolant temperature is adopted.

- ① : Multi-way control valve
- Ⓐ : To turbocharger RH
- Ⓑ : To radiator
- Ⓒ : To ATF warmer
- Ⓓ : To heater



When the water temperature is low, the water channels to radiator, heater, and ATF warmer are closed, accelerating warming of these parts.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

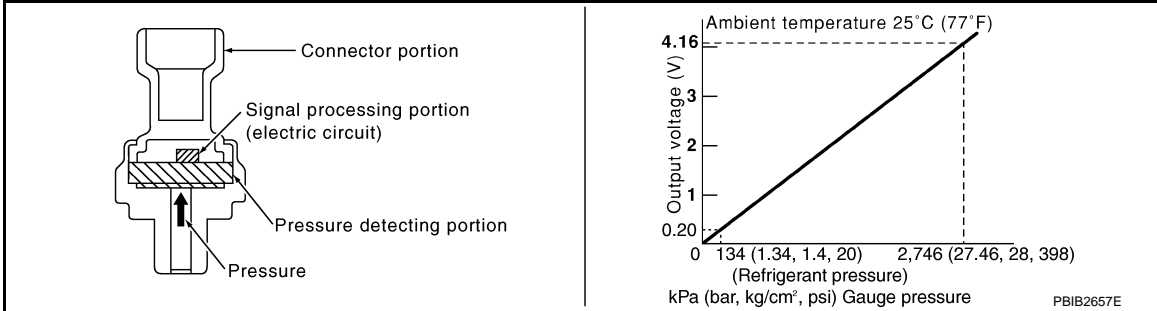
[VR30DDTT FOR MEXICO]

For control, refer to [EC6-1071. "THERMAL MANAGEMENT CONTROL : System Description"](#).

Refrigerant Pressure Sensor

INFOID:000000013844079

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

INFOID:000000013844080

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).

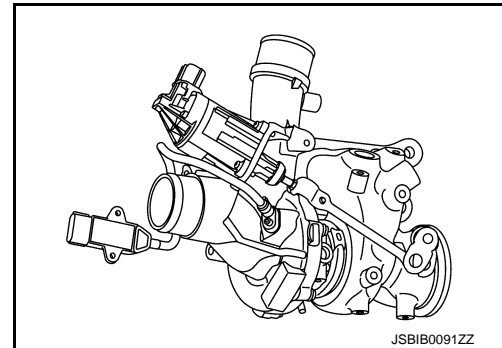
Brake pedal	Brake pedal position switch	Stop lamp switch
Released	ON	OFF
Depressed	OFF	ON

Turbocharger

INFOID:000000013844081

ELECTRIC WASTEGATE CONTROL ACTUATOR

The electric wastegate control actuator operates based on a signal from ECM and adjusts the turbocharger boost control valve angle via link rod. The electronic control allows the turbocharger wastegate control valve to be opened even in non-supercharging regions. This reduces pumping losses and contributes to the fuel economy. In charging regions, wastegate valve angles are controlled by the electronic control with a high degree of accuracy.

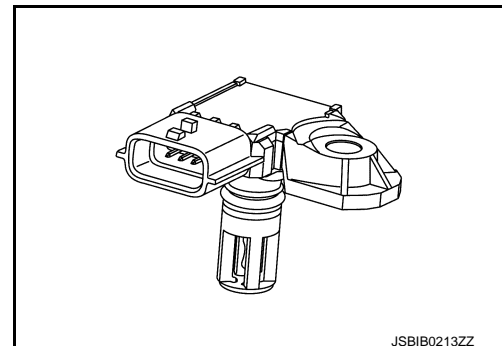


Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)

INFOID:000000013844082

TURBOCHARGER BOOST SENSOR

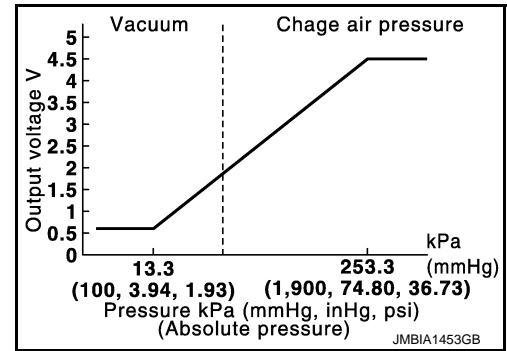
The turbocharger boost sensor detects the pressure of the outlet side of the charge air cooler. As the pressure increases, the voltage rises.



COMPONENT PARTS

< SYSTEM DESCRIPTION >

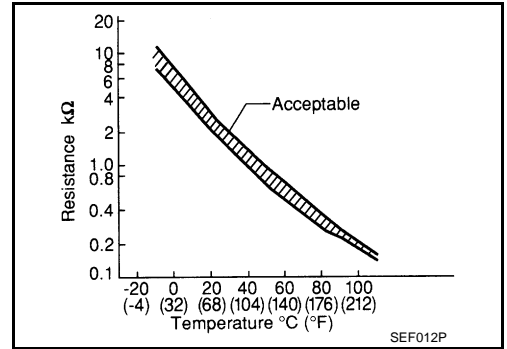
[VR30DDTT FOR MEXICO]



INTAKE AIR TEMPERATURE SENSOR 2

The intake air temperature sensor 2 is built-into turbocharger boost sensor (bank1). 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	0.310 - 0.322

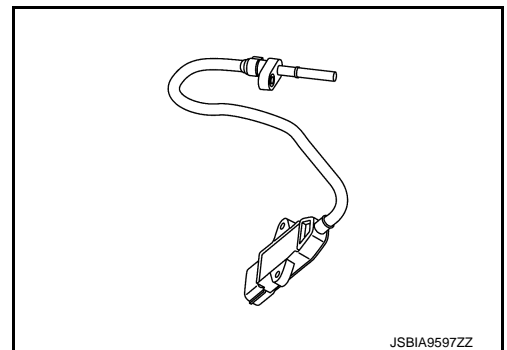
*: These data are reference values and are measured between ECM terminals.

Turbocharger Speed Sensor

INFOID:000000013844083

The turbocharger speed sensor is installed to the compressor side of turbocharger and detects revolutions of turbocharger with the compressor wheel blade of turbocharger.

The use of eddy current sensor enables the detection of revolutions of turbocharger at high speed rotation.



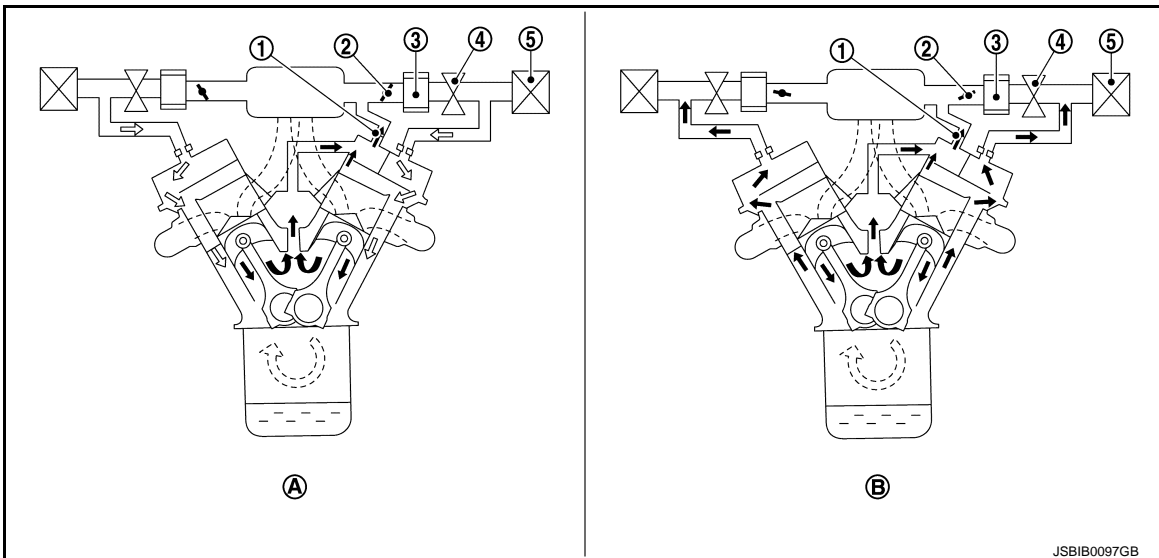
STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:000000013844084

A

EC6



- ① PCV valve
- ② Electric throttle control actuator
- ③ Charge air cooler
- ④ Turbocharger
- ⑤ Air cleaner
- Ⓐ Low-middle load condition
- Ⓑ Hi load condition
- ⇐: Fresh air
- ←: Blow-by air

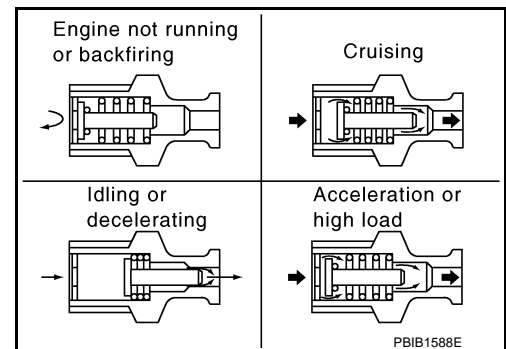
Blow-by gas in the crank case is returned to the intake manifold to improve ventilation efficiency. This allows the intervals of engine oil change to be extended.

When the engine is in the low-middle load condition as shown in the figure Ⓐ, the blow-by gas goes to the intake manifold via the PCV valve.

In the general driving conditions, the capacity of the PCV valve is sufficient for treating the blow-by gas and a little amount of the fresh air.

The fresh air enters to the rocker cover from the air duct via a hose, and is guided to the crankcase.

When the engine is in the high load condition as shown in the figure Ⓑ, blow-by gas flows backward in the blow-by hose and gets sucked into air duct.



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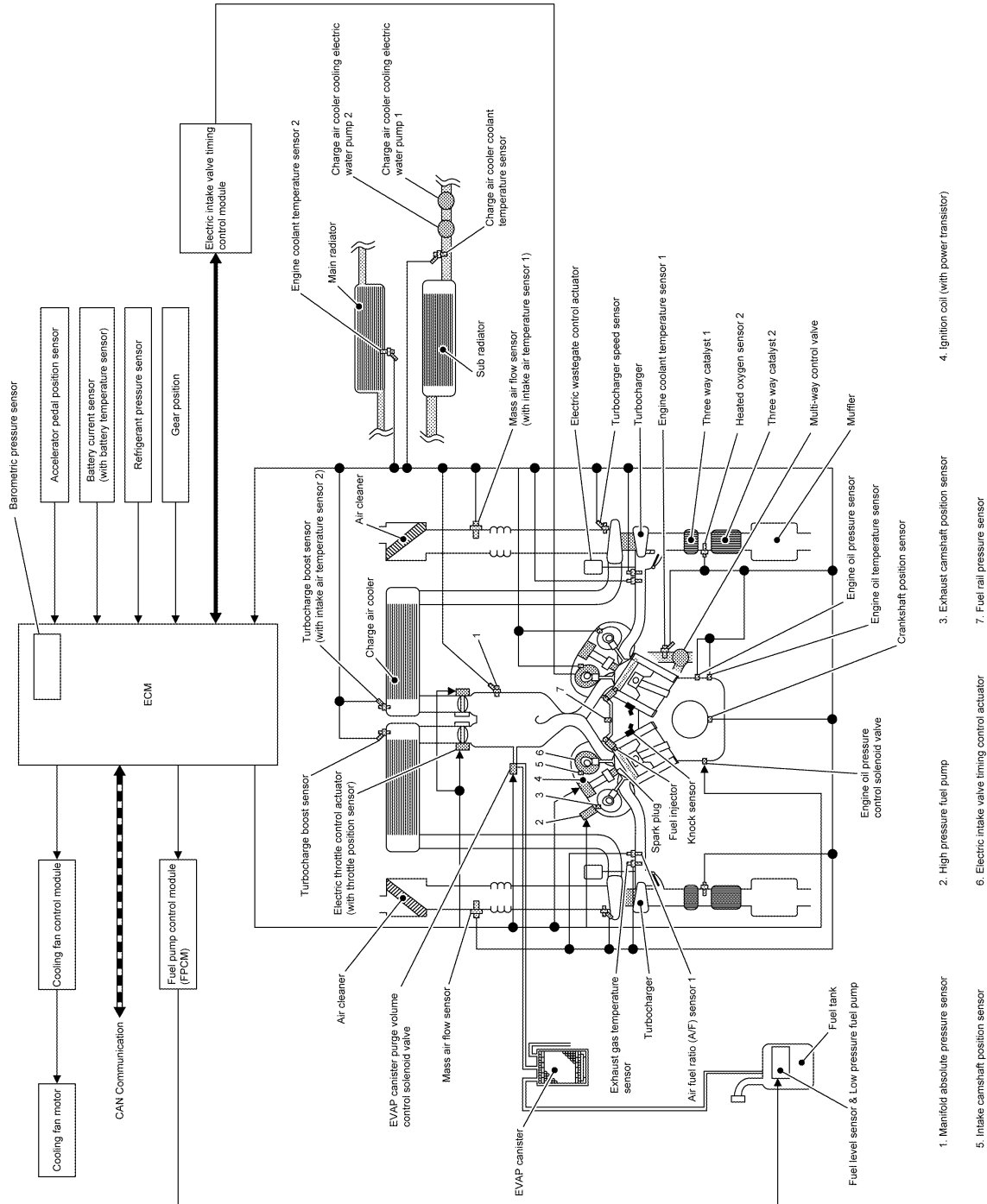
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SYSTEM ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Description

INFOID:000000013844085

SYSTEM DIAGRAM



JSBIB0502GB

SYSTEM DESCRIPTION

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

ECM controls the engine by various functions.

Function	Reference
Direct injection gasoline system	EC6-1057, "DIRECT INJECTION GASOLINE SYSTEM : System Description"
Fuel pressure control	EC6-1060, "FUEL PRESSURE CONTROL : System Description"
Engine oil pressure control system	EC6-1067, "ENGINE OIL PRESSURE CONTROL SYSTEM : System Description"
Electric ignition system	EC6-1059, "ELECTRIC IGNITION SYSTEM : System Description"
Air conditioning cut system	EC6-1066, "AIR CONDITIONING CUT CONTROL : System Description"
Automatic speed control device (ASCD)	EC6-1074, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
CAN communication	EC6-1081, "CAN COMMUNICATION : System Description"
Cooling fan control	EC6-1069, "COOLING SYSTEM : System Description (Charge Air Cooler Cooling Control System)"
Thermal management control	EC6-1071, "THERMAL MANAGEMENT CONTROL : System Description"
Evaporative emission system	EC6-1073, "EVAPORATIVE EMISSION SYSTEM : System Description"
Intake valve timing control	EC6-1062, "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC6-1063, "EXHAUST VALVE TIMING CONTROL : System Description"
Turbocharger boost control	EC6-1065, "TURBOCHARGER BOOST CONTROL : System Description"
Fuel pump control module (FPCM)	EC6-1061, "FUEL PUMP CONTROL MODULE (FPCM) : System Description"
Infiniti Drive Mode Selector	EC6-1076, "Infiniti Drive Mode Selector : System Description"
Oil control system	EC6-1074, "OIL CONTROL SYSTEM : System Description"

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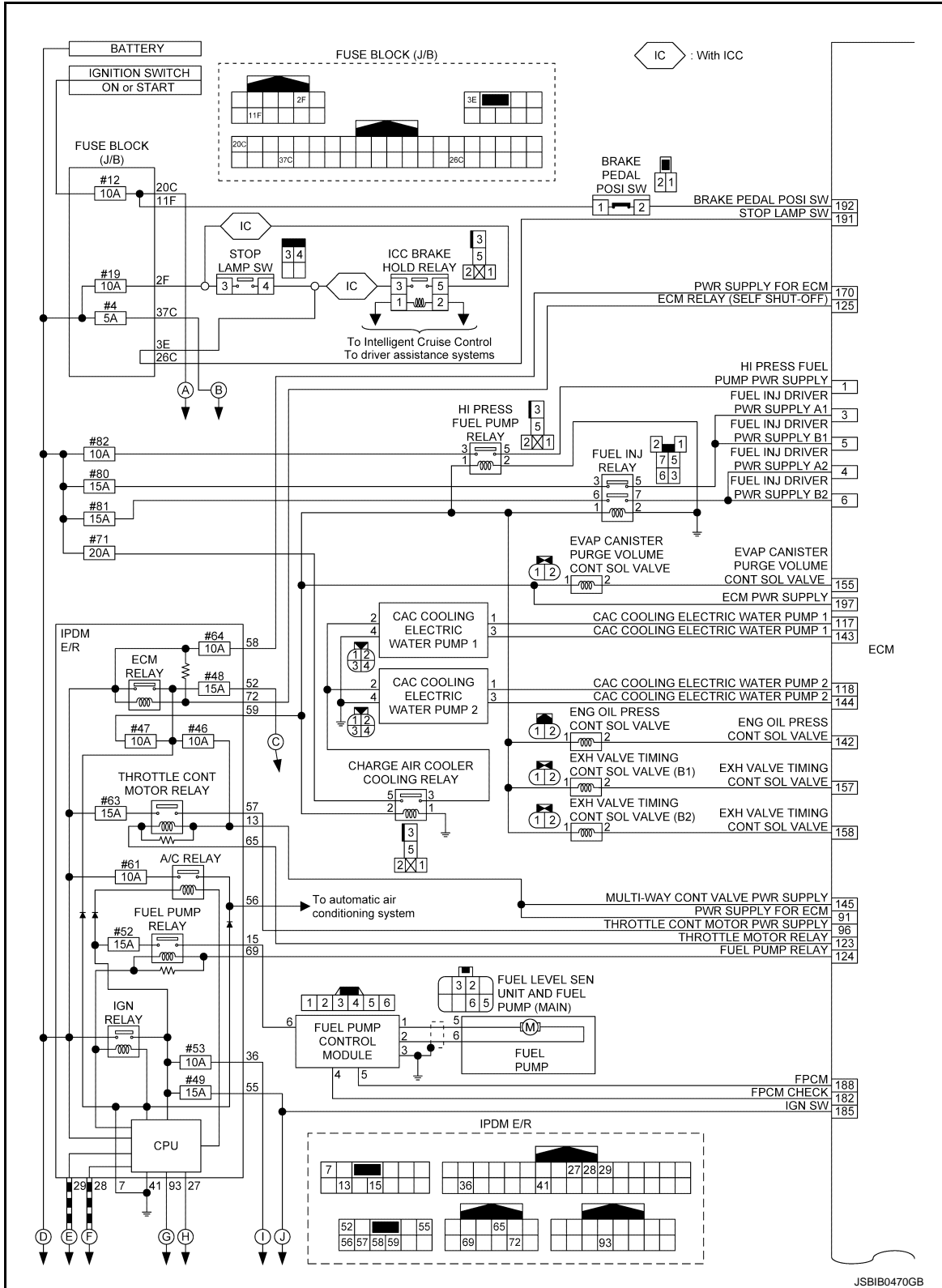
SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM : Circuit Diagram

INFOID:000000013844086

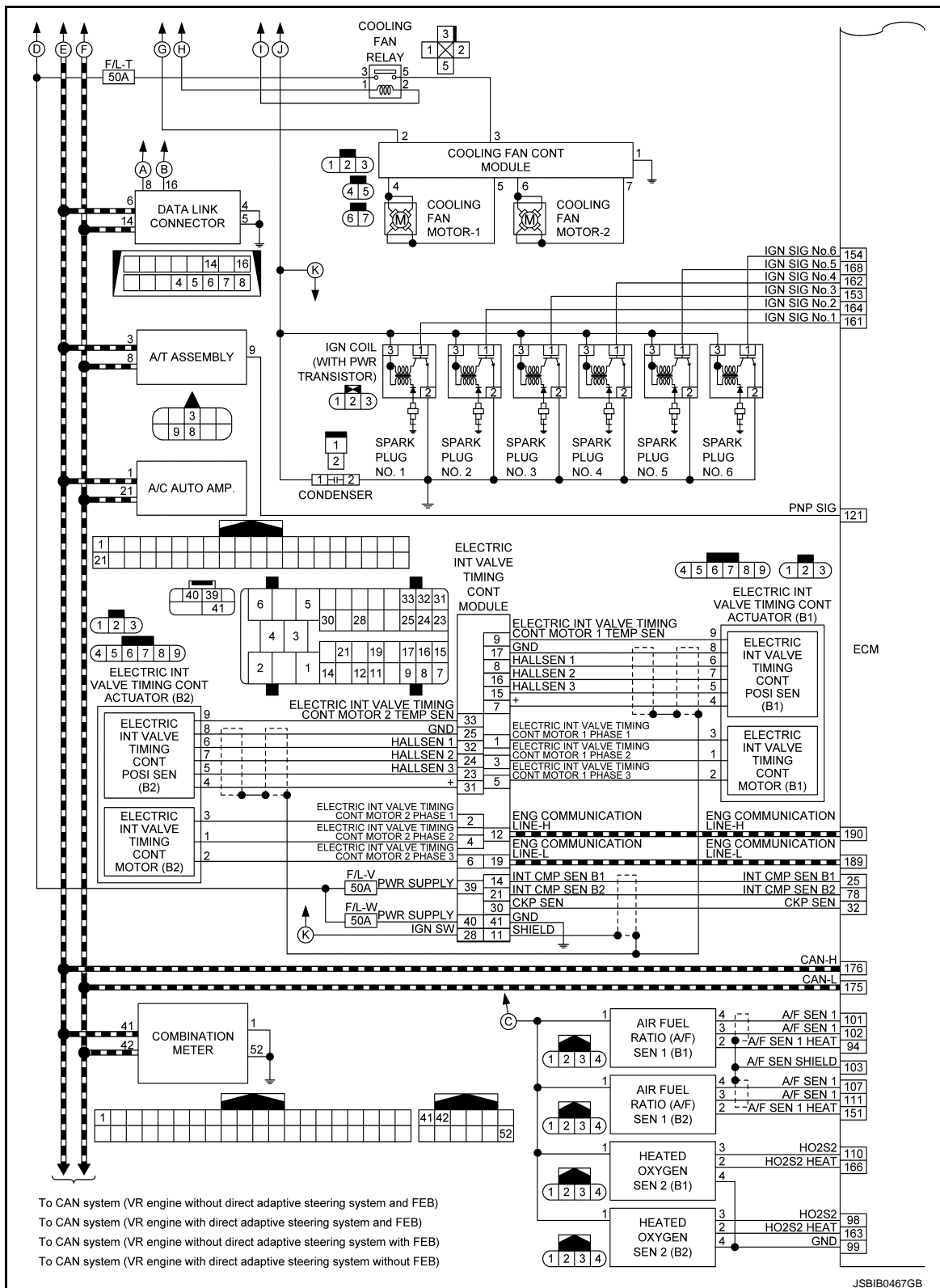


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SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]



To CAN system (VR engine without direct adaptive steering system and FEB)
 To CAN system (VR engine with direct adaptive steering system and FEB)
 To CAN system (VR engine without direct adaptive steering system with FEB)
 To CAN system (VR engine with direct adaptive steering system without FEB)

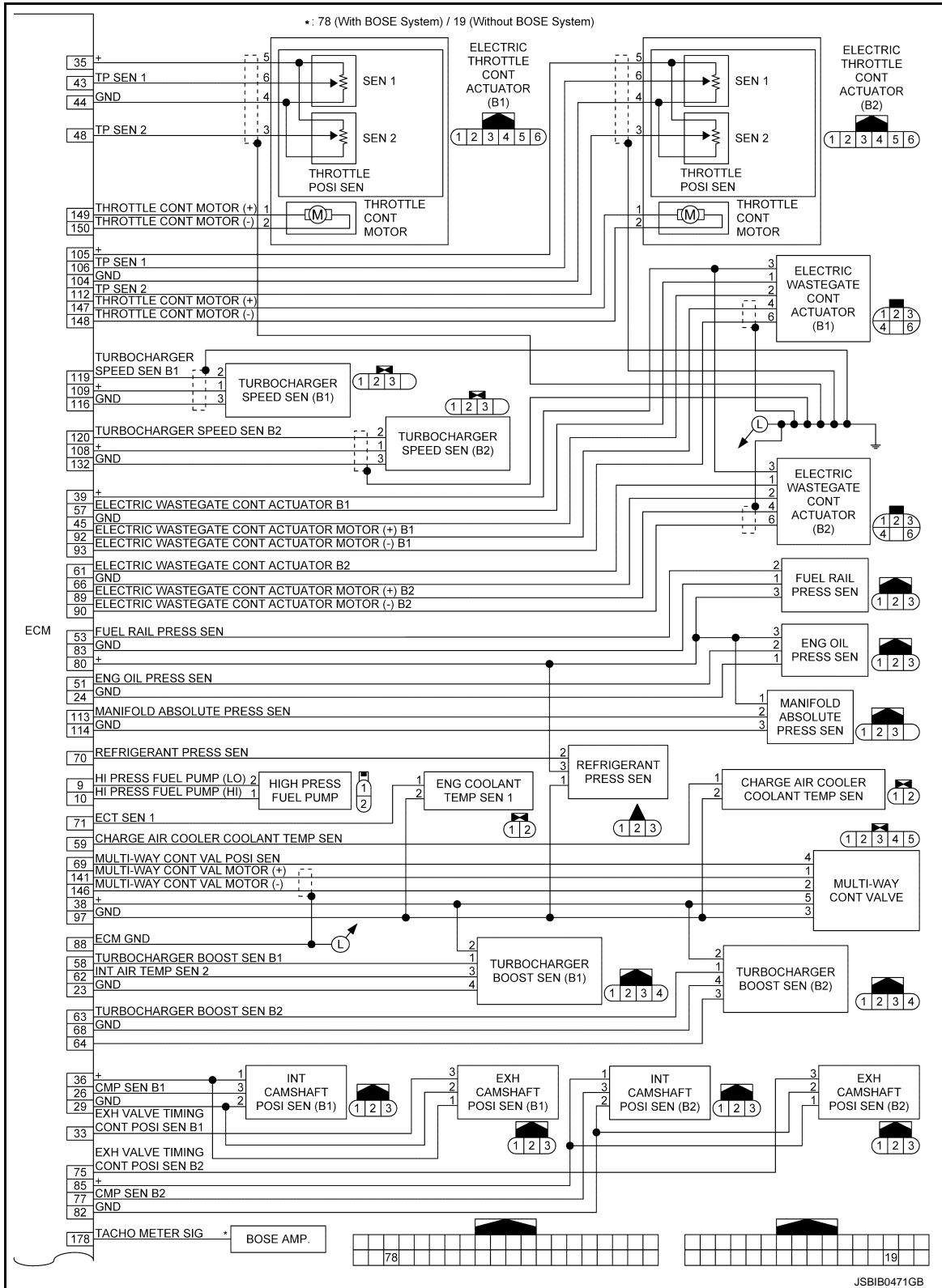
JSBIB0467GB

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SYSTEM

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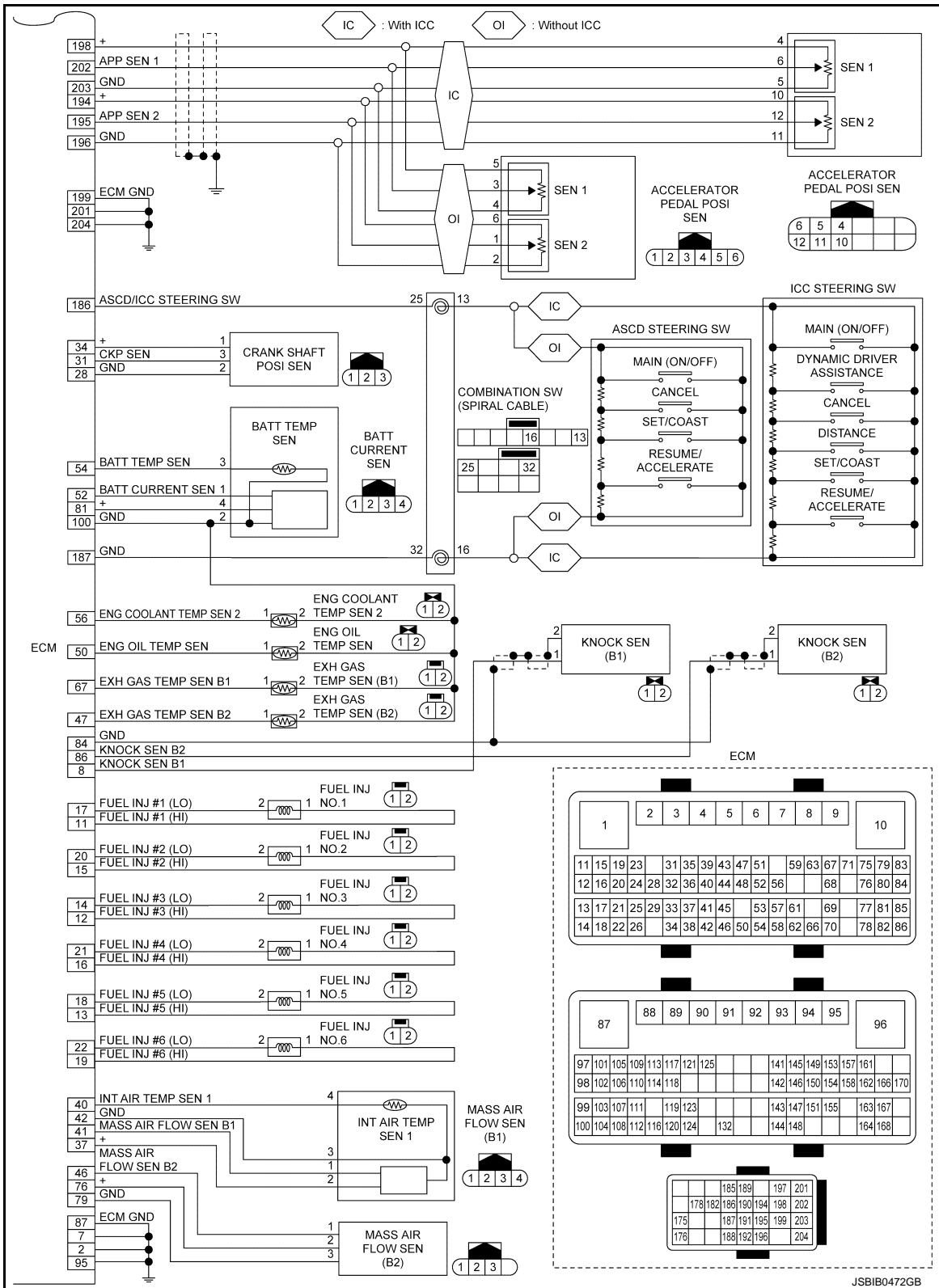
[VR30DDTT FOR MEXICO]



SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]



ENGINE CONTROL SYSTEM : Fail safe

INFOID:000000013844087

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. <ul style="list-style-type: none"> • Engine output control 1: Driving at 70 km/h or more is possible. • Engine output control 2: Driving at 40 km/h or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode		<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control 1
C		Engine output control 2
D	Device fix mode	
E	Combustion control mode	Stratified charge combustion control at starting
F		<ul style="list-style-type: none"> • Idle speed control • Recovery speed control at decelerating • Idle neutral control*
G		<ul style="list-style-type: none"> • Ignition timing correction control • Retardation control

*: Not applicable

Fail Safe List

x:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior							Others
		Pattern							
		A	B	C	D	E	F	G	
U012E U042F	Engine communication	—	—	—	x	x	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	x	—	x	—	
P0010 P0020	Electric intake valve timing control module	—	—	—	x	x	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	x	—	x	—	

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

DTC No.	Detected items	Vehicle behavior							Others	
		Pattern								
		A	B	C	D	E	F	G		
P0011 P0021	Intake valve timing control	—	—	—	×	—	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: When VTC mechanism sticks, camshaft position does not change from position of stuck angle.	EC6
P0014 P0024	Exhaust valve timing control	—	—	—	×	—	—	—	—	C
P0046 P004B	Electric wastegate actuator motor	—	×	—	×	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)	D
P0078 P0084	Exhaust valve timing control solenoid valve	—	—	—	×	—	—	—	—	E
P0090	High pressure fuel pump	×	—	—	×	×	—	—	—	
P0102 P0103 P010C P010D	Mass air flow sensor	—	×	—	×	—	—	×	—	F
P0107 P0108	Barometric pressure sensor (built-into ECM)	—	×	—	×	—	—	—	—	G
P0117 P0118	Engine coolant temperature sensor	—	—	—	—	—	×	—	—	H
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 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.	I
P0171 P0172 P0174 P0175	Fuel injection system	×	—	—	—	—	×	—	—	K
P0190	Fuel rail pressure sensor	×	—	—	×	—	×	—	—	L
P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	—	Exhaust valve timing control does not function.	M
P0201 P0202 P0203 P0204 P0205 P0206	Fuel injector	×	—	—	—	×	—	—	—	N
P0234 P1334	Turbocharger system	—	×	—	×	—	—	—	—	O
P0235	Turbocharger boost sensor	—	×	—	×	—	—	—	—	
P0300 P0301 P0302 P0303 P0304 P0305 P0306	Misfire	×	—	—	—	—	×	—	—	P

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0335	Crankshaft position sensor	—	—	—	×	×	—	—	—
		—	—	—	×	—	×	—	
P0340 P0345	Intake camshaft position sensor	—	—	—	×	×	—	—	—
		—	—	—	×	—	×	—	
P1140 P1145		×	—	—	×	—	—	×	—
P0365 P0390	Exhaust camshaft position sensor	—	—	—	×	—	—	—	—
P0500	Vehicle speed sensor	×	—	—	—	—	×	—	—
P0524	Engine oil pressure	—	—	—	—	—	—	—	<ul style="list-style-type: none"> • ECM illuminates engine oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON.
P0603 P0607	ECM	—	—	—	—	—	—	—	—
		—	×	—	—	—	—	—	ASCD operation may be deactivated.
P0604		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0605		—	—	—	—	—	—	—	—
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0606		—	—	—	—	—	—	—	—
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P060A		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
		—	×	—	×	—	—	—	<ul style="list-style-type: none"> • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • ASCD operation may be deactivated.
P060B		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P062B	—	—	—	—	—	—	—	—	
	×	—	—	—	×	—	—	—	
P0641	Sensor power supply	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	
P0643		—	—	—	×	—	—	—	—

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P14A4 P14A5 P14AD P14AE	Charge air cooler cooling electric water pump	—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at the command speed.
P14A7 P14B0		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at full speed.
P14A9 P14AA P14AC P14B2 P14B3 P14B5		—	—	—	—	—	—	—	Charge air cooler cooling electric water pump stops.
P1197	Out of gas	—	—	—	×	—	—	—	—
P1233 P2101	Electric throttle control	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1236 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.
P1238 P2119	Electric throttle control actuator	—	×	—	—	—	—	—	—
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1290 P2100 P2103	Throttle control motor relay	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
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	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	—	—	—	×	—	—	—	—
P23E9 P23EA P2614 P2615	Intake camshaft position sensor	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	
P23EB P2616 P2617 P2618		—	—	—	×	×	—	—	
P2619		—	—	—	×	—	×	—	
P2562 P2566 P2586 P2590	Electric wastegate control valve position sensor	—	×	—	×	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)
P2578 P2593	Turbocharger speed sensor	—	—	—	—	—	—	—	Torque have to be limited to the operating range that does not generate the over speed of the turbocharger.

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SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

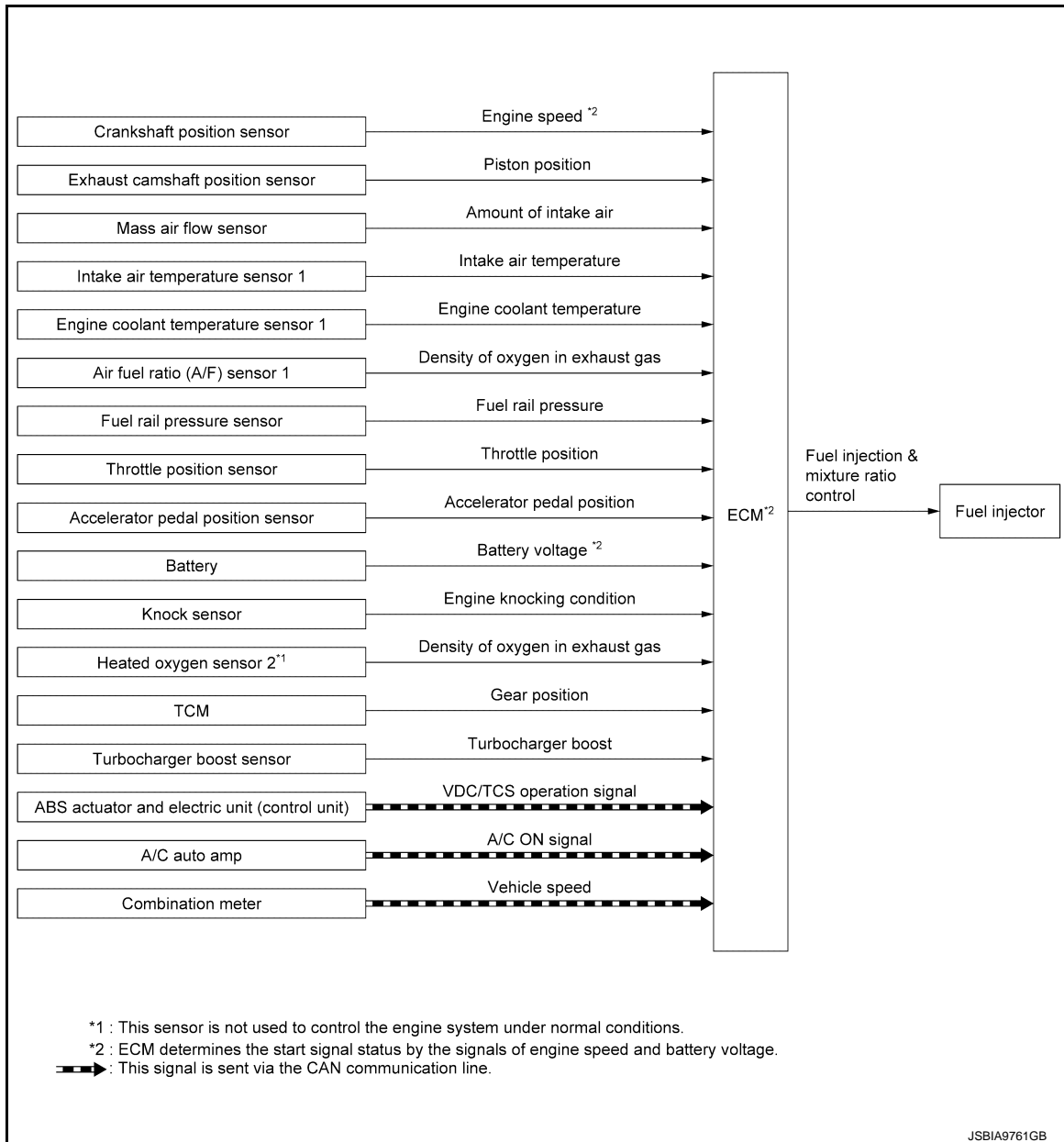
DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1	Electric intake valve timing control actuator								ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.
P34C4 P34C5	Electric intake valve timing control actuator	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
P34C8	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	

DIRECT INJECTION GASOLINE SYSTEM

DIRECT INJECTION GASOLINE SYSTEM : System Description

INFOID:000000013844088

SYSTEM DIAGRAM



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 pressure) from the crankshaft position sensor, exhaust 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

< SYSTEM DESCRIPTION >

- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever position is changed from N to D
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

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.

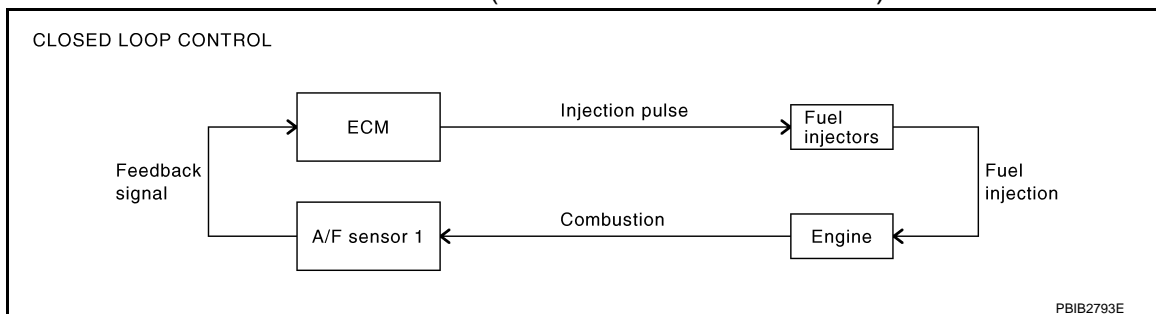
Right after a start with the engine cold, the catalyst warm-up is accelerated by stratified-charge combustion.

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 [EC6-1031. "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 senses an oxygen concentration of exhaust gas at downstream of catalytic converter. Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

• Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor sensing element) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

SYSTEM

[VR30DDTT FOR MEXICO]

< SYSTEM DESCRIPTION >

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes "short-term fuel trim" and "long-term fuel trim".

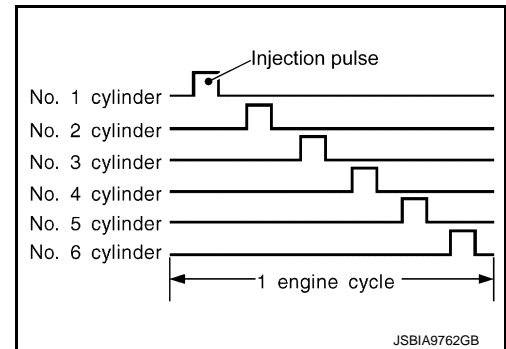
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long-term fuel trim" is overall fuel compensation carried out over time to compensate for continual deviation of the "short-term fuel trim" from the central value. Continual deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING

Sequential Direct Injection Gasoline System

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

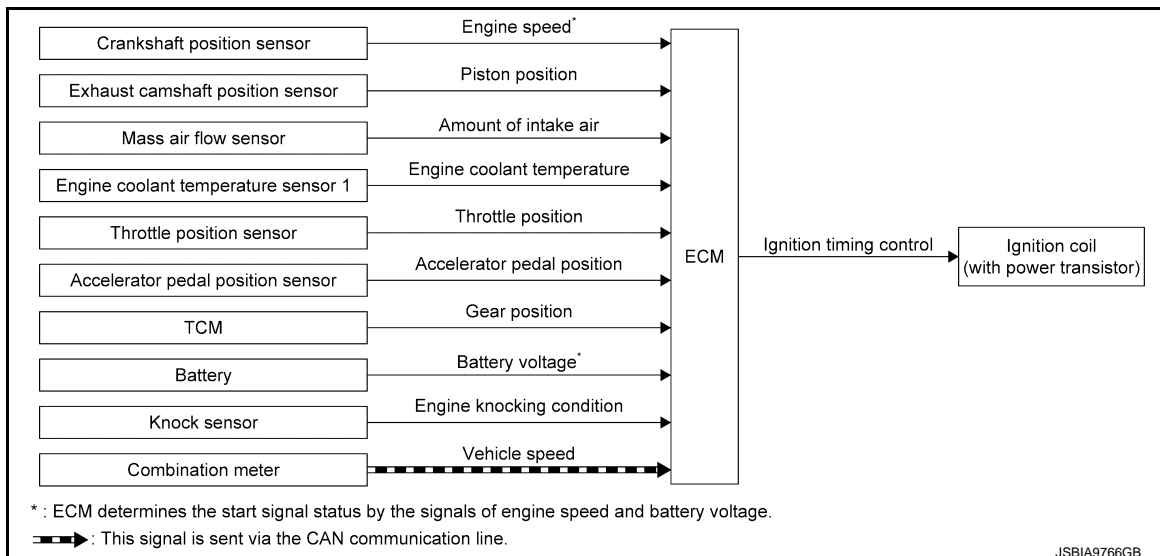
Fuel to each cylinder is shut-off during deceleration, operation of the engine at excessively high speed or operation of the vehicle at excessively high speed.

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Description

INFOID:000000013844089

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

Ignition order: 1 - 2 - 3 - 4 - 5 - 6

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

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.

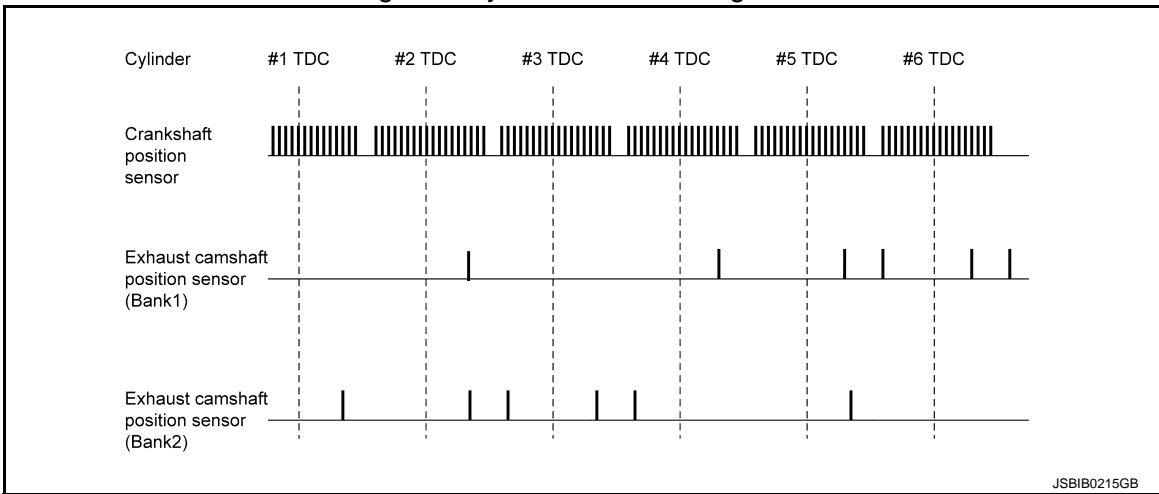
The ECM receives information such as the injection pulse width and exhaust camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Ignition cylinder detection signals

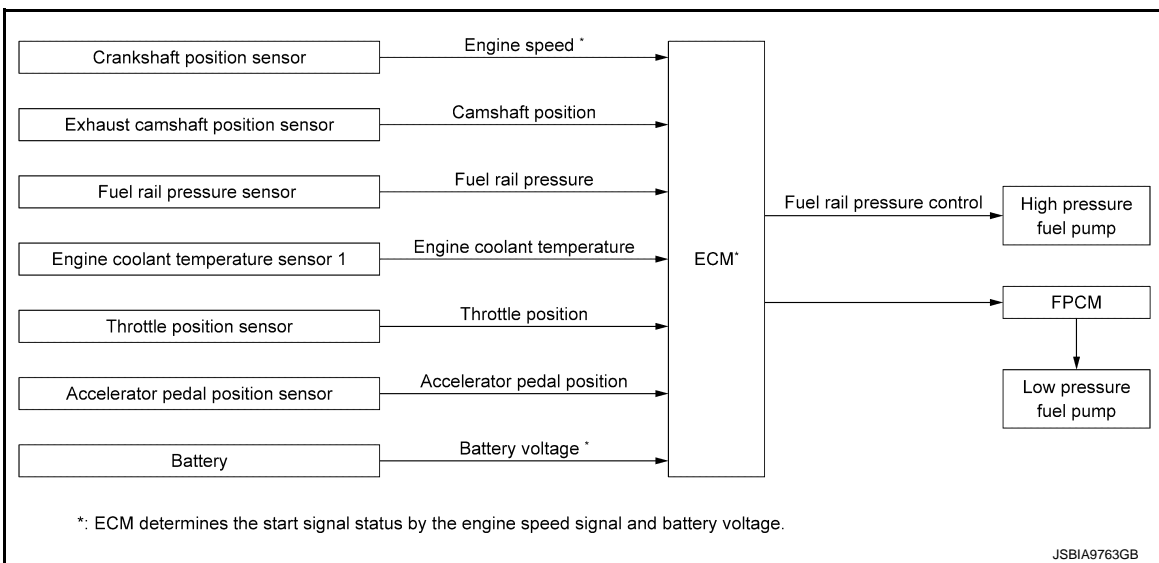


FUEL PRESSURE CONTROL

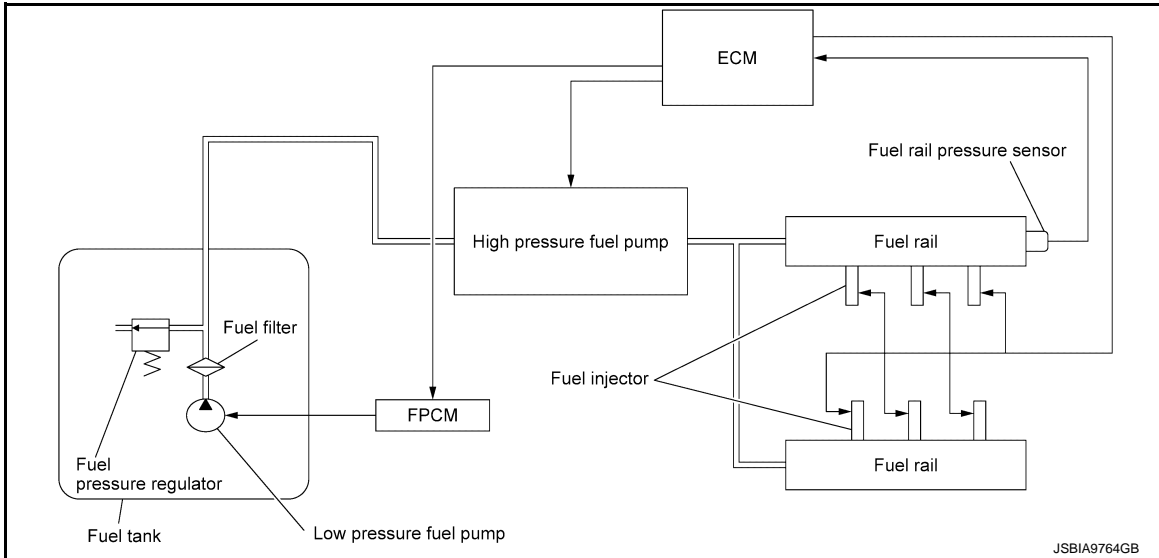
FUEL PRESSURE CONTROL : System Description

INFOID:000000013844090

SYSTEM DIAGRAM



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

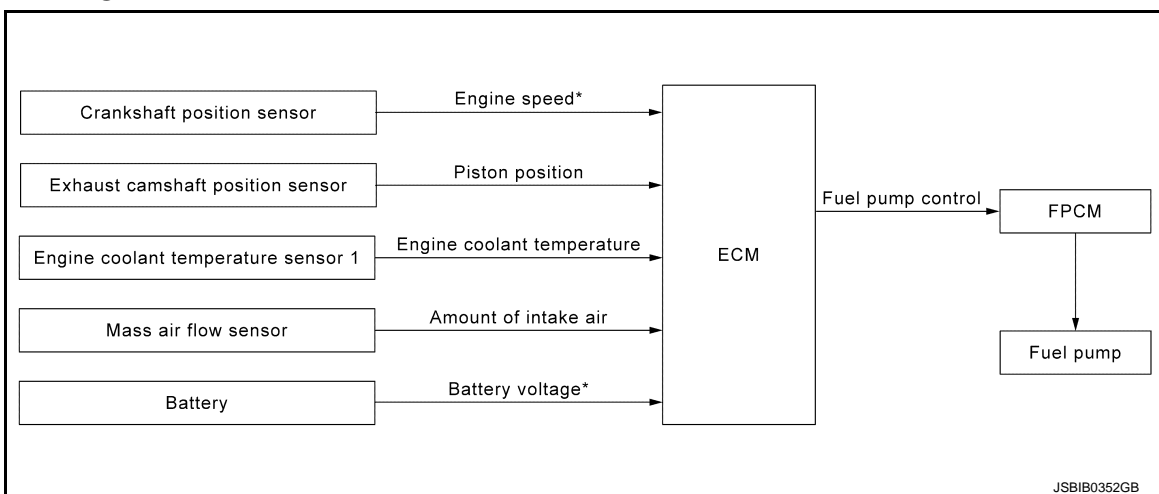
The high pressure fuel pump raises the pressure of the fuel sent from the low pressure fuel pump. Actuated by the exhaust camshaft, the high pressure fuel pump activates the high pressure fuel pump solenoid based on a signal received from ECM, and adjusts the amount of discharge by changing the timing of closing the inlet check valve to control fuel rail pressure.

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : System Description

INFOID:000000013844091

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The fuel pump control module (FPCM) controls the discharging volume of the fuel pump by the FPCM control signals (Low/Mid/High) depending on driving conditions.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

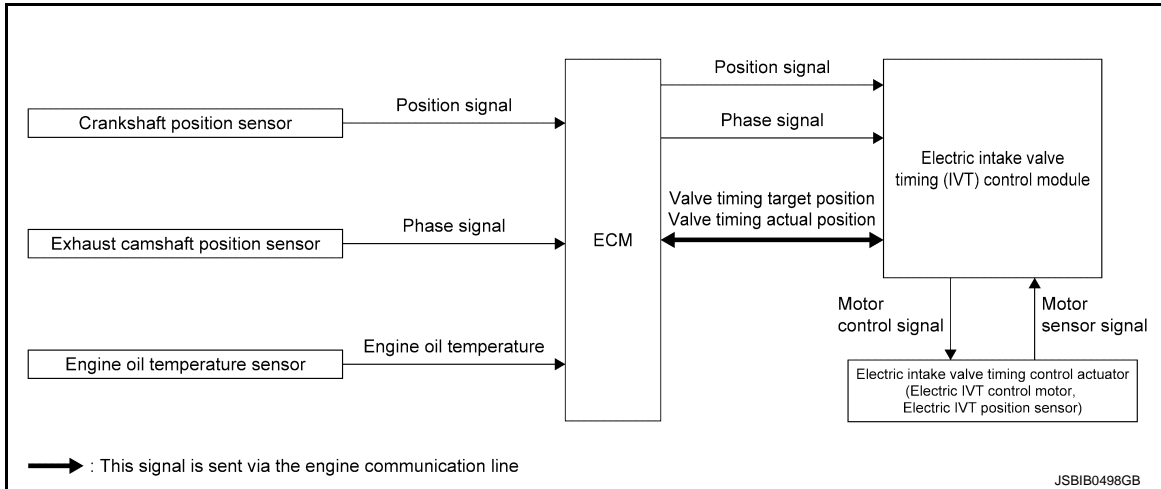
Conditions	Amount of fuel flow	Supplied voltage
For 1 second after turning ignition switch ON	Low/Mid	Approximately 9.9 V
<ul style="list-style-type: none"> • Engine cranking • Engine coolant temperature is below 10°C (50°F) • Engine is running under high load and high speed conditions 	High	Battery voltage (11 – 14 V)
Except the above	Low/Mid	Approximately 9.9 V

INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Description

INFOID:0000000013844092

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

This engine uses an electric VTC. The electric VTC responds faster than hydraulic VTC and allows operating under low engine speed condition. This improves the fuel economy, engine output, and exhaust performance. This mechanism continuously controls the phase of camshaft by the electric intake valve timing (IVT) control actuator with the amount of intake valve operation held constant.

ECM transmits a crankshaft position signal and an intake camshaft position signal to the electric IVT control module and transmits target values of electric IVT control actuator via engine communication (CAN).

The electric IVT control module controls the electric IVT control actuator according to a signal from ECM and changes the opening and closing timing of intake valve. Furthermore, the electric IVT control actuator has a diagnostic function and transmits a DTC detection signal to ECM via engine communication when detecting a system error.

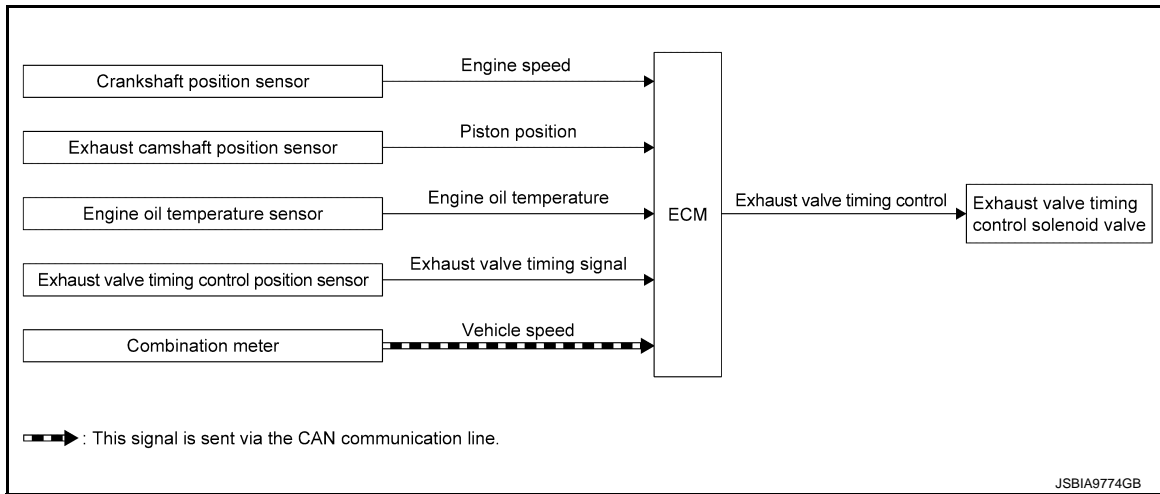
Status of electric intake valve timing control actuator	Electric intake valve timing control actuator activation
Advanced angle	Electric IVT control motor rotates faster than camshaft. This allows the camshaft position (cam phase) against camshaft sprocket to move toward the advanced angle.
Maintained	Electric IVT control motor and camshaft rotate at the same speed.
Retard angle	Electric IVT control motor rotates slower than camshaft. This allows the camshaft position (cam phase) against camshaft sprocket to move toward the retard angle.

EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL : System Description

INFOID:000000013844093

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

With the exhaust valve timing controller which controls the phase of exhaust camshaft to optional position continuously, ECM improves both low-middle speed torque and high speed performance, emission and fuel efficiency by optimizing the exhaust valve open/close timing according to driving conditions.

The exhaust valve timing controller is hydraulically controlled by the exhaust valve timing control solenoid valve.

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 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.

EXHAUST VALVE TIMING CONTROL SOLENOID VALVE CONTROL

The exhaust valve timing control solenoid valve is driven ON-OFF (duty control) by ECM output signal, and controls the open/close timing of the exhaust valve to the optimum by changing its duty ratio according to the vehicle's driving condition.

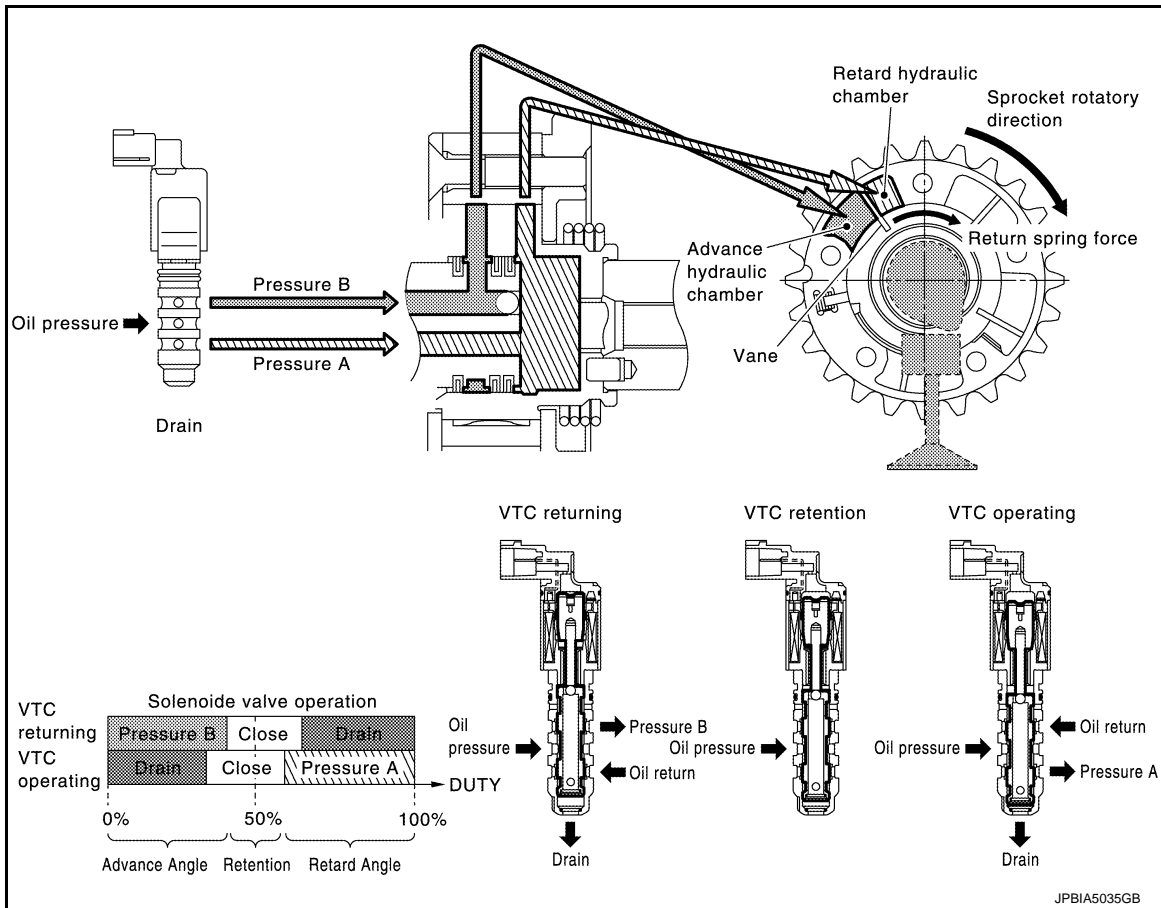
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SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]



Exhaust valve timing control solenoid valve condition	Exhaust valve timing controller operation
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full advanced position by the reaction force of return spring, improving the starting performance of the engine.
Active (Retard angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the retard angle chamber of the controller. And advanced angle chamber oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle. This condition brings about the greater overlap with the intake valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.
Return (Advanced angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the advanced chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advanced angle.

EXHAUST VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

The exhaust camshaft position sensor detects a cam position, by using the groove on the plate located at the rear of the exhaust camshaft.

Feedback Control

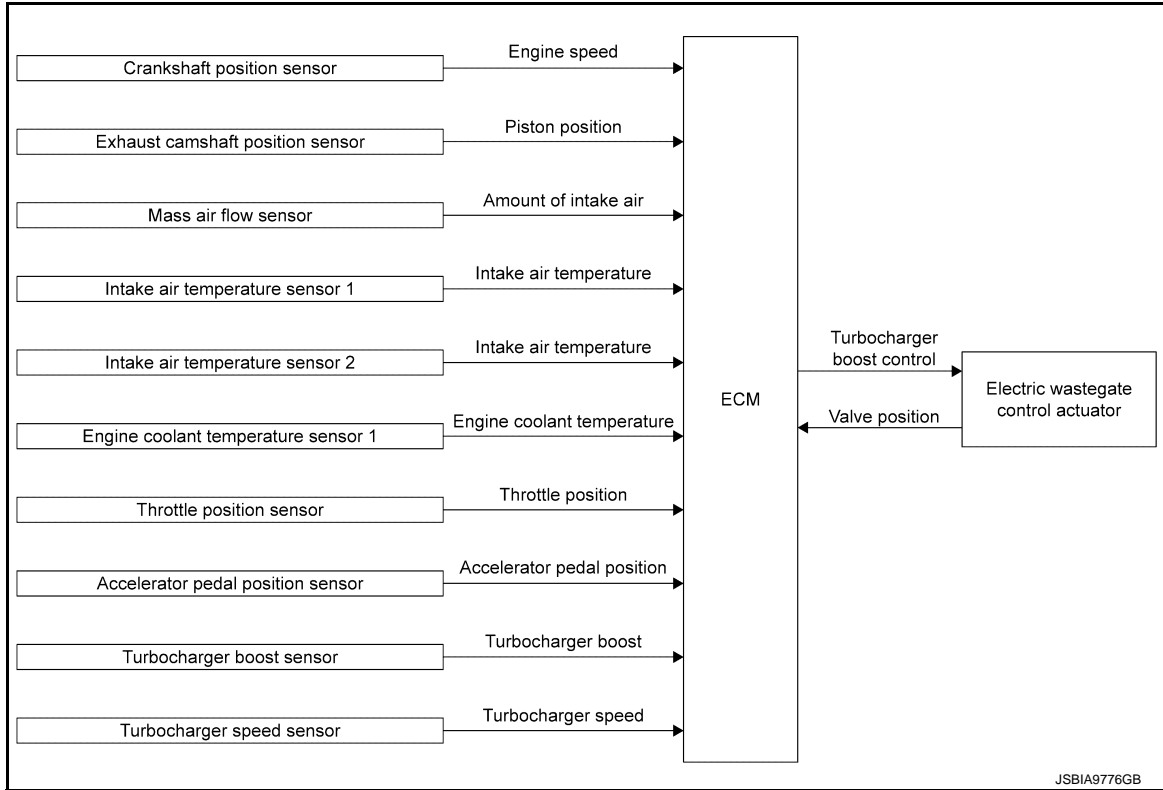
The exhaust camshaft position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the exhaust valve timing control solenoid valve to satisfy the optimum target valve opening/closing timing according to a driving condition.

TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : System Description

INFOID:000000013844094

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The wastegate is installed inside the exhaust side housing of turbocharger and connected via electric wastegate control actuator and link rod. When the wastegate opens, part of exhaust gas directly flows into exhaust pipe through bypass without passing the turbine. This limits the rise in boost pressure.

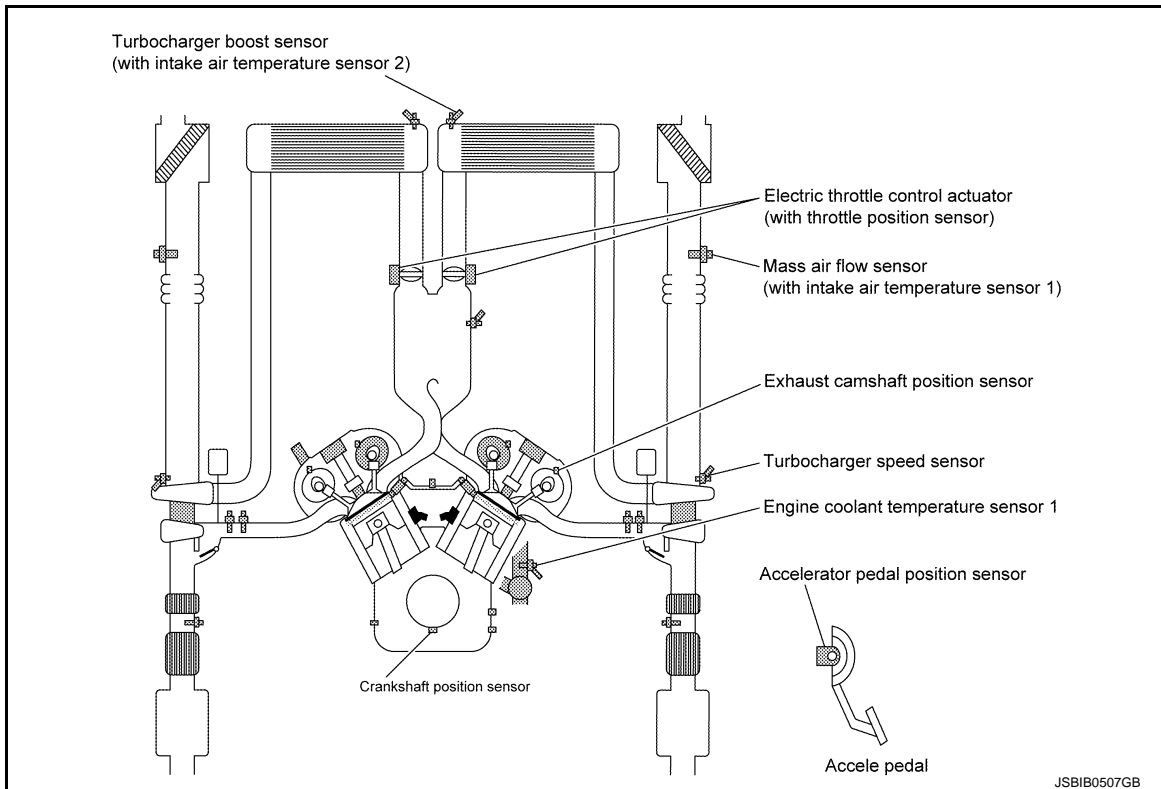
Furthermore, the introduction of electrically-controlled wastegate control valve enables the wastegate valve to be opened even in non-supercharging area, improving fuel consumption by the reduction of pumping loss.

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[VR30DDTT FOR MEXICO]



ECM controls boost pressure to make it suitable for driving conditions by controlling the electric wastegate control actuator.

ECM judges a target boost pressure based on engine speed, accelerator pedal position, and throttle valve position and calculates suction pressure near the entrance of compressor according to the amount of intake air and intake air pressure. Based on the above mentioned information, ECM judges wastegate valve opening angle to satisfy the target boost pressure.

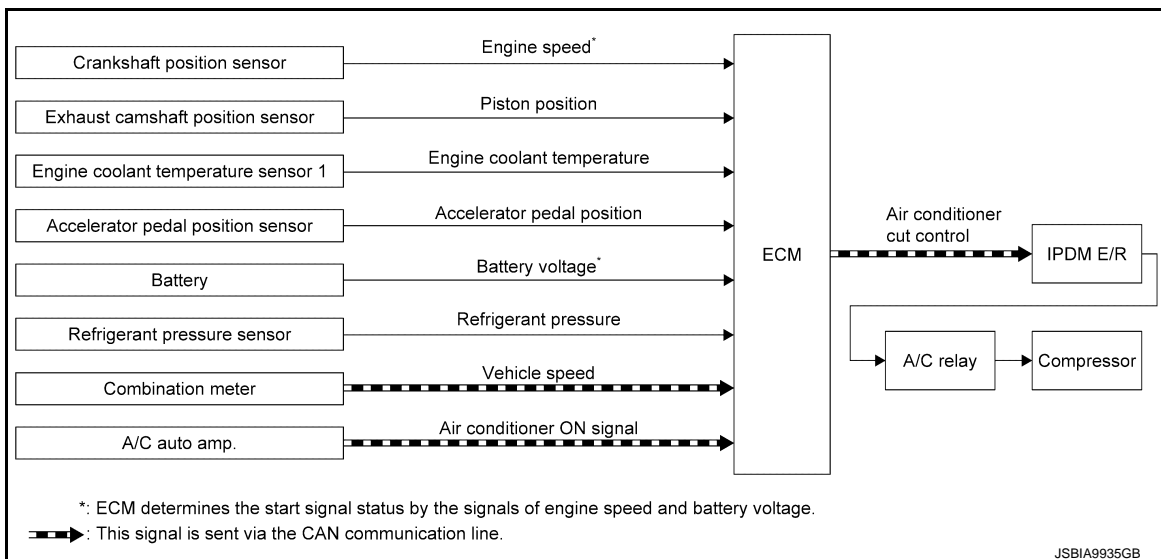
Furthermore, the revolution speed of compressor blade is directly monitored with a turbocharger speed sensor. This enables more accurate control of boost pressure and reduces damage to turbocharger caused by excess rise in revolution.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000013844095

SYSTEM DIAGRAM



Exhaust camshaft position sensor is not used for engine control operation.

SYSTEM DESCRIPTION

< SYSTEM DESCRIPTION >

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned off.

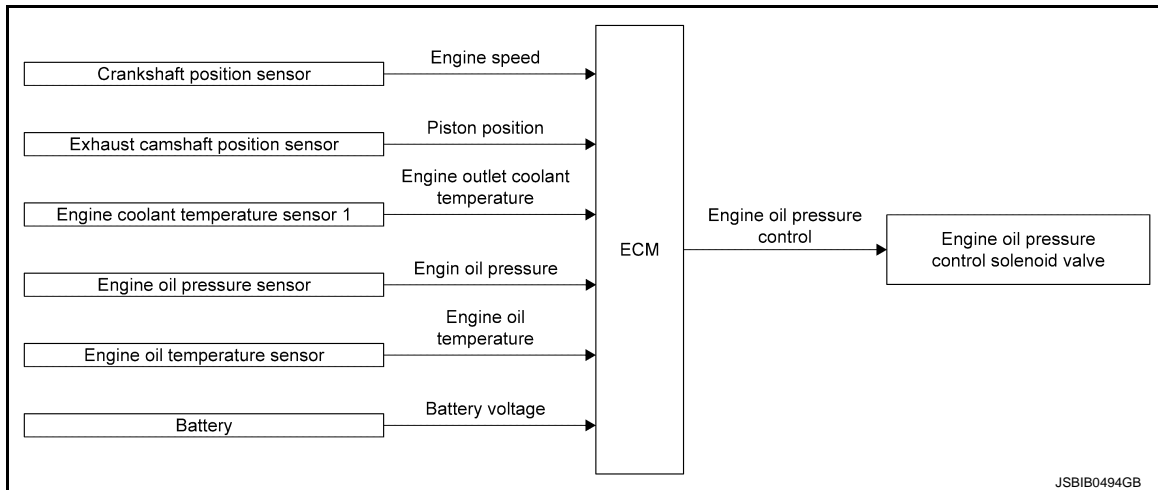
- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

ENGINE OIL PRESSURE CONTROL SYSTEM

ENGINE OIL PRESSURE CONTROL SYSTEM : System Description

INFOID:000000013844096

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

ECM performs the variable hydraulic control (low oil pressure control and high oil pressure control) based on signals from each sensor according to oil temperature and engine load. ECM activates the engine oil pressure control solenoid valve and switches to the low oil pressure control and high oil pressure control. ECM uses the low oil pressure control for 80-90% of the operating area to maintain low oil pressure and stops piston cooling jet (i.e. achievement of less than or equal to jet injection valve opening pressure).

High oil pressure control start condition

- High oil pressure control start condition
- High engine speed
- Coolant temperature is 60°C (140°F) or more under high engine load condition

Low oil pressure control start condition

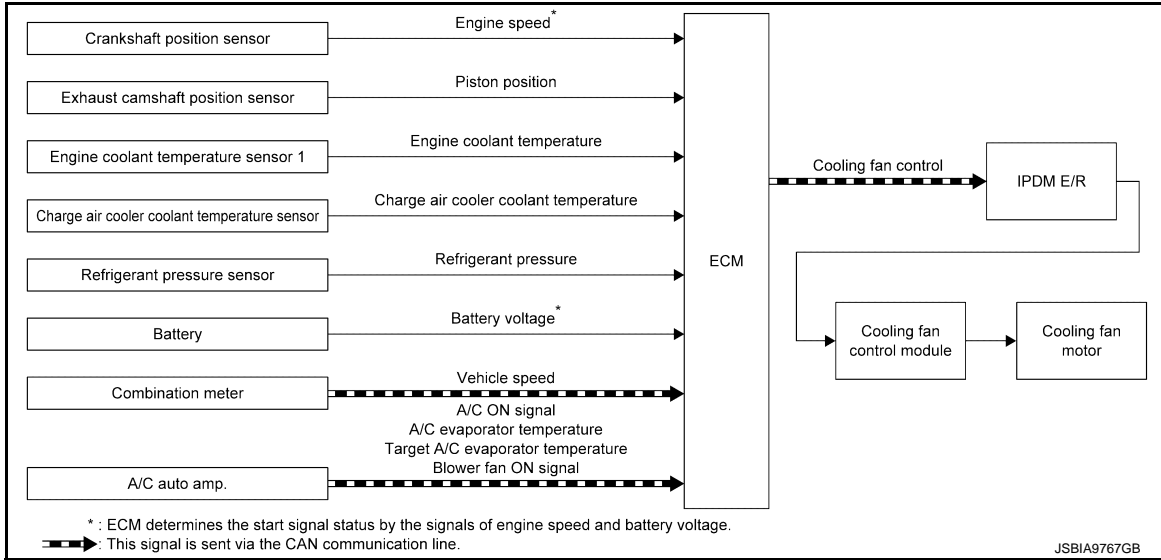
- Coolant temperature is less than 60°C (140°F) under low engine speed condition
- Coolant temperature is 60°C (140°F) or more under low engine load and low engine speed conditions

COOLING SYSTEM

COOLING SYSTEM : System Description (Cooling Fan Control System)

INFOID:000000013844097

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

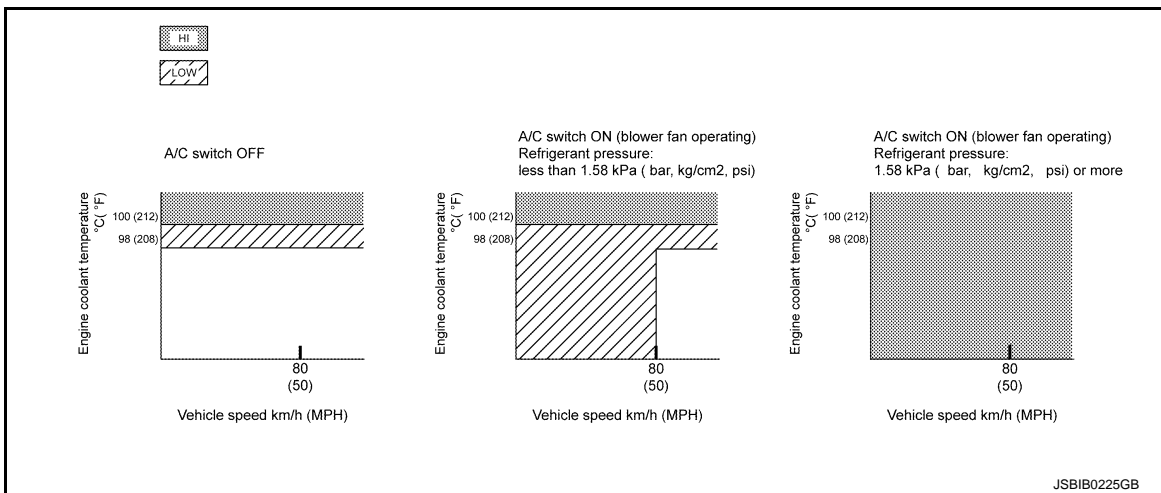
The cooling fan system of this vehicle cools both engine cooling main radiator and charge air cooler (CAC) cooling sub radiator with the same cooling fan. There are two cooling fan speed requests as follows:

- Cooling fan speed request for cooling the engine.
- Cooling fan request for cooling the charge air cooler.

ECM compares these requested speeds and transmits faster one to IPDM E/R as a cooling fan control signal. 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.

Cooling Fan Speed Request for Cooling the Engine

Cooling fan speed for cooling the engine is judged based on vehicle speed, engine coolant temperature, air conditioner ON signal, refrigerant pressure, target A/C evaporator temperature, and A/C evaporator temperature.



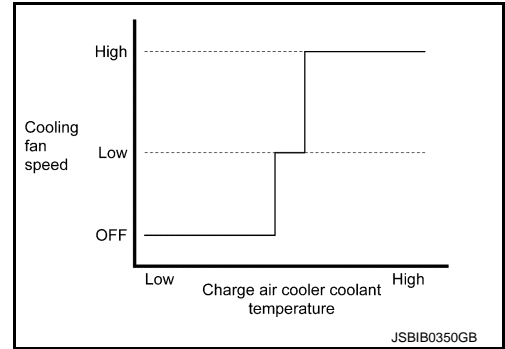
Cooling Fan Speed Request for Cooling the Charge Air Cooler

SYSTEM

[VR30DDTT FOR MEXICO]

< SYSTEM DESCRIPTION >

To judge a cooling fan speed for cooling the charge air cooler, ECM monitors an estimated ambient temperature and a CAC coolant temperature calculated based on a CAC coolant temperature sensor signal.



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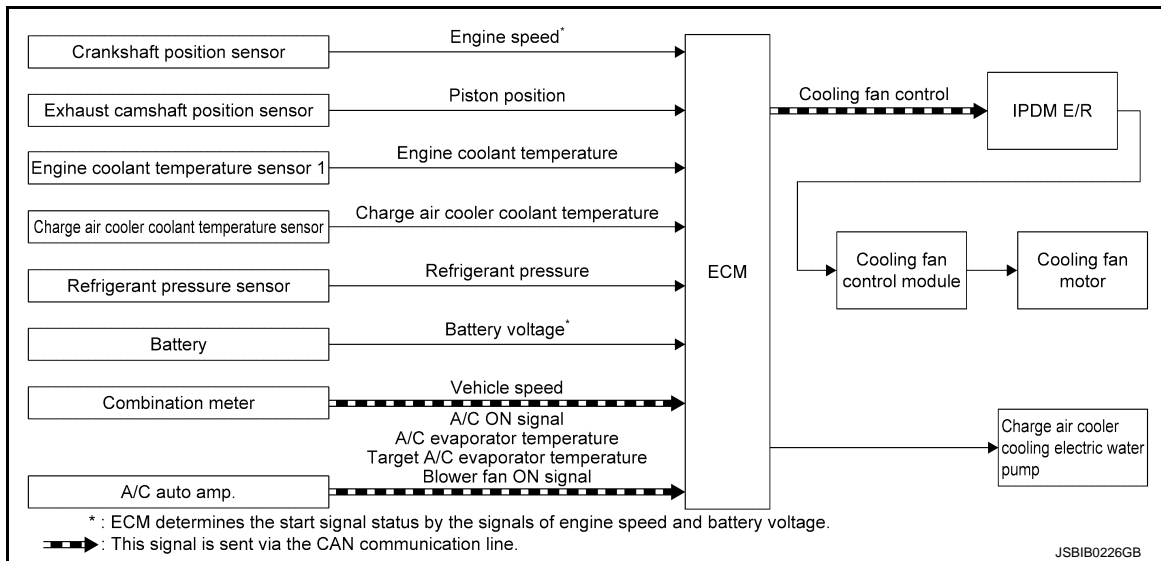
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COOLING SYSTEM : System Description (Charge Air Cooler Cooling Control System)

INFOID:000000013844098

SYSTEM DIAGRAM



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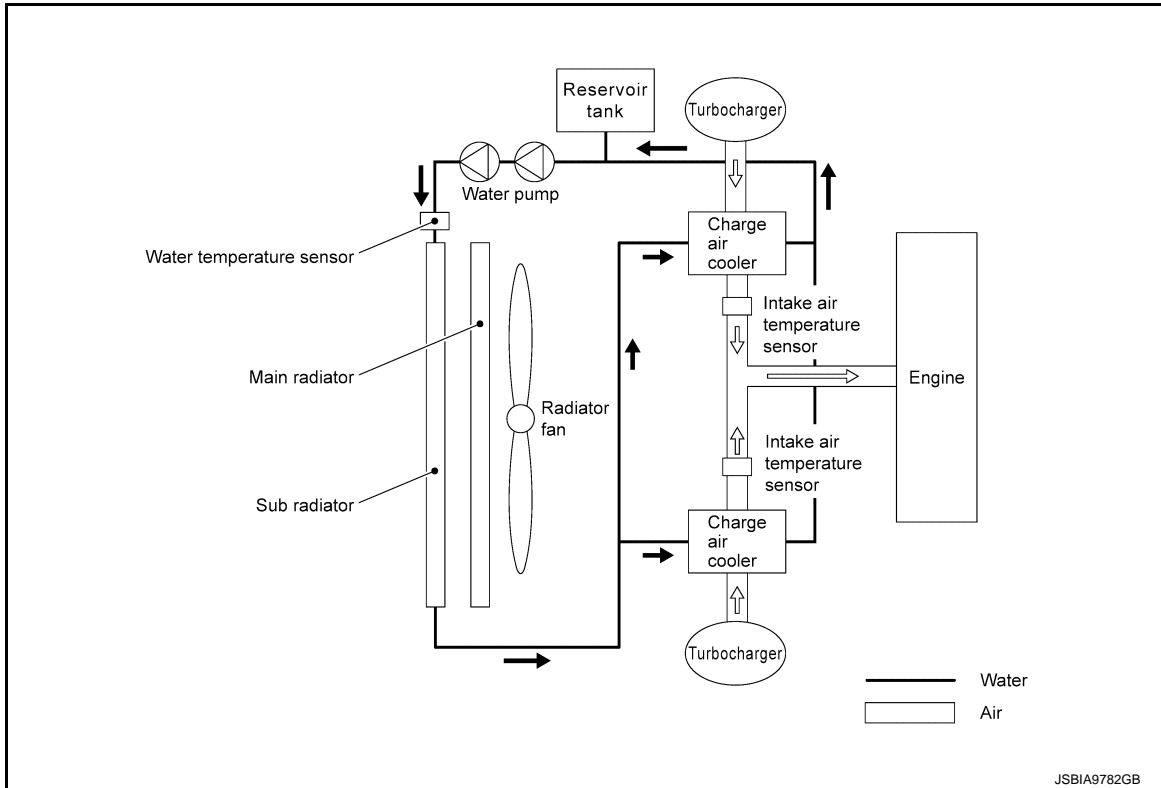
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SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

SYSTEM DESCRIPTION



This engine uses a water-cooled charge air cooler (CAC).

The CAC charging system has an independent cooling water circuit and circulates coolant from charge air cooler to sub radiator by using electric water pumps.

Water Pump and Cooling Fan Control During Engine Running

The charge air cooler (CAC) cooling water pump is controlled by two-stage speeds (High/Low) method.

ECM judges revolution speed of the water pump by calculating engine speeds and engine load and applying this information to the ECM-memorized control MAP.

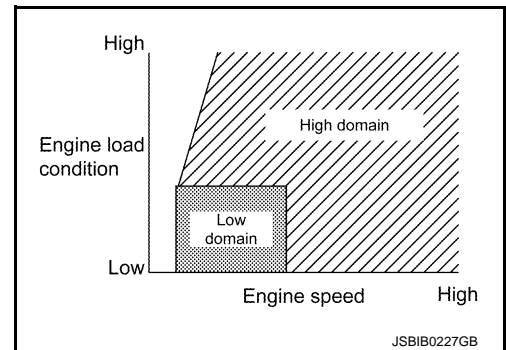
Furthermore, ECM monitors an estimated ambient temperature calculated based on an intake air temperature sensor signal and a CAC coolant temperature calculated based on a CAC coolant temperature sensor signal.

When the temperature difference between these two becomes wide during the low-speed control of the water pump, the water pump is switched to the high speed control and the cooling fan is activated.

ECM inhibits the operation of the water pump when the following condition is satisfied.

- Source voltage is abnormally high or low.
- CAC coolant temperature is -40°C (-40°F) or less.

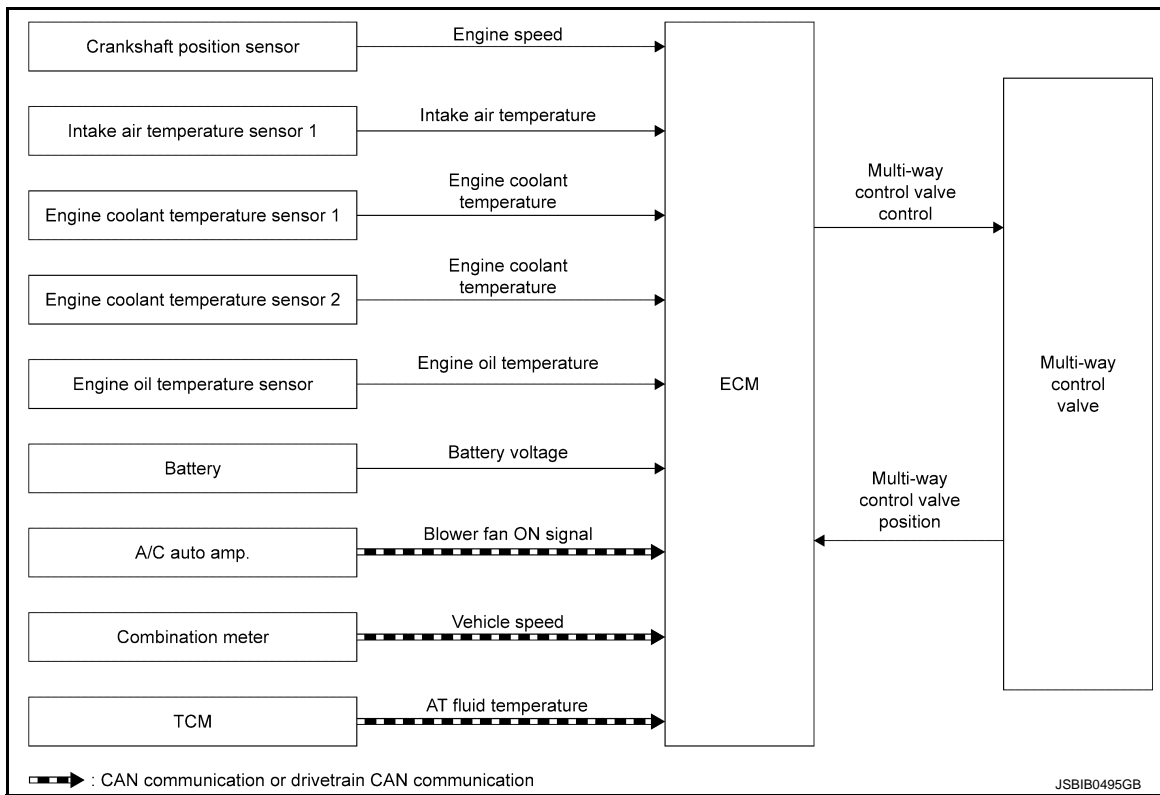
THERMAL MANAGEMENT CONTROL



THERMAL MANAGEMENT CONTROL : System Description

INFOID:000000013844099

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The multi-way control valve changes the paths to radiator, heater, and ATF warmer according to engine coolant temperature and driving conditions.

When coolant temperature is low, the paths to radiator, heater, and ATF warmer are closed and coolant is circulated only inside the engine to accelerate engine warm-up.

When coolant temperature is high, the paths to radiator, heater, and ATF warmer are opened and coolant is refrigerated. This raises the coolant temperature and oil temperature rapidly and improves the fuel economy by reducing friction among parts.

Operation

When the ignition switch is OFF, the valve is fully opened to accelerate bleeding the coolant channels.

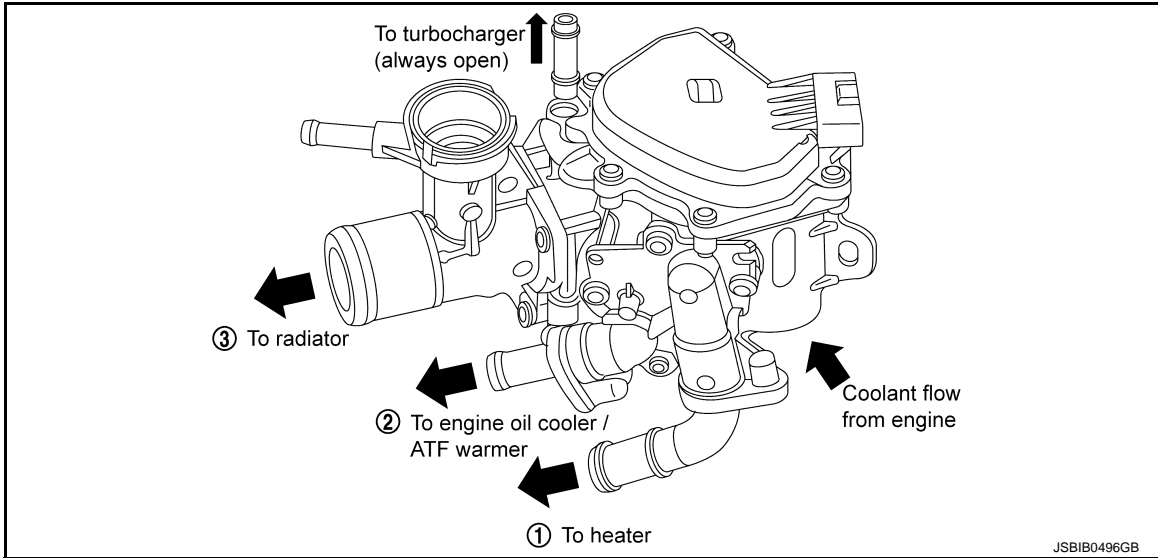
When receiving a blower fan ON signal ECM opens the flow path to the heater even when coolant temperature is low.

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< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]



Valve position	①	②	③
	Heater	Engine oil cooler* / ATF warmer	Radiator
A	Full close	Full close	Full close
B	Open	Full close	Full close
C	Full open	Open	Full close
D	Full open	Full open	Open
E	Full open	Full open	Full open

*: Not applicable

A: Closes all flow paths ①, ②, and ③ and circulates coolant only inside the engine.

B: Opens the flow path to heater and circulates coolant to heater.

C: Opens the flow path to ATF warmer and circulates coolant to heater and ATF warmer.

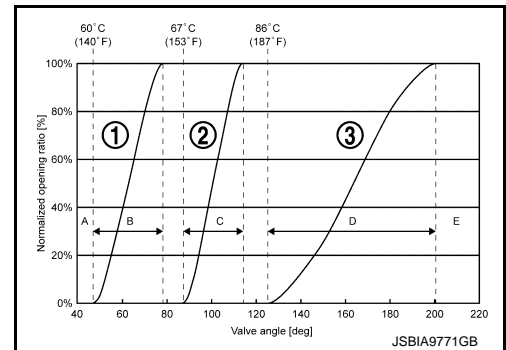
D: Opens the flow path to radiator and circulates coolant to heater, ATF warmer and radiator.

E: Opens all the flow paths ①, ②, and ③.

NOTE:

- The flow paths to the turbocharger are constantly ON.
- When detecting a malfunction in multi-way control valve, ECM fully opens the valve to secure cooling paths.

EVAPORATIVE EMISSION SYSTEM



SYSTEM

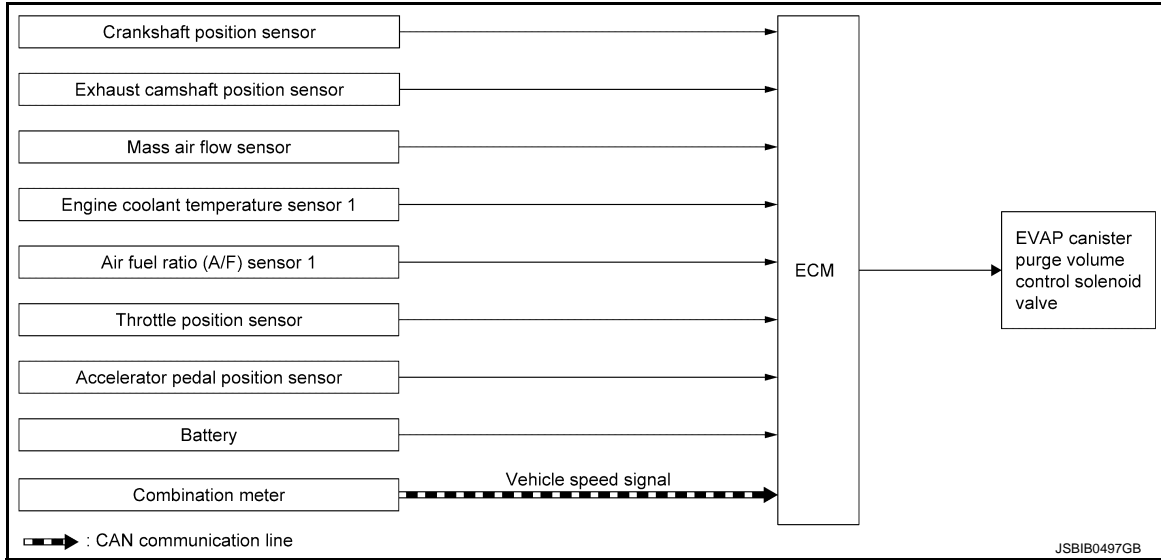
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[VR30DDTT FOR MEXICO]

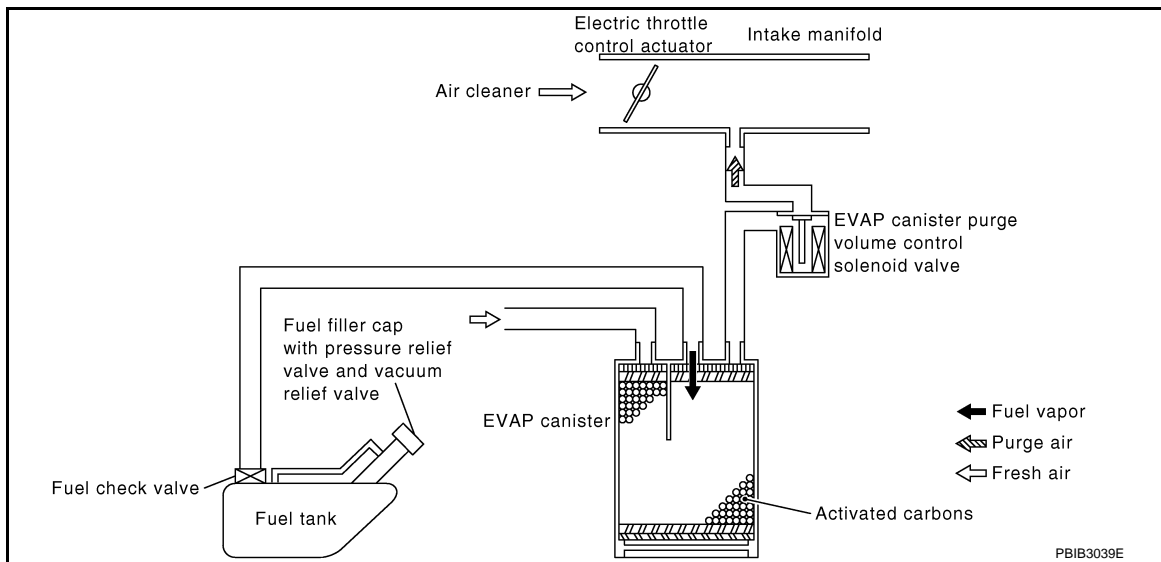
EVAPORATIVE EMISSION SYSTEM : System Description

INFOID:000000013844100

SYSTEM DIAGRAM



SYSTEM DESCRIPTION



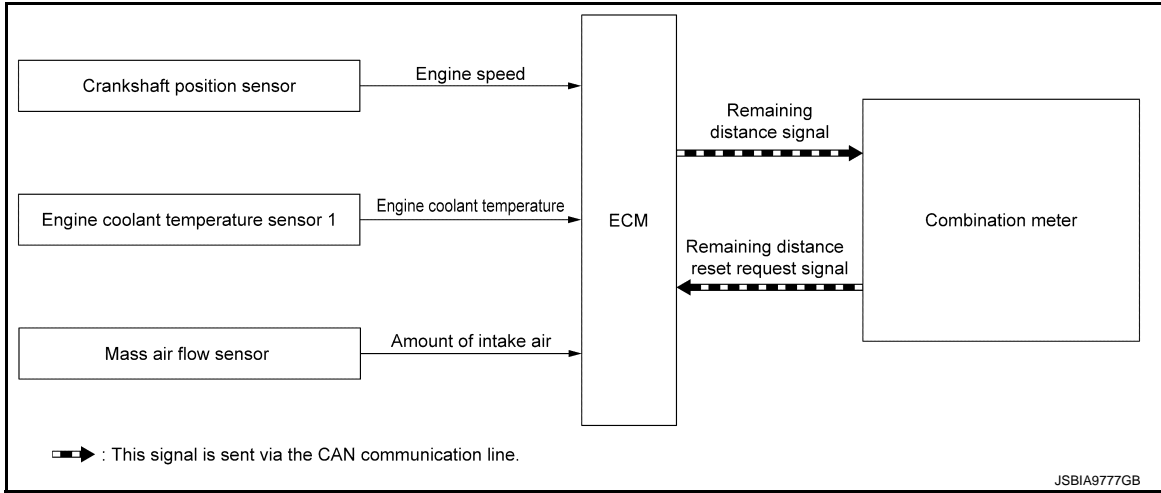
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank. The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases. EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

OIL CONTROL SYSTEM

OIL CONTROL SYSTEM : System Description

INFOID:000000013844101

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

ECM calculates engine load, engine coolant temperature, and engine speed based on signals from the mass air flow sensor, engine coolant temperature sensor 1, and crankshaft position sensor and monitors the deterioration state of engine oil.

When the mileage before engine oil change comes to approximately 1,500 km or less, pre-alert message is displayed to inform the driver that the maintenance timing is close as shown in the following table.

Remaining mileage to the engine oil change timing	Alert timing
1,000 km < the mileage ≤ 1,500 km (630 mile < the mileage ≤ 940 mile)	The first IGN ON after reaching 1,500 km (940 mile)
500 km < the mileage ≤ 1,000 km (310 mile < the mileage ≤ 630 mile)	The first IGN ON after reaching 1,000 km (630 mile)
500 km or less (310 mile or less)	The first IGN ON every 100 km (60 mile)

Furthermore, when the timing is passed, alert message is displayed every time when ignition switch is turned ON to inform the driver that engine oil change is necessary.

At oil change, the mileage must be reset using vehicle information display function.

NOTE:

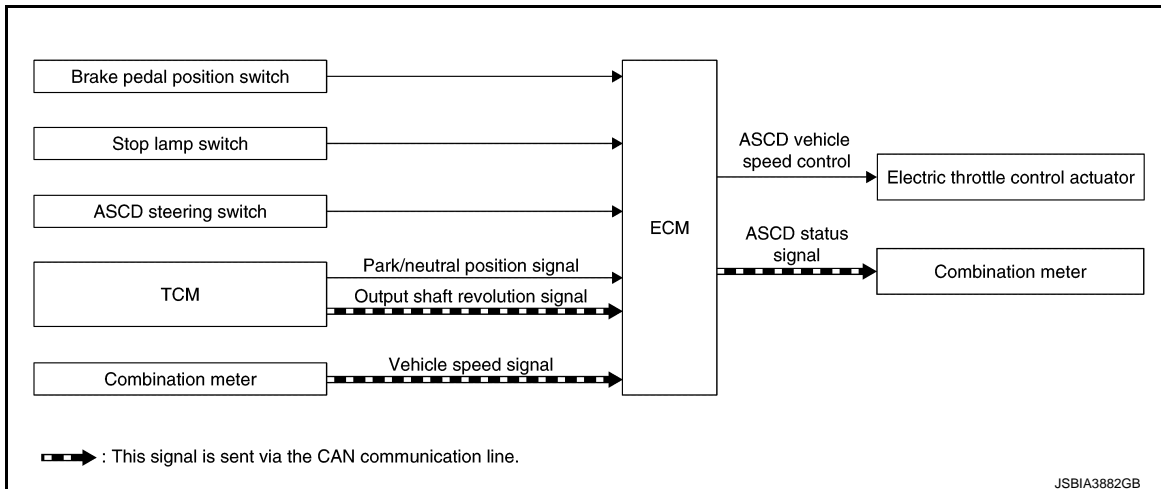
Alerted mileage might be different from actual mileage.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:000000013844102

SYSTEM DIAGRAM



BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 240 km/h (149 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 the ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

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 240 km/h (149 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

And then ASCD will maintain the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever is in the N, P, R position
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.

- Malfunction for some self-diagnoses regarding ASCD control: SET indicator will blink quickly.

If MAIN switch is turned to OFF while ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will maintain the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- A/T selector lever is in the P and N positions
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 240 km/h (149 MPH)

Infiniti Drive Mode Selector

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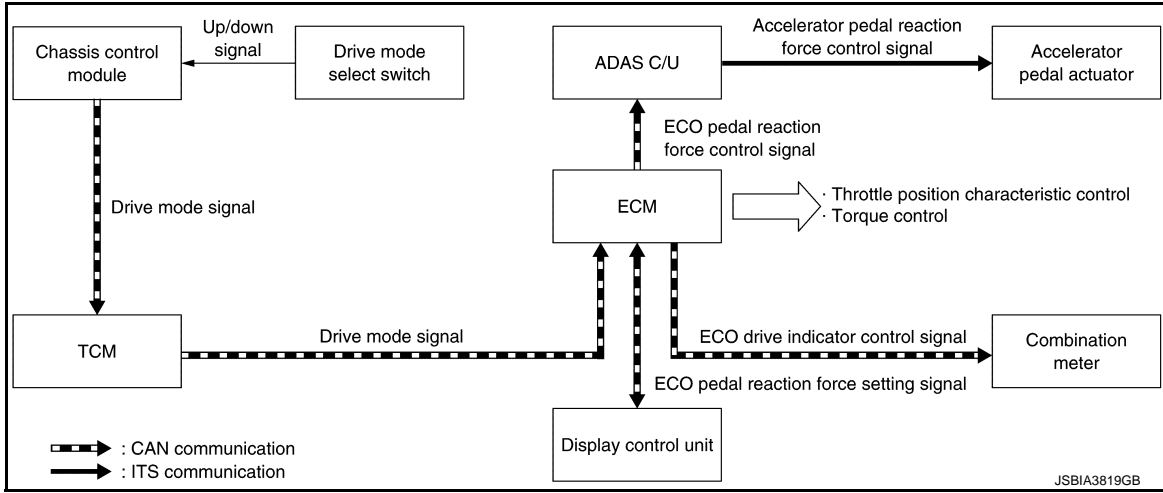
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Infiniti Drive Mode Selector : System Description

INFOID:000000013844105

System Diagram



NOTE:

- This section provides descriptions only about the control by ECM. For overall control, refer to [DMS-15, "Infiniti Drive Mode Selector : System Description \(For VR30DDTT Engine Models\)"](#).
- ECO pedal control is only for vehicles with Distance Control Assist.

ECO Pedal Control

- The display control unit transmits an ECO pedal reaction force setting signal (Standard/Soft/OFF) to ECM via CAN communication.

NOTE:

- An ECO pedal reaction force setting signal which determines reaction force of the accelerator pedal can be selected on the settings screen of the Multi AV system.
- ECM transmits an ECO pedal reaction force control signal to the ADAS control unit via CAN communication, based on a ECO mode signal received from TCM via CAN communication and an ECO pedal reaction force setting signal received from the display control unit via CAN communication.
- ECM sends back an ECO pedal reaction force setting signal received from the display control unit to the display control unit for confirmation.
- The ADAS control unit controls pedal reaction force of the accelerator pedal actuator via ITS communication, based on an ECO pedal reaction force control signal received from the ECM.

CONTROL

- With the drive mode selector, a drive mode select switch installed at the top of the center console switches a vehicle drive mode, changes throttle angle characteristics, and controls torque and ECO pedal.
- Vehicle characteristics are controlled in the following modes, on the basis of STANDARD mode.
 - PERSONAL: Driver may set the vehicle characteristic optionally.
 - SPORT/SPORT+: Changing throttle angle characteristics allows to use a high engine performance range and increases driving performance.
 - ECO: Changing throttle angle characteristics and controlling torque, ECO drive indicator, and ECO pedal enhance fuel economy in actual traffic.
 - SNOW: Changing throttle angle characteristics enhances driving performance on roads with a low coefficient of friction.

Control item	Vehicle drive mode				Description
	PERSONAL*1	SPORT	ECO	SNOW	
Engine	×	×	×	×	Changes throttle angle and controls torque*2 and the ECO drive indicator*2.
ECO pedal*3	×		×		Controls ECO pedal (Accelerator pedal reaction force control).

*1: When the driver operates integral switch to turn ON/OFF the control or set some mode.

*2: Torque control and the ECO drive indicator is available only when in ECO mode.

SYSTEM

[VR30DDTT FOR MEXICO]

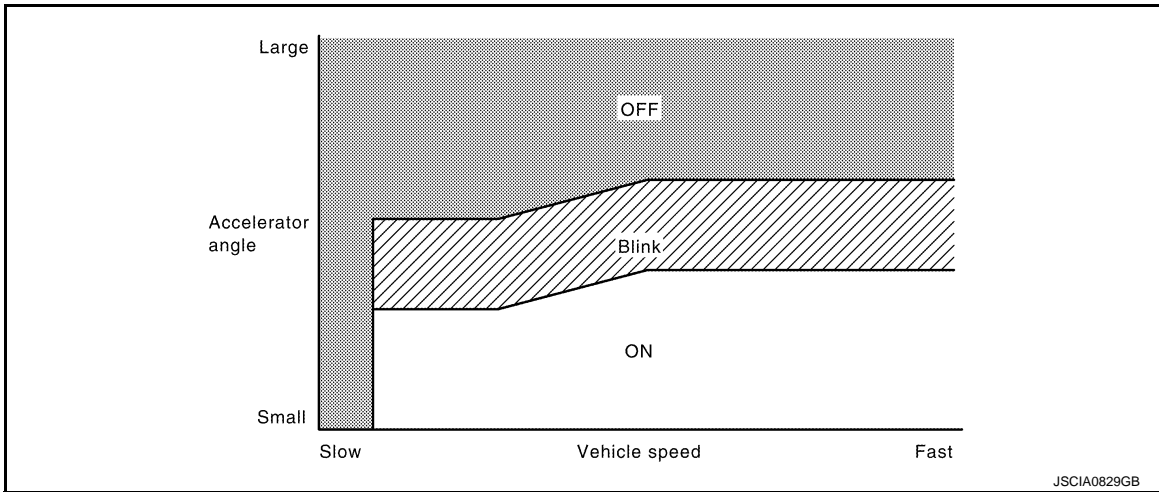
< SYSTEM DESCRIPTION >

*3: ECO pedal control is only for vehicles with Distance Control Assist.

ECO Drive Indicator Control

- ECO drive indicator turns ON or blinks when in ECO mode, according to the operation of the accelerator pedal.
- The blinking timing of the ECO drive indicator synchronizes to the generation timing of ECO pedal reaction force.

ECO drive indicator	Driving condition
ON	Within the ECO drive range.
Blink	Likely over the ECO drive range.
OFF	Low-speed range [approx. 2 MPH (3.2 km/h) or less] and high-speed range [approx. 90 MPH (144 km/h) or more]



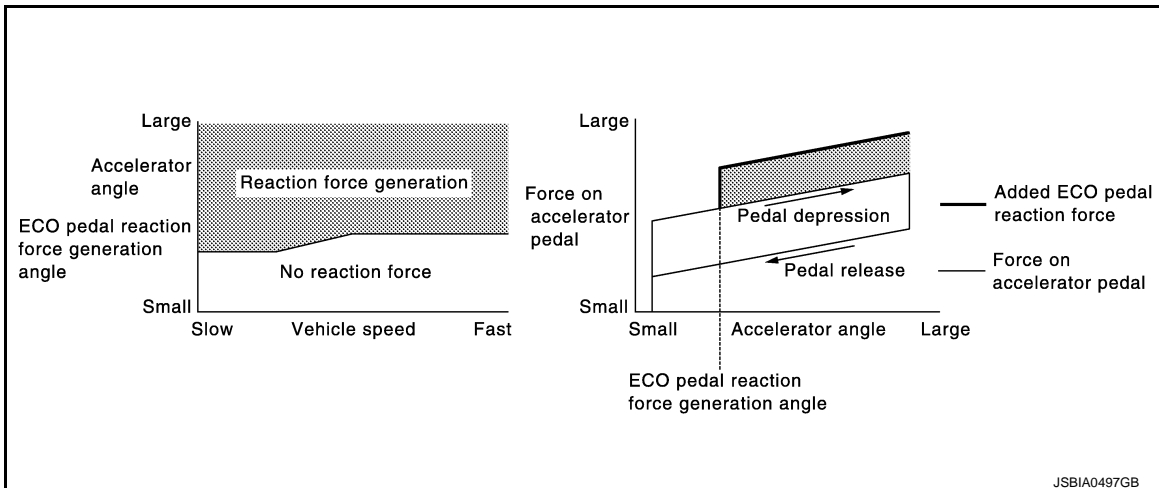
NOTE:

ECO drive indicator turns OFF under the following conditions.

- Intelligent cruise control in operation.
- Selector lever is in R range.

ECO Pedal Control

- Increasing reaction force of the accelerator pedal supports ECO driving in accordance with the accelerator pedal operation when in ECO mode.
- The level of reaction force to the accelerator pedal can be changed among Standard/Soft/OFF on the navigation screen. ECO pedal reaction force can be turned OFF even when in ECO mode.
- The generation timing of ECO pedal reaction force synchronizes to the blinking timing of the ECO drive indicator.



NOTE:

- When switching from ECO mode to the other mode by operating the drive mode select switch, ECO pedal reaction force is generated in common with ECO mode until the accelerator pedal is released.

SYSTEM

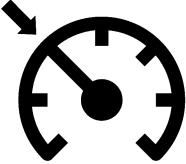
[VR30DDTT FOR MEXICO]

< SYSTEM DESCRIPTION >

- ECO pedal reaction force is not generated under the following conditions.
 - Intelligent cruise control is in operation.
 - Accelerator pedal is depressed quickly.
 - Selector lever is in N or R range.

INFORMATION DISPLAY (COMBINATION METER)




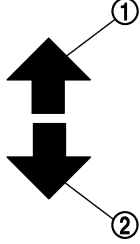
INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information INFOID:000000013844106

Item	Symbol	Function
ASCD indicator	 <small>JSCIA0831ZZ</small> Message: - - Km/h / - - MPH	For detail of ASCD function, refer to EC6-1074 , " AUTOMATIC SPEED CONTROL DEVICE (AS-CD) : System Description ".

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Item	Symbol	Function
Oil control system (OCS) indicator	<p>Engine Oil</p>  <p>Service in 25 miles</p> <p style="font-size: small;">JSBIA9685GB</p>	<p>For detail of OCS function, refer to EC6-1074, "OIL CONTROL SYSTEM : System Description".</p>
	<p>Engine Oil</p>  <p>Service due now</p> <p><input type="checkbox"/> Push & HOLD : RESET</p> <p style="font-size: small;">JSBIA9686GB</p> <p>Message: Push & HOLD: RESET</p>	<p>For detail of OCS function, refer to EC6-1074, "OIL CONTROL SYSTEM : System Description".</p>
	<p>Engine Oil</p>  <p>Service in --- miles</p> <p style="font-size: small;">JSBIA9687GB</p> <p>Message: --- Km/h / --- MPH</p>	<p>For detail of OCS function, refer to EC6-1074, "OIL CONTROL SYSTEM : System Description".</p>
Gear shift indicator	 <p style="font-size: small;">JSCIA0915ZZ</p>	<p>①: When higher gear position is recommended. ②: When lower gear position is recommended. NOTE: Does not indicate when the recommended position is selected.</p>

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INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning

INFOID:000000013844107

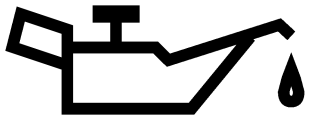
DESIGN/PURPOSE

When engine oil pressure is low, the engine oil pressure warning informs the driver of low oil pressure to prevent damage to the engine.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Symbol	Message
 <p style="text-align: right; font-size: small;">JPNIA1881ZZ</p>	<ul style="list-style-type: none"> • Low Oil Pressure • Stop Vehicle

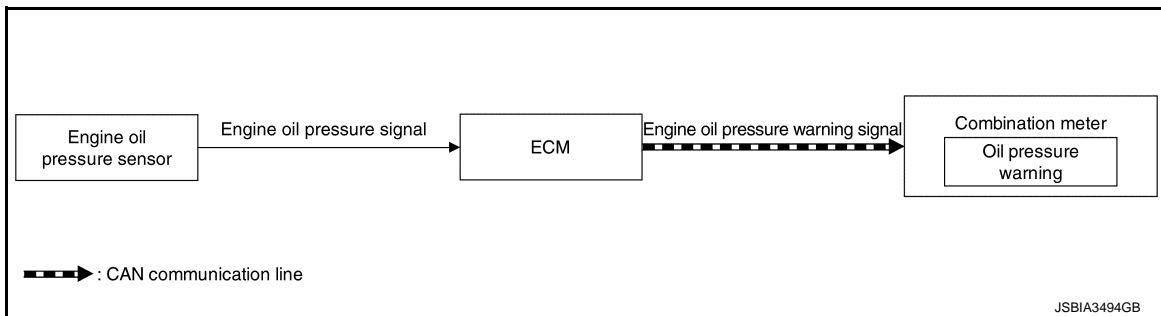
BULB CHECK

Not applicable

OPERATION AT COMBINATION METER CAN COMMUNICATION CUT-OFF OR UNUSUAL SIGNAL

For the operation for CAN communications blackout or abnormal signal reception, refer to [MWI-86, "Fail-Safe"](#).

SYSTEM DIAGRAM



SIGNAL PATH

ECM calculates an engine oil pressure according to a signal transmitted from the engine oil pressure sensor. After engine running when the engine oil pressure is low and at least 5 seconds, ECM transmits the engine oil pressure warning signal to combination meter via CAN communication. Then the engine oil pressure warning displays.

LIGHTING CONDITION

When all of the following conditions for at least 5 seconds are satisfied:

- Ignition switch: ON
- Engine oil pressure is less than specified value.
- Engine speed is more than 170 rpm.

SHUTOFF CONDITION

When any of the following conditions is satisfied:

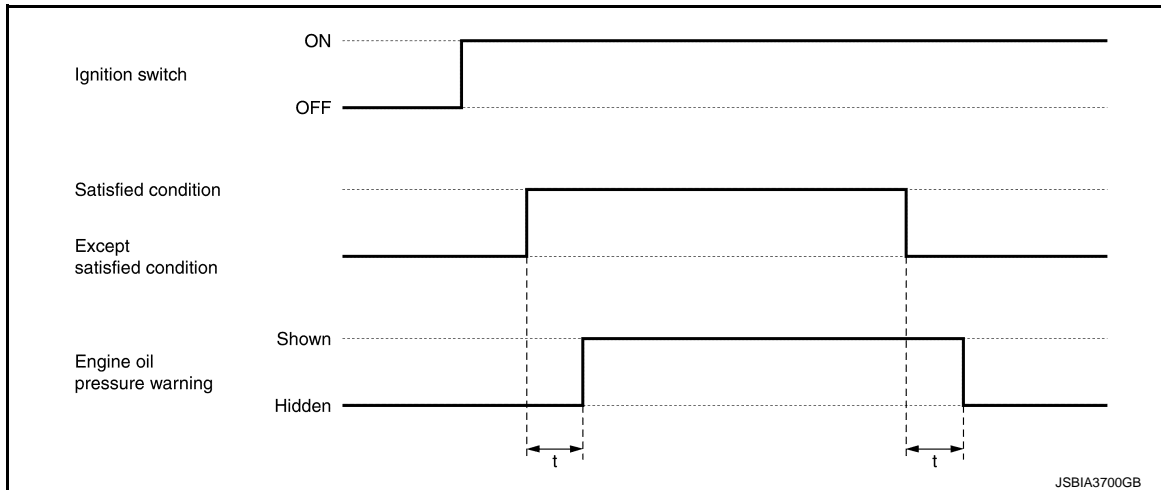
- Ignition switch: OFF
- Engine oil pressure is the specified value or more.
- Engine speed is less than 170 rpm.

SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

TIMING CHART



t: 100 ms



WARNING/INDICATOR/CHIME LIST

WARNING/INDICATOR/CHIME LIST : Warning lamps/Indicator lamps

INFOID:000000013844108

NOTE:

Regarding the arrangement. Refer to [MWI-9. "METER SYSTEM : Design"](#).

Item	Design	Reference
Malfunction indicator lamp (MIL)		Regarding the function. Refer to MWI-35. "WARNING LAMPS/INDICATOR LAMPS : Malfunction Indicator Lamp (MIL)" .
ECO drive indicator lamp		Regarding the function. Refer to MWI-26. "WARNING LAMPS/INDICATOR LAMPS : ECO Drive Indicator Lamp" .

WARNING/INDICATOR/CHIME LIST : Warning/Indicator (On Information Display)

INFOID:000000013844109

Item	Reference
Engine oil pressure warning	Refer to EC6-1079. "INFORMATION DISPLAY (COMBINATION METER) : Engine Oil Pressure Warning" .
ASCD indicator	Refer to EC6-1078. "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .
Oil control system (OCS) indicator	Refer to EC6-1078. "INFORMATION DISPLAY (COMBINATION METER) : Indicator/Information" .

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:000000013844110

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-52. "CAN COMMUNICATION SYSTEM : System Description"](#), about CAN communication for detail.

OPERATION

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

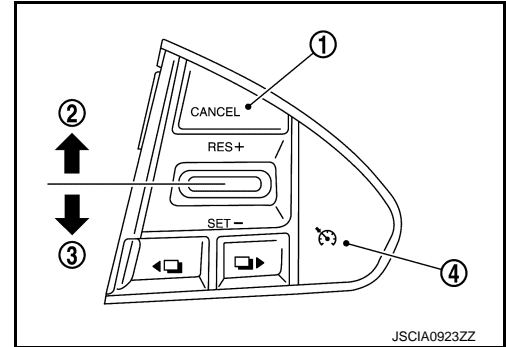
OPERATION

AUTMATIC SPEED CONTROL DEVICE (ASCD)

AUTMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:000000013844111

Functions of each switch are listed in the following table.



No.	Name	Function
①	CANCEL switch	When the switch is pressed, the ASCD control is cancelled.
②	RESUME/ACCEL switch (RES/+)	<ul style="list-style-type: none"> When the switch is pressed after the cruise control is cancelled in any method other than main switch operation, the vehicle speed is reset to the previous speed setting before the cancellation*. When the switch is pressed during cruise control, the setting speed is increased and the vehicle speed increases.
③	SET/COAST switch (SET/-)	<ul style="list-style-type: none"> When the switch is pressed at the preferred vehicle speed, the cruise control starts to operate. When the switch is pressed during cruise control, the set speed is reduced and the vehicle speed reduces.
④	ASCD MAIN switch	Turns the ASCD ON/OFF.

*: To reset vehicle speed, the vehicle condition must be as follows:

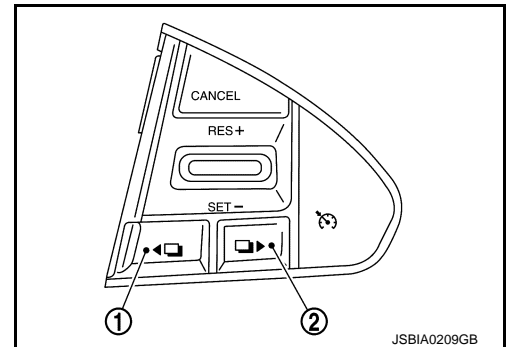
- Brake pedal is released.
- Selector lever is in a position other than P, R, and N.
- Vehicle speed is greater than 40 km/h (25 MPH) and 240 km/h (149 MPH).

OIL CONTROL SYSTEM

OIL CONTROL SYSTEM : Switch Name and Function

INFOID:000000013844113

Function of each switch are listed in the following table.



No.	Name	Function
①	Display back switch	<ul style="list-style-type: none"> • The information display screen can be switched. • The distance to oil change can be erased.
②	Display next switch	

Operation status of OCS reset, refer to [EC6-1211. "Description"](#).

HANDLING PRECAUTION

Infiniti Drive Mode Selector

INFOID:000000013844114

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ECO DRIVE INDICATOR LAMP CONTROL

- ECO drive indicator turns OFF under the following conditions.
 - While driving at low speeds [3 MPH (4.8 km/h) or less] or high speeds [90 MPH (144 km/h) or more].
 - Intelligent cruise control is in operation.
 - Selector lever is in R range.

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ECO PEDAL CONTROL

- When switching from ECO mode to the other mode by operating the drive mode select switch, ECO pedal reaction force is generated in common with ECO mode until the accelerator pedal is released.
- ECO pedal reaction force is not generated under the following conditions.
 - Intelligent cruise control is in operation.
 - Accelerator pedal is depressed quickly.
 - Selector lever is in N or R range.
 - ECO pedal reaction force setting is OFF.

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NOTE:

ECO pedal control is only for vehicles with an intelligent pedal (distance control assist).

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ENGINE OUTPUT CHARACTERISTICS AFTER SWITCHING MODE

- Engine output characteristics after switching mode by operating the drive mode select switch are as follows.
 - After switching mode to a mode that engine output increase, engine output characteristics are changed by releasing the accelerator pedal.
 - After switching mode to a mode that engine output decreases, engine output characteristics are changed immediately.
- When an accelerator angle is constant, engine output characteristics are as follows.
 - SPORT/SPORT+ > STANDARD > ECO > SNOW

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Output characteristics of each mode

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Control mode	Engine output
SPORT/SPORT+	Increase
STANDARD	Normal
ECO	Decrease
SNOW	Decrease (More reduction than ECO mode)

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000013844115

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in ECU memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

INFOID:0000000013844116

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to [EC6-1084, "Diagnosis Description"](#).

NOTE:

Service \$0A is not applied for regions where it is not mandated.

DIAGNOSIS SYSTEM (ECM)

DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:000000013844117

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When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Illuminate	Blinking	Illuminate				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC6-1139, "DTC Index" .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:000000013844118

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

For malfunctions in which 1st trip DTCs are displayed, refer to [EC6-1139, "DTC Index"](#). These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC6-1190, "Work Flow"](#). Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

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DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR MEXICO]

< SYSTEM DESCRIPTION >

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0308 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was saved in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

DIAGNOSIS DESCRIPTION : Counter System

INFOID:000000013844119

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on.
- The MIL will turn OFF after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

COUNTER SYSTEM CHART

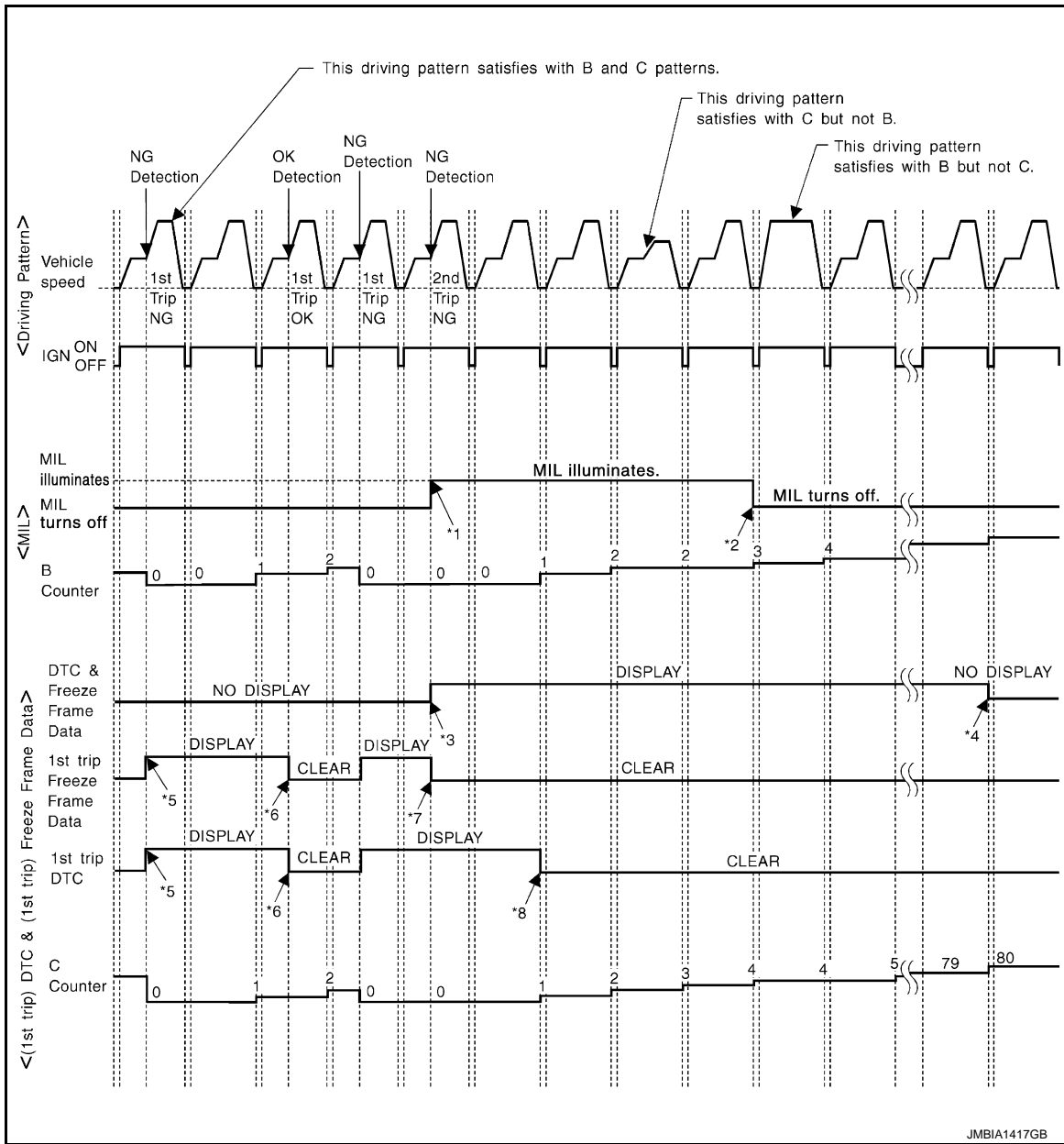
Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

- *1: Clear timing is at the moment OK is detected.
- *2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will turn OFF after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

Explanation for Driving Patterns for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"

Driving Pattern B

Refer to [EC6-1089, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR MEXICO]

< SYSTEM DESCRIPTION >

Driving Pattern C

Refer to [EC6-1089. "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

Example:

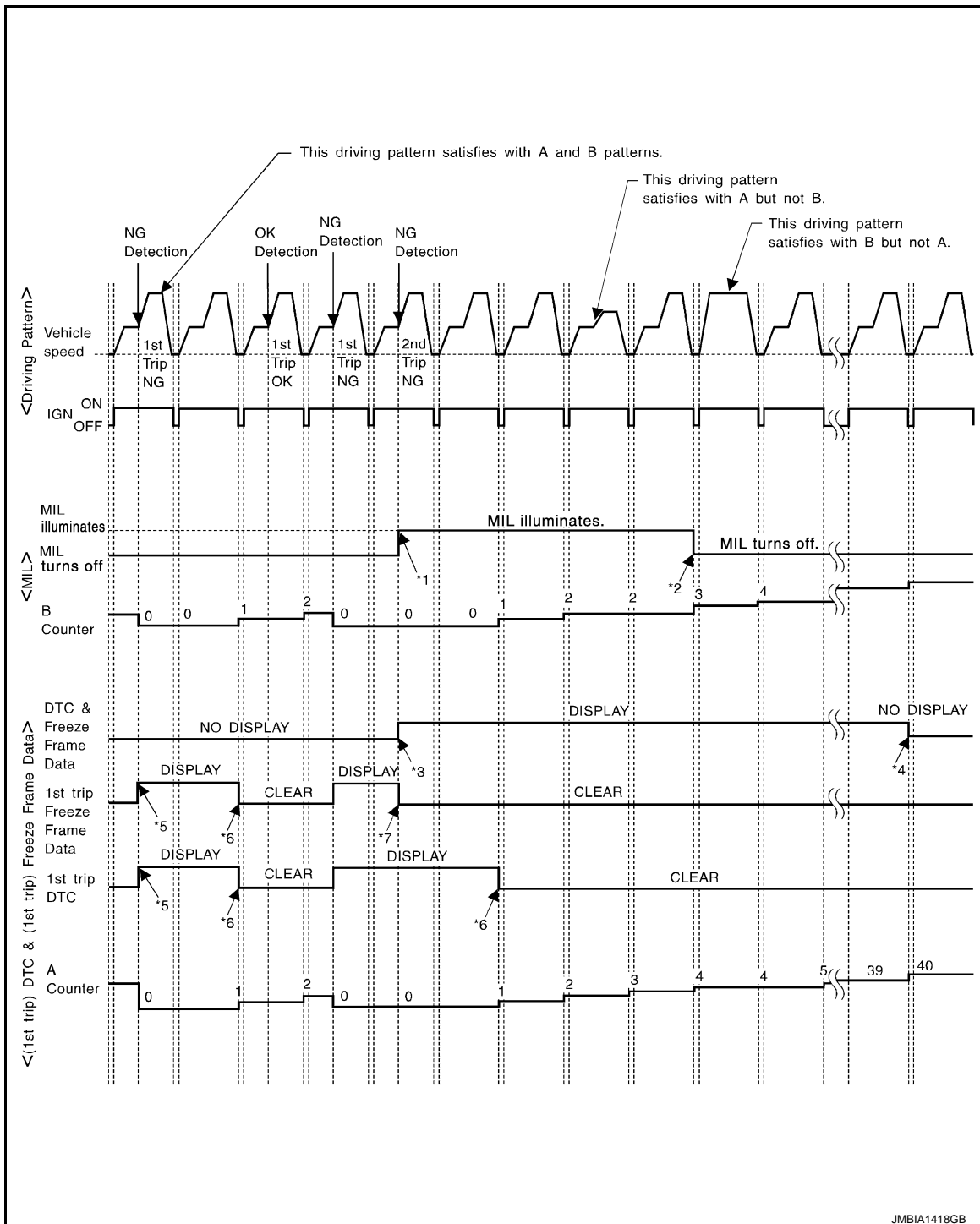
If the stored freeze frame data is as per the following:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 – 1,225 rpm, Calculated load value: 27 – 33%, Engine coolant temperature: more than 70°C (158°F)

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”



JMBIA1418GB

< SYSTEM DESCRIPTION >

- | | | | |
|---|--|---|-----|
| <p>*1: When the same malfunction is detected in two consecutive trips, MIL will light up.</p> | <p>*2: MIL will turn OFF after vehicle is driven 3 times (pattern B) without any malfunctions.</p> | <p>*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.</p> | A |
| <p>*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction.
(The DTC and the freeze frame data still remain in ECM.)</p> | <p>*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.</p> | <p>*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.</p> | EC6 |
| <p>*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.</p> | | | C |

Explanation for Driving Patterns Except for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

Driving Pattern A

Refer to [EC6-1089, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

Driving Pattern B

Refer to [EC6-1089, "DIAGNOSIS DESCRIPTION : Driving Pattern"](#).

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:000000013844120

CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (32°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern A.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

NOTE:

- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern B.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:
 Engine speed: (Engine speed in the freeze frame data) ±375 rpm

DIAGNOSIS SYSTEM (ECM)

[VR30DDTT FOR MEXICO]

< SYSTEM DESCRIPTION >

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]

Engine coolant temperature condition:

- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:

- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:000000013844121

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If permanent DTC is stored or MIL illuminates during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT"), DTC (No DTCs) and permanent DTC (NO permanent DTCs) before the inspection.

SRT SET TIMING

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

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Self-diagnosis result		Example						
		Diagnosis	Ignition cycle					
			← ON →	OFF	← ON →	OFF	← ON →	OFF
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)		
		P0402	OK (1)	— (1)	— (1)	OK (2)		
		P1402	OK (1)	OK (2)	— (2)	— (2)		
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”		
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)		
		P0402	— (0)	— (0)	OK (1)	— (1)		
		P1402	OK (1)	OK (2)	— (2)	— (2)		
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”		
NG exists	Case 3	P0400	OK	OK	—	—		
		P0402	—	—	—	—		
		P1402	NG	—	NG	NG (Consecutive NG)		
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL ON)		
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”		

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses show OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above

If one or more SRT related self-diagnoses show NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above

The table above shows that the minimum number of cycles for setting SRT as “INCMP” is the number one (1) for each self-diagnosis (Case 1 & 2) or the number two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- During SRT driving pattern, the 1st trip DTC (NG) is detected prior to “CMPLT” of SRT and the self-diagnosis memory must be erased from the ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

NOTE:

SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

On Board Diagnosis Function

INFOID:000000013844122

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.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC6-1204. "Description" .

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Diagnostic test mode	Function
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC6-1204, "Description" .
Wastegate actuator posi learn value clear	The initial position of the wastegate valve position can be adjusted. Refer to EC6-1210, "Description" .
Electric intake valve timing control learning	The initial position of the electric intake valve timing control actuator can be adjusted. Refer to EC6-1209, "Description" .
OCS reset	Engine oil date reset. Refer to EC6-1211, "Description" .

BLUB CHECK MODE

Description

This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).

Operation Procedure

1. Turn ignition switch ON.
2. The MIL on the instrument panel should stay ON.
If it remains OFF, check MIL circuit. Refer to [EC6-1741, "Diagnosis Procedure"](#).

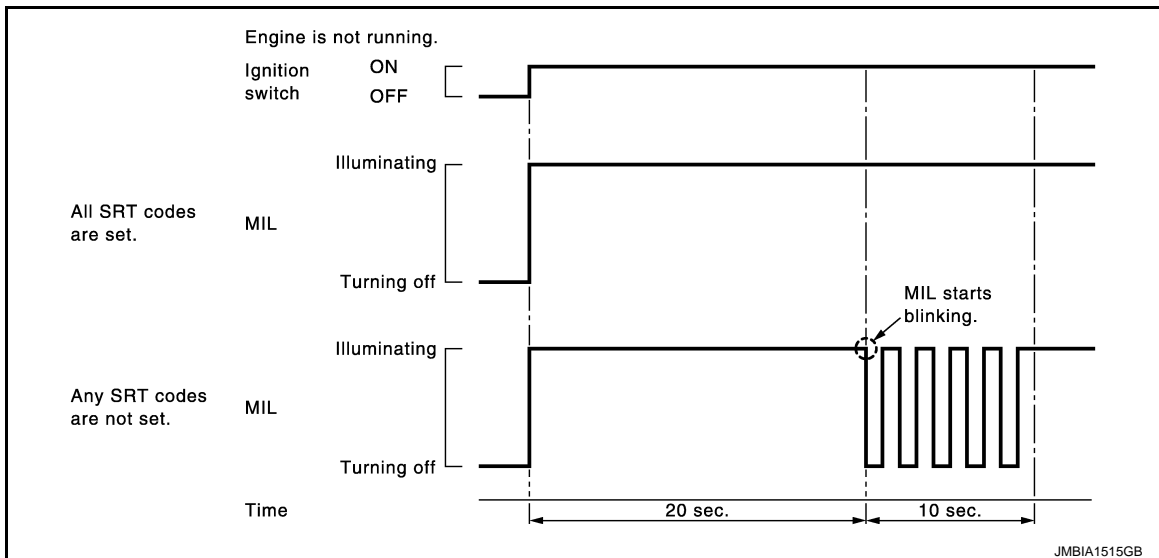
SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to [EC6-1090, "DIAGNOSIS DESCRIPTION : System Readiness Test \(SRT\) Code"](#).

Operation Procedure

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown blow.
 - ECM continues to illuminate MIL if all SRT codes are set.
 - ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

1. Turn ignition switch ON.
2. Check that MIL illuminates.
If it remains OFF, check MIL circuit. Refer to [EC6-1741, "Diagnosis Procedure"](#).

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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).

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CONSULT Function

INFOID:000000013844123

FUNCTION

Diagnostic test mode	Function
Self Diagnostic Result	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECU Identification	ECM part number can be read.
DTC Work Support	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC6-1139. "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.

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code that is displayed as PXXXX. (Refer to EC6-1139. "DTC Index" .)
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 schedule.

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Freeze frame data item*	Description
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed
ABSOL TH-P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed
FUEL SYS-B1	<ul style="list-style-type: none"> • "Fuel injection system status" at the moment a malfunction is detected is displayed. • One of the following mode is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enrichment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2	
INT MANI PRES [kPa]	These items are displayed but are not applicable to this model.
COMBUST CONDITION	
FUEL RAIL PRESSURE [MPa]	The fuel rail pressure at the moment a malfunction is detected is displayed.
TARGET FUEL RAIL PRESSURE [MPa]	The target fuel rail pressure at the moment a malfunction is detected is displayed.
BATTERY VOLTAGE [V]	The battery voltage at the moment a malfunction is detected is displayed.
FUEL LEVEL [%]	The fuel level at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For reference values of the following items, refer to [EC6-1107, "Reference Value"](#).

Monitored Item

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
COOLANT TEMP/S	°C or °F	×	×	<ul style="list-style-type: none"> • The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> • When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE	km/h or mph	×	×	<ul style="list-style-type: none"> • The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed. 	
BATTERY VOLT	V			<ul style="list-style-type: none"> • The power supply voltage of ECM is displayed. 	
INT/A TEMP SE	°C or °F	×	×	<ul style="list-style-type: none"> • The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated. 	
TURBO BST SEN	V			<ul style="list-style-type: none"> • The turbocharger boost sensor signal voltage is displayed. 	
PURG VOL C/V	%			<ul style="list-style-type: none"> • 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. 	

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
FUEL T/TMP SE	°C or °F			<ul style="list-style-type: none"> The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed. 	
FUEL LEVEL SE	V	×		<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
EVAP SYS PRES	V			<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
CAL/LD VALUE	%			<ul style="list-style-type: none"> “Calculated load value” indicates the value of the current air flow divided by peak air flow. 	
HO2S2 (B1)	V	×	×	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 is displayed. 	
HO2S2 (B2)					
ENG OIL TEMP	°C or °F			<ul style="list-style-type: none"> The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed. 	
A/F ALPHA-B1	%			<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. When engine is running, specification range is indicated in “SPEC”.
A/F ALPHA-B2					
INT/V TIM (B1)	°CA			<ul style="list-style-type: none"> Indicates [°CA] of intake camshaft advance angle. 	
INT/V TIM (B2)					
A/F S1 HTR (B1)	%			<ul style="list-style-type: none"> 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. 	
A/F S1 HTR (B2)					
TC/SC SPEED B1	rpm			<ul style="list-style-type: none"> The turbocharge revolution speed (determined by the signal voltage of the turbocharge speed sensor) is displayed. 	
TC/SC SPEED B2					
EXH/V TIM B1	°CA			<ul style="list-style-type: none"> Indicates [°CA] of exhaust camshaft retard angle. 	
EXH/V TIM B2					
W/GATE V CLSD LEARN B2	INCMP/CMPLT			<ul style="list-style-type: none"> Displays “full close position learning” experience of wastegate actuator. INCMP: Learning is incomplete. There is no memory of the full close position voltage in the ECM. CMPLT: Learning is complete. Full close position voltage is memory in the ECM. 	
W/GATE V CLSD LEARN B1					
W/G ACTUATOR POSITION B1	m			<ul style="list-style-type: none"> Indicates real stroke position of turbocharger wastegate actuator. The value is calculated by ECM based on the difference voltage between position sensor output and valve close position. 	
W/G ACTUATOR POSITION B2					

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
RADIATOR COOLANT TEMP	°C			<ul style="list-style-type: none"> The radiator coolant temperature (determined by the signal voltage of the radiator coolant temperature sensor) is displayed. 	
Ignition timing	deg	×	×	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. <p>NOTE: Indicates degree from BTDC (Before Top Dead Center) of compression stroke.</p>	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
Fuel injection timing	deg			<ul style="list-style-type: none"> Indicates the fuel injection timing computed by ECM according to the input signals. <p>NOTE: Indicates degree from BTDC (Before Top Dead Center) of intake stroke.</p>	
FAN DUTY	%			<ul style="list-style-type: none"> Indicates a command value for cooling fan. The value is calculated by ECM based on input signals. 	
AC EVA TEMP	°C or °F			<ul style="list-style-type: none"> Indicates A/C evaporator temperature sent from "unified meter and A/C amp". 	
AC EVA TARGET	°C or °F			<ul style="list-style-type: none"> Indicates target A/C evaporator temperature sent from "unified meter and A/C amp". 	
ALT DUTY	%			<ul style="list-style-type: none"> Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal. 	
FUEL PUMP DUTY	%			<ul style="list-style-type: none"> The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signals) is indicated. 	
BAT TEMP SEN	V			<ul style="list-style-type: none"> The signal voltage from the battery temperature sensor is displayed. 	
THRTL STK CNT B1	—			<p>NOTE: The item is indicated, but not used.</p>	
THRTL STK CNT B2					
ENG SPEED	rpm	×	×	<ul style="list-style-type: none"> Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE). 	<ul style="list-style-type: none"> 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.
TRVL AFTER MIL	km or mile			<ul style="list-style-type: none"> Distance traveled while MIL is activated. 	
B/FUEL SCHDL	ms	×	×	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> When engine is running, specification range is indicated in "SPEC".

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
MASS AIRFLOW	g/s			<ul style="list-style-type: none"> Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor. 	
FUEL PRES SEN	MPa			<ul style="list-style-type: none"> Indicates the fuel rail pressure computed by ECM according to the input signals. 	
ACCEL SEN 1	V			<ul style="list-style-type: none"> The accelerator pedal position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> ACCEL SEN 2 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
ACCEL SEN 2					
TP SEN 1-B1	V	×	×	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> TP SEN 2-B1 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 2-B1					
FUEL INJ B1	msec			<ul style="list-style-type: none"> ECM-calculated injection pulse width of the fuel injector on the Bank 1 side. 	
FUEL INJ B2					
I/P PULLY SPD	rpm			<ul style="list-style-type: none"> Indicates the engine speed computed from the input speed sensor signal. 	
VEHICLE SPEED	km/h or mph			<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from TCM is displayed. 	
AC PRESS SEN	V			<ul style="list-style-type: none"> The signal voltage from the refrigerant pressure sensor is displayed. 	
A/F SEN1 (B1)	V	×	×	<ul style="list-style-type: none"> The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed. 	
A/F SEN1 (B2)					
VHCL SPEED SE	km/h or mph			<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed. 	
SET VHCL SPD	km/h			<ul style="list-style-type: none"> The preset vehicle speed is displayed. 	
VTC DTY EX B1	%			<ul style="list-style-type: none"> The control condition of the exhaust valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. 	
VTC DTY EX B2					
BAT CUR SEN	mV			<ul style="list-style-type: none"> The signal voltage of battery current sensor is displayed. 	
MILEAGE FOR EONV	km			<ul style="list-style-type: none"> Mileage counter for EONV upper byte is displayed. 	
A/F ADJ-B1	—			<ul style="list-style-type: none"> Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal. 	
A/F ADJ-B2					
TP SEN 1-B2	mV			<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	<ul style="list-style-type: none"> TP SEN 2-B2 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 2-B2					

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
BOOST S/V DUTY	%			<ul style="list-style-type: none"> The turbocharger boost control valve control condition (determined by ECM according to the input signals) is indicated. 	
H/P FUEL PUMP DEG	deg			<ul style="list-style-type: none"> Displays ECM-calculated fuel discharge position of the high pressure fuel pump. 	
FUEL PRES SEN V	V			<ul style="list-style-type: none"> The signal voltage of FRP sensor is displayed. 	
EOP SENSOR	V			<ul style="list-style-type: none"> The signal voltage of EOP sensor is displayed. 	
ECM TEMP 1	°C			<ul style="list-style-type: none"> The ECM temperature is indicated. 	
ECM TEMP 2					
MASS AIR FLOW SENSOR (Hz)	Hz			<ul style="list-style-type: none"> The signal frequency of the mass air flow sensor is displayed. 	
A/F-S ATMSPHRC CRCT B2	—			<ul style="list-style-type: none"> Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure. 	
A/F-S ATMSPHRC CRCT B1	—			<ul style="list-style-type: none"> Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure. 	
A/F-S ATMSPHRC CRCT UP B2	count			<ul style="list-style-type: none"> Displays the number of updates of the A/F sensor atmospheric correction factor. 	
A/F-S ATMSPHRC CRCT UP B1	count			<ul style="list-style-type: none"> Displays the number of updates of the A/F sensor atmospheric correction factor. 	
EXHAUST GAS TEMP SEN 1 B1	V			<ul style="list-style-type: none"> The signal voltage of exhaust gas temperature sensor is displayed. 	
EXHAUST GAS TEMP SEN 1 B2					
AFM output	V			<ul style="list-style-type: none"> Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor. 	
W/G ACTUATOR POSI SEN B1	V			<ul style="list-style-type: none"> Indicates position sensor output voltage of turbocharger wastegate actuator. 	
W/G ACTUATOR POSI SEN B2					
ENGINE COOLANT B/V POSI	deg			<ul style="list-style-type: none"> The Multi-way Control Valve position detected by the position sensor is displayed. 	

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
TOTAL DISTANC - OCS RST 1	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System is reset. 	A
TOTAL DISTANC - OCS RST 2	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System is reset. (two times ago) 	C
TOTAL DISTANC - OCS RST 3	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System is reset. (three times ago) 	D
DETERIORTN VL - OCS RST 1	—			<ul style="list-style-type: none"> Insicates deterioration condition of the engine oil when Oil Control System is reset. 	E
DETERIORTN VL - OCS RST 2	—			<ul style="list-style-type: none"> Insicates deterioration condition of the engine oil when Oil Control System is reset. (two times ago) 	F
DETERIORTN VL - OCS RST 3	—			<ul style="list-style-type: none"> Insicates deterioration condition of the engine oil when Oil Control System is reset. (three times ago) 	G
TOTAL DISTANC - OCS WRN 1	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System remaining distance is zero. 	H
TOTAL DISTANC - OCS WRN 2	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System remaining distance is zero. (two times ago) 	I
TOTAL DISTANC - OCS WRN 3	km			<ul style="list-style-type: none"> Total travel distance of odd meter when Oil Control System remaining distance is zero. (two times ago) 	J
DETERIORTN VL - OCS WRN 1	—			<ul style="list-style-type: none"> Insicates deterioration condition of the engine oil when Oil Control System remaining distance is zero. 	K
DETERIORTN VL - OCS WRN 2	—			<ul style="list-style-type: none"> Insicates deterioration condition of the engine oil when Oil Control System remaining distance is zero. (two times ago) 	L
DETERIORTN VL - OCS WRN 3	—			<ul style="list-style-type: none"> Insicates deterioration condition of the engine oil when Oil Control System remaining distance is zero. (three times ago) 	M
CURRENT DETERIORATN VAL	—			<ul style="list-style-type: none"> Insicates deterioration condition of the engine oil. 	N
LOAD SIGNAL	On/Off	×	×	<ul style="list-style-type: none"> 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. 	O
AIR COND SIG	On/Off	×	×	<ul style="list-style-type: none"> Indicates [On/Off] condition of the air conditioner switch as determined by the air conditioner signal. 	P

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
PW/ST SIGNAL	On/Off	×	×	<ul style="list-style-type: none"> [On/Off] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated. 	
P/N POSI SW	On/Off	×	×	<ul style="list-style-type: none"> Indicates [On/Off] condition from the park/neutral position (PNP) signal. 	
START SIGNAL	On/Off			<ul style="list-style-type: none"> Indicates start signal status [On/Off] computed by the ECM according to the signals of engine speed and battery voltage. 	<ul style="list-style-type: none"> After starting the engine, [Off] is displayed regardless of the starter signal.
CLSD THL POS	On/Off	×	×	<ul style="list-style-type: none"> Indicates idle position [On/Off] computed by ECM according to the accelerator pedal position sensor signal. 	
HO2S2 MNTR (B1)	RICH/ LEAN		×	<ul style="list-style-type: none"> Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2)			×		
IGNITION SW	On/Off	×	×	<ul style="list-style-type: none"> Indicates [On/Off] condition from ignition switch signal. 	
HEATER FAN SW	On/Off	×		<ul style="list-style-type: none"> Indicates [On/Off] condition from the heater fan switch signal. 	
IDL A/V LEARN	YET/ CMLPT			<ul style="list-style-type: none"> Displays the condition of Idle Air Volume Learning Yet: Idle air volume learning has not been performed yet. CMLPT: Idle air volume learning has already been performed successfully. 	
BRAKE SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from the stop lamp switch signal. 	
COMBUSTION	—			<ul style="list-style-type: none"> These items are displayed but are not applicable to this model. 	
AIR COND RLY	On/Off			<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signals) is indicated. 	
FUEL PUMP RLY	On/Off			<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
FPCM	Hi/Mid/ Low/Off			<ul style="list-style-type: none"> The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signals) is indicated. 	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
VENT CONT/V	On/Off			<ul style="list-style-type: none"> The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. On: Closed Off: Open 	
THRTL RELAY	On/Off			<ul style="list-style-type: none"> Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. 	
HO2S2 HTR (B1)	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. 	
HO2S2 HTR (B2)					
BRAKE SW1	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from brake pedal position switch signal. 	
BRAKE SW2	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of stop lamp switch signal. 	
SET SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from SET switch signal. 	
RESUME/ACC SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from RESUME/ACCELERATE switch signal. 	
CANCEL SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from CANCEL switch signal. 	
MAIN SW	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition from MAIN switch signal. 	
SET LAMP	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of SET lamp determined by the ECM according to the input signals. 	
AT OD CANCEL	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of CVT O/D according to the input signal from the TCM. 	For M/T models, always "OFF" is displayed.
AT OD MONITOR	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of CVT O/D according to the input signal from the TCM. 	For M/T models, always "OFF" is displayed.
CRUISE LAMP	On/Off			<ul style="list-style-type: none"> Indicates [On/Off] condition of CRUISE lamp determined by the ECM according to the input signals. 	
LO SPEED CUT	NON/CUT			<ul style="list-style-type: none"> 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. 	

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DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
VHCL SPD CUT	NON/CUT			<ul style="list-style-type: none"> 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. 	
ALT DUTY SIG	On/Off			<ul style="list-style-type: none"> The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. On: Power generation voltage variable control is active. Off: Power generation voltage variable control is inactive. 	
HO2 S2 DIAG1 (B2)	INCMP/CMPLT			<ul style="list-style-type: none"> Indicates DTC P0159 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
HO2 S2 DIAG1 (B1)	INCMP/CMPLT			<ul style="list-style-type: none"> Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
HO2 S2 DIAG2 (B2)	INCMP/CMPLT			<ul style="list-style-type: none"> Indicates DTC P0159 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
HO2 S2 DIAG2 (B1)	INCMP/CMPLT			<ul style="list-style-type: none"> Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
EVAP LEAK DIAG	YET/CMPLT			<ul style="list-style-type: none"> 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			<ul style="list-style-type: none"> Indicates the ready condition of EVAP leak diagnosis. On: Diagnosis has been ready condition. Off: Diagnosis has not been ready condition. 	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

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Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
SYSTEM 1 DIAGNOSIS A B2	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P219B self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete. 	
SYSTEM 1 DIAGNOSIS A B1	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P219A self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG1 (B2)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P015C or P015D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG1 (B1)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P015A or P015B self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG2 (B2)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P014E or P014F self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
A/F SEN1 DIAG2 (B1)	INCMP/ CMPLT			<ul style="list-style-type: none"> Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 	
SYSTEM 1 DIAGNOSIS B B2	ABSNT/ PRSNT			<ul style="list-style-type: none"> Indicates DTC P219B self-diagnosis condition. - ABSNT: Self-diagnosis standby - PRSNT: Under self-diagnosis 	
SYSTEM 1 DIAGNOSIS B B1	ABSNT/ PRSNT			<ul style="list-style-type: none"> Indicates DTC P219A self-diagnosis condition. - ABSNT: Self-diagnosis standby - PRSNT: Under self-diagnosis 	
A/F SEN1 DIAG3 (B2)	ABSNT/ PRSNT			<ul style="list-style-type: none"> Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. 	

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DIAGNOSIS SYSTEM (ECM)

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[VR30DDTT FOR MEXICO]

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN-SIGNALS		
A/F SEN1 DIAG3 (B1)	ABSNT/ PRSNT			<ul style="list-style-type: none"> Indicates DTC P014E, P014F, P015C or P015D self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. 	
VALVE TIMING ADJUSTMENT	YET/ CMPLT			<ul style="list-style-type: none"> Displays the learning completion flag with the VTC. 	
V/D DEFAULT POSI LEARN	YET/ CMPLT			<ul style="list-style-type: none"> Displays the condition of VTC standard position learning end flag. 	
THRTL STK CNT B1	—			NOTE: The item is indicated, but not used.	
THRTL STK CNT B2					

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
VIN REGISTRATION	<ul style="list-style-type: none"> In this mode, VIN is registered in ECM. 	When registering VIN in ECM
EVAP SYSTEM CLOSE	Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. <ul style="list-style-type: none"> Ignition switch ON Engine not running Ambient temperature is above 0°C (32°F). No vacuum and no high pressure in EVAP system Fuel tank temp. is more than 0°C (32°F). Within 10 minutes after starting "EVAP SYSTEM CLOSE" When trying to execute "EVAP SYSTEM CLOSE" Under the condition except above, CONSULT will discontinue it and display appropriate instruction. NOTE: When starting engine, CONSULT may display "Battery voltage is low. Charge battery", even when using a charged battery.	When detecting EVAP vapor leak in the EVAP system
IDLE AIR VOL LEARN	<ul style="list-style-type: none"> The idle air volume that keeps the engine within the specified range is memorized in ECM. 	When learning the idle air volume
SELF-LEARNING CONT	<ul style="list-style-type: none"> The coefficient of self-learning control mixture ratio returns to the original coefficient. 	When clearing mixture ratio self-learning value
CLSD THL POS LEARN	<ul style="list-style-type: none"> Ignition switch ON and engine stopped. 	When learning the throttle valve closed position
TARGET IGN TIM ADJ*	<ul style="list-style-type: none"> Idle condition 	When adjusting target ignition timing
TARGET IDLE RPM ADJ*	<ul style="list-style-type: none"> Idle condition 	When setting target idle speed
SAVING DATA FOR REPLC CPU	<ul style="list-style-type: none"> In this mode, save data that is in ECM. 	When ECM is replaced.
WRITING DATA FOR REPLC CPU	<ul style="list-style-type: none"> In this mode, write data stored by "SAVE DATA FOR CPU REPLC" in work support mode to ECM. 	When ECM is replaced.

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[VR30DDTT FOR MEXICO]

WORK ITEM	CONDITION	USAGE
WASTEGATE ACTUATOR POSI LEARN VALUE CLEAR	<ul style="list-style-type: none"> Ignition switch is ON and Engine running 	When learning full close position of wastegate actuator after ECM or turbocharger assembly is replaced.
ENGINE COOLANT BYPASS VALVE	<ul style="list-style-type: none"> Condition: The valve is in the full opening position 	When filling with coolant.
ELECTRIC INTAKE VALVE TIMING CONTROL LEARN- ING	<ul style="list-style-type: none"> Ignition switch ON and engine stopped. 	After the following parts are replaced. <ul style="list-style-type: none"> Electric intake valve timing control actuator Electric intake valve timing control module camshaft, timing chain, camshaft sprocket piston, connecting rod, crankshaft position sensor

*: This function is not necessary in the usual service procedure.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
PURG VOL CONT/V	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Harness and connectors Solenoid valve
FUEL/T TEMP SEN	This item may be displayed but not used.		
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N Cut off each injector signal one at a time using CONSULT. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
EXT V/T ASSIGN AN- GLE	<ul style="list-style-type: none"> Engine: Return to the original non-standard condition Change exhaust valve timing using CONSULT. 	If malfunctioning symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connectors Exhaust valve timing control solenoid valve
VENT CONTROL/V	This item may be displayed but not used.		
FAN DUTY CONTROL*	<ul style="list-style-type: none"> Ignition switch: ON Change duty ratio using CONSULT. 	Cooling fan speed changes.	<ul style="list-style-type: none"> Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R
ALTERNATOR DUTY	<ul style="list-style-type: none"> Engine: Idle Change duty ratio using CONSULT. 	Battery voltage changes.	<ul style="list-style-type: none"> Harness and connectors IPDM E/R Alternator
FPCM	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Select "LOW", "MID" and "HI" with CONSULT. 	Fuel pump speed changes or stops.	<ul style="list-style-type: none"> Harness and connectors Fuel pump control module (FPCM)

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

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TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
IGNITION TIMING	<ul style="list-style-type: none"> 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.
WASTEGATE ACTUATOR	<ul style="list-style-type: none"> Ignition switch: ON Engine stopped Change valve of wastegate actuator target angle using CONSULT 	Wastegate valve position sensor voltage changes according to valve target angle	<ul style="list-style-type: none"> Harness and connectors Electric wastegate control actuator (Removal bypass valve from turbocharger is NG) Turbocharger assembly
ENGINE OIL PRESSURE CONTROL SOLENOID VALVE	<ul style="list-style-type: none"> Water temperature: > -10°C Engine oil temperature: < 120°C (248°F) Engine speed: < 4000rpm 	Engine oil pressure change	<ul style="list-style-type: none"> Harness and connectors Engine oil pressure control solenoid valve Engine oil pressure sensor Engine oil pump
Charge air cooler cooling electric water pump	<ul style="list-style-type: none"> Engine: Idle 	Change the driving mode of charge air cooler cooling electric water pump.	<ul style="list-style-type: none"> Charge air cooler coolant temperature sensor Intake air temperature sensor Engine oil pressure sensor Charge air cooler cooling electric water pump 1, 2

*: Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

DTC WORK SUPPORT MODE

Test Item

Test mode	Test item	Corresponding DTC No.	Reference page
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC6-1307
	A/F SEN1 (B2) P1286	P0150	EC6-1307
HO2S2	HO2S2 (B1) P1146	P0138	EC6-1323
	HO2S2 (B1) P1147	P0137	EC6-1317
	HO2S2 (B2) P1166	P0158	EC6-1323
	HO2S2 (B2) P1167	P0157	EC6-1317

SRT & P-DTC MODE

SRT STATUS Mode

- For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.
- "SRT STATUS" provides the presence or absence of permanent DTCs stored in ECM memory.

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000013844124

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VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations. Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor.
This occurs because the timing light shows a value calculated by ECM according to signals received from the camshaft position sensor and other sensors related to ignition timing.
- For outlines of following items, refer to [EC6-1093, "CONSULT Function"](#).

CONSULT MONITOR ITEM

Monitor Item	Condition		Values/Status
COOLANT TEMP/S	Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature
TURBO BST SEN	Ignition switch: ON		Indicates intake boost
PURG VOL C/V	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
		2,000 rpm	—
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank temperature
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
CAL/LD VALUE	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	5% - 35%
		2,500 rpm	5% - 35%
HO2S2 (B1)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> • Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 (B2)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> • Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F ALPHA-B1	See EC6-1220, "Description" .		
A/F ALPHA-B2	See EC6-1220, "Description" .		
A/F S1 HTR(B1)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%

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< ECU DIAGNOSIS INFORMATION >

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Monitor Item	Condition	Values/Status
A/F S1 HTR(B2)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)	4 - 100%
TC/SC SPEED B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	3,200 rpm 15,000 - 30,000 rpm
TC/SC SPEED B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	3,200 rpm 15,000 - 30,000 rpm
EXH/V TIM B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle 0.0°C
		2,000 rpm 3.0°C
EXH/V TIM B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle -0.5°C
		2,000 rpm 2.0°C
W/GATE V CLSD LEARN B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle CMPLT
		2,000 rpm CMPLT
W/GATE V CLSD LEARN B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle CMPLT
		2,000 rpm CMPLT
W/G ACTUATOR POSITION B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle 0.0061- 0.0098 m
		2,000 rpm 0.0061- 0.0098 m
W/G ACTUATOR POSITION B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle 0.0061- 0.0098 m
		2,000 rpm 0.0061- 0.0098 m
RADIATOR COOLANT TEMP	Engine: Running	More than 70°C (158°F)
Ignition timing	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle 10 deg
		2,000 rpm 44 deg
Fuel injection timing	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle -38 deg
		2,000 rpm -34 deg
FAN DUTY	Engine: Running	0 - 100%
Charge air cooler coolant temp	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle Indicates charge air cooler temperature
AC EVA TEMP	Engine: Running	Indicates A/C evaporator temperature sent from "unified meter and A/C amp."
AC EVA TARGET	Engine: Running	Indicates target A/C evaporator temperature sent from "unified meter and A/C amp."
ALT DUTY	Engine: Idle	0 - 80%

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Monitor Item	Condition		Values/Status
FUEL PUMP DUTY	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N position Air conditioner switch: OFF No load 	Idle	60 – 70
BAT TEMP SEN	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N A/C switch: OFF No load 	Idle	Indicates the temperature around the battery.
THRTL STK CNT B1	This item is displayed but is not applicable to this model.		
THRTL STK CNT B2	This item is displayed but is not applicable to this model.		
ENG SPEED	Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 655,350 km (0 - 407,234 miles)
B/FUEL SCHDL	See EC6-1220, "Description" .		
MASS AIRFLOW	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	1.2 - 2.0 g/s
		2,500 rpm	4.6 - 7.6 g/s
FUEL PRES SEN	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	2.0 - 4.0 MPa
		2,000 rpm	2.0 - 4.0 MPa
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.45 - 1.00 V
		Accelerator pedal: Fully depressed	4.4 - 4.8 V
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.45 - 1.00 V
		Accelerator pedal: Fully depressed	4.3 - 4.8 V
TP SEN 1-B1	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Selector lever: D 	Accelerator pedal: Fully released	More than 0.360 V
		Accelerator pedal: Fully depressed	Less than 4.750 V
TP SEN 2-B1*1	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Selector lever: D 	Accelerator pedal: Fully released	More than 0.360 V
		Accelerator pedal: Fully depressed	Less than 4.750 V
FUEL INJ B1	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N A/C switch: OFF No load 	Idle	1.1 msec
		2,000 rpm	0.6 msec
FUEL INJ B2	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N A/C switch: OFF No load 	Idle	1.1 msec
		2,000 rpm	0.6 msec
IDLE FUEL PRES MIN	Engine: After warming up		2.0 MPa
IDLE FUEL PRES MAX	Engine: After warming up		4.0 MPa
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
AC PRESS SEN	<ul style="list-style-type: none"> Engine: Idle Both A/C switch and blower fan switch: ON (Compressor operates) 		1.0 - 4.0 V
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V

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[VR30DDTT FOR MEXICO]

Monitor Item	Condition	Values/Status
SET VHCL SPD	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle 0 km/h
		2,000 rpm 0 km/h
VTC DTY EX B1	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle 0%
		2,000 rpm 0%
VTC DTY EX B2	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle 0%
		2,000 rpm 0%
BAT CUR SEN	• Engine speed: Idle • Battery: Fully charged*2 • Selector lever: P or N • Air conditioner switch: OFF • No load	Approx. 2.600 - 3.500 V
MILEAGE FOR EONV	• Engine: After warming up • Selector lever: P or N • A/C switch: OFF • No load	Idle Varies depending on vehicle environment.
A/F ADJ-B1	Engine: Running	-0.330 - 0.330
A/F ADJ-B2	Engine: Running	-0.330 - 0.330
TP SEN 1-B2	• Ignition switch: ON (Engine stopped) • Selector lever: D	Accelerator pedal: Fully released More than 0.360 V
		Accelerator pedal: Fully depressed Less than 4.750 V
TP SEN 2-B2*1	• Ignition switch: ON (Engine stopped) • Selector lever: D	Accelerator pedal: Fully released More than 0.360 V
		Accelerator pedal: Fully depressed Less than 4.750 V
INT/V TIM (B1)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle - 5 - 5°C
		2,000 rpm Approx. 0 - 30°C
INT/V TIM (B2)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle - 5 - 5°C
		2,000 rpm Approx. 0 - 30°C
BOOST S/V DUTY	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 0.00000000%
		2,000 rpm 0.00000000%
H/P FUEL PUMP DEG	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 286 - 308 deg
		2,000 rpm 294 - 316 deg
FUEL PRES SEN V	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 0.7 - 1.0 V
		2,000 rpm 0.6 - 1.0 V
EOP SENSOR	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 1.385 V
		2,000 rpm 1.945 V
ECM TEMP 1	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 56.375°C
		2,000 rpm 48.750°C

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[VR30DDTT FOR MEXICO]

Monitor Item	Condition		Values/Status
ECM TEMP 2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	54.875°C
		2,000 rpm	47.125°C
MASS AIR FLOW SENSOR (Hz)	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2800 - 3100 Hz
		2,000 rpm	2200 - 2600 Hz
A/F-S ATMSPHRC CRCT B2	Engine: After warming up, idle the engine		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the engine		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT UP B2	Engine: Running		Varies depending on the number of updates.
A/F-S ATMSPHRC CRCT UP B1	Engine: Running		Varies depending on the number of updates.
EXHAUST GAS TEMP SEN 1 B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2.53250 V
		2,000 rpm	1.29500 V
EXHAUST GAS TEMP SEN 1 B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2.45625 V
		2,000 rpm	1.33125 V
Electric water pump 1 duty	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	40 %
Electric water pump 2 duty	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	40 %
AFM output	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	2800 - 3100 Hz
		2,000 rpm	2200 - 2600 Hz
W/G ACTUATOR POSI SEN B1	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	3.240 - 4.480 V
		2,000 rpm	3.240 - 4.480 V
W/G ACTUATOR POSI SEN B2	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	3.240 - 4.480 V
		2,000 rpm	3.240 - 4.480 V
ENGINE COOLANT B/V POSI	Ignition switch: ON		Approx. 207 deg
	Engine: Idle	Engine coolant temperature: 60°C (140°F)	Approx. 47 deg
		Engine coolant temperature: 67°C (153°F)	Approx. 87 deg
		Engine coolant temperature: 86°C (187°F)	Approx. 125 deg
TOTAL DISTNC - OCS RST 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS RST 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)

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[VR30DDTT FOR MEXICO]

Monitor Item	Condition		Values/Status
TOTAL DISTNC - OCS RST 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
DETERIORTN VL - OCS RST 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS RST 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS RST 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
TOTAL DISTNC - OCS WRN 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS WRN 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
TOTAL DISTNC - OCS WRN 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655,350 km (0 - 407,234 miles)
DETERIORTN VL - OCS WRN 1	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS WRN 2	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
DETERIORTN VL - OCS WRN 3	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
CURRENT DETERIORATN VAL	Ignition switch: ON	Varies depending on vehicle environment.	0 - 655.35
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	On
		Rear window defogger switch and lighting switch: OFF	Off
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates.)	On
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	Off
		Steering wheel: Being turned	On
P/N POSI SW	Ignition switch: ON	Selector lever: P or N	On
		Selector lever: Except above	Off
START SIGNAL	Ignition switch: ON → START → ON		Off → On → Off
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	On
		Accelerator pedal: Slightly depressed	Off
HO2S2 MNTR(B1)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		LEAN ↔ RICH
HO2S2 MNTR(B2)	Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. <ul style="list-style-type: none"> Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		LEAN ↔ RICH
IGNITION SW	Ignition switch: ON → OFF → ON		On → Off → On
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	On
		Heater fan switch: OFF	Off

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[VR30DDTT FOR MEXICO]

Monitor Item	Condition	Values/Status	
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been performed yet.	Yet
		Idle air volume learning has already been performed successfully.	CMPLT
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
COMBUSTION	<ul style="list-style-type: none"> • Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load 	Idle	Mode1
		2,000 rpm	Mode1
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates)	On
FUEL PUMP RLY	<ul style="list-style-type: none"> • For 1 second after turning ignition switch: ON • Engine running or cranking 	On	
	Except above	Off	
FPCM	Ignition switch: OFF	Off	
	<ul style="list-style-type: none"> • For 1 seconds after turning ignition switch: ON • Engine: Idle speed 	Low	
	<ul style="list-style-type: none"> • Engine: Cranking • Engine coolant temperature: More than 10°C (50°) • Engine: Above 4000 rpm 	Mid	
	Engine: Cranking	Hi	
VENT CONT/V	Ignition switch: ON	Off	
THRTL RELAY	Ignition switch: ON	On	
HO2S2 HTR (B1)	Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> • 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	
	Engine speed: Above 3,600 rpm	Off	
HO2S2 HTR (B2)	Engine speed: Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> • 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	
	Engine speed: Above 3,600 rpm	Off	
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	On
		Brake pedal: Slightly depressed	Off
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	On
		SET/COAST switch: Released	Off
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	On
		RESUME/ACCELERATE switch: Released	Off
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	On
		CANCEL switch: Released	Off
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	On
		MAIN switch: Released	Off

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[VR30DDTT FOR MEXICO]

Monitor Item	Condition	Values/Status
SET LAMP	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Off
		2,000 rpm Off
AT OD CANCEL	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Off
		2,000 rpm Off
AT OD MONITOR	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Off
		2,000 rpm Off
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time On → Off
LO SPEED CUT	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Non
		2,000 rpm Non
VHCL SPD CUT	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle Non
		2,000 rpm Non
ALT DUTY SIG	Power generation voltage variable control: Operating On	
	Power generation voltage variable control: Not operating Off	
HO2 S2 DIAG1(B2)	DTC P0159 self-diagnosis (delayed response) is incomplete. INCMP	
	DTC P0159 self-diagnosis (delayed response) is complete. CMPLT	
HO2 S2 DIAG1(B1)	DTC P0139 self-diagnosis (delayed response) is incomplete. INCMP	
	DTC P0139 self-diagnosis (delayed response) is complete. CMPLT	
HO2 S2 DIAG2(B2)	DTC P0159 self-diagnosis (slow response) is incomplete. INCMP	
	DTC P0159 self-diagnosis (slow response) is complete. CMPLT	
HO2 S2 DIAG2(B1)	DTC P0139 self-diagnosis (slow response) is incomplete. INCMP	
	DTC P0139 self-diagnosis (slow response) is complete. CMPLT	
EVAP LEAK DIAG	Ignition switch: ON	Depending on condition of EVAP leak diagnosis
EVAP DIAG READY	Ignition switch: ON	Depending on ready condi- tion of EVAP leak diagnosis
SYSTEM 1 DIAGNO- SIS A B2	DTC P219B self-diagnosis is incomplete. INCMP	
	DTC P219B self-diagnosis is complete. CMPLT	
SYSTEM 1 DIAGNO- SIS A B1	DTC P219A self-diagnosis is incomplete. INCMP	
	DTC P219A self-diagnosis is complete. CMPLT	
A/F SEN1 DIAG1(B2)	DTC P015C and P015D self-diagnosis incomplete. INCMP	
	DTC P015C and P015D self-diagnosis is complete. CMPLT	
A/F SEN1 DIAG1(B1)	DTC P015A and P015B self-diagnosis incomplete. INCMP	
	DTC P015A and P015B self-diagnosis is complete. CMPLT	
A/F SEN1 DIAG2(B2)	DTC P014E and P014F self-diagnosis incomplete. INCMP	
	DTC P014E and P014F self-diagnosis is complete. CMPLT	
A/F SEN1 DIAG2(B1)	DTC P014C and P014D self-diagnosis incomplete. INCMP	
	DTC P014C and P014D self-diagnosis is complete. CMPLT	
SYSTEM 1 DIAGNO- SIS B B2	DTC P219B self-diagnosis is on standby. ABSENT	
	DTC P219B self-diagnosis is under diagnosis. PRSENT	

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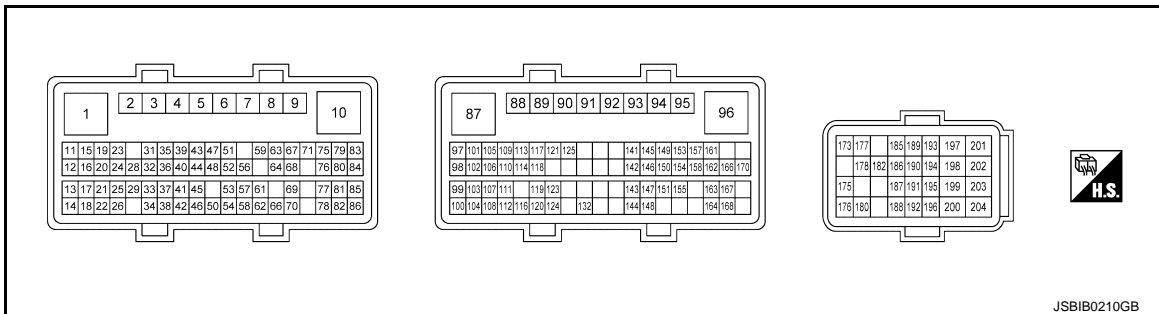
[VR30DDTT FOR MEXICO]

Monitor Item	Condition		Values/Status
SYSTEM 1 DIAGNOSIS B B1	DTC P219A self-diagnosis is on standby.		ABSENT
	DTC P219A self-diagnosis is under diagnosis.		PRESENT
A/F SEN1 DIAG3(B2)	The vehicle condition is not within the diagnosis range of DTC P014E, P014F, P015C or P015D.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014E, P014F, P015C or P015D.		PRSNT
A/F SEN1 DIAG3(B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT
VALVE TIMING ADJUSTMENT	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	YET
V/T DEFAULT POSITION LEARN	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	YET

*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-245. "VR30DDTT : How to Handle Battery"](#).

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

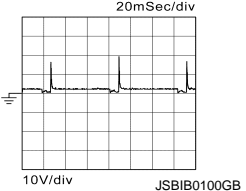
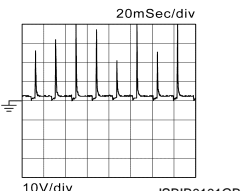
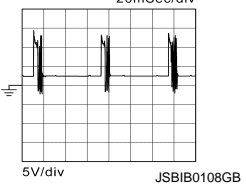
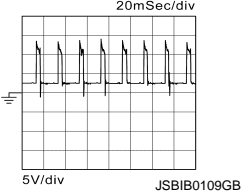
- ECM is located behind the instrument assist lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description	Input/ Output	Condition	Value (Approx.)
+	-	Signal name			
1 (R)	204 (B)	High pressure fuel pump power supply	Input	[Ignition switch: ON]	11.0 - 14.0 V
				[Engine is running] Idle speed	13.0 - 14.5 V
2 (GR)	—	ECM ground	—	—	—
3 (G)	204 (B)	Fuel injector driver power supply A1	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V

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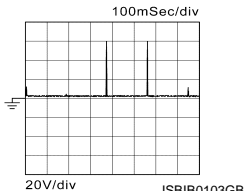
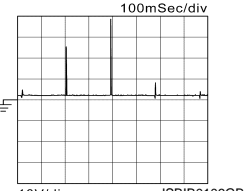
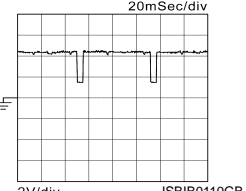
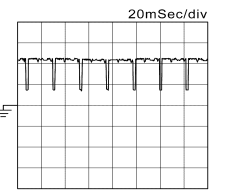
[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
4 (L)	204 (B)	Fuel injector driver power supply A2	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
5 (LG)	204 (B)	Fuel injector driver power supply B1	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
6 (V)	204 (B)	Fuel injector driver power supply B2	Input	[Ignition switch: ON]	11.3 V
				[Engine is running] Idle speed	13.6 V
7 (BG)	—	ECM ground	—	—	—
8 (W)	204 (B)	Knock sensor (bank 1)	Input	[Ignition switch: ON]	1.8 V
				[Engine is running] Idle speed	2.0 V*1
9 (R)	204 (B)	High pressure fuel pump (LO)	Output	[Ignition switch: ON]	1.8 V
				[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.1 V★ 
10 (B)	204 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.1 V★ 
				[Ignition switch: ON]	1.8 V
10 (B)	204 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.7 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.7 V★ 
				[Ignition switch: ON]	1.8 V

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
11 (BR)	204 (B)	Fuel injector No.1 (HI)	Output	[Ignition switch: ON]	1.8 V
12 (W)		Fuel injector No.3 (HI)		[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.2 V★ 
13 (LG)		Fuel injector No.5 (HI)			
15 (GR)		Fuel injector No.2 (HI)			
16 (V)		Fuel injector No.4 (HI)			
19 (L)		Fuel injector No.6 (HI)			
14 (R)	204 (B)	Fuel injector No.3 (LO)	Output	[Ignition switch: ON]	1.8 V
17 (Y)		Fuel injector No.1 (LO)		[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2.1 V★ 
18 (L)		Fuel injector No.5 (LO)			
20 (SB)		Fuel injector No.2 (LO)			
21 (P)		Fuel injector No.4 (LO)			
22 (W)		Fuel injector No.6 (LO)			
23 (GR)	—	Sensor ground [Turbocharger boost sensor (bank1)]	—	—	—
24 (W)	—	Sensor ground (Engine oil pressure sensor)	—	—	—
25 (Y)	204 (B)	Intake camshaft position sensor (bank 1) [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.8 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.8 V★ 

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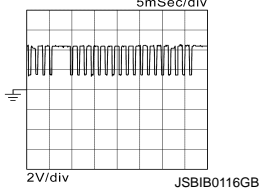
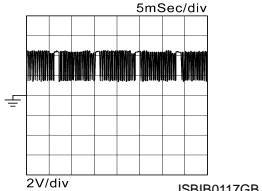
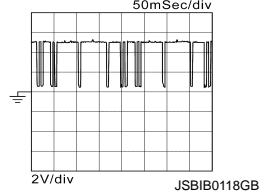
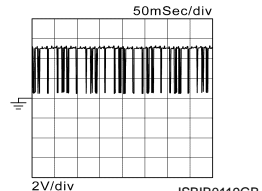
[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
26 (SB)	204 (B)	Intake camshaft position sensor (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.3 V★
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.3 V★
28 (Y)	—	Sensor ground (Crankshaft position sensor)	—	—	—
29 (BR)	—	Sensor ground [Intake camshaft posi- tion sensor (bank 1), Ex- haust camshaft position sensor (bank 1)]	—	—	—
31 (W)	204 (B)	Crankshaft position sen- sor	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.2 V★
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.2 V★

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
32 (G)	204 (B)	Crankshaft position sensor [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.1 V★ 
33 (G)	204 (B)	Exhaust camshaft position sensor (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	3.7 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.7 V★ 
34 (R)	204 (B)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5 V
35 (G)	44 (R)	Sensor power supply [Throttle position sensor (bank 1)]	—	[Ignition switch: ON]	5 V
36 (GR)	204 (B)	Sensor power supply [Intake camshaft position sensor (bank 1), Exhaust camshaft position sensor (bank 1)]	—	[Ignition switch: ON]	5 V
37 (Y)	204 (B)	Sensor power supply (Mass air flow sensor, Intake air temperature sensor 1)	—	[Ignition switch: ON]	5 V
38 (L)	204 (B)	Sensor power supply [Multi-way control valve motor, Turbocharger boost sensor (bank 1, 2)]	—	[Ignition switch: ON]	5 V
39 (BG)	204 (B)	Sensor power supply [Electric wastegate control actuator (bank 1, 2)]	—	[Ignition switch: ON]	5 V

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
40 (P)	204 (B)	Intake air temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
41 (R)	204 (B)	Mass air flow sensor (bank 1)	Input	[Ignition switch: ON]	Approx. 3,300 Hz
				[Engine is running] • Warm-up condition • Idle speed	2,800 - 3,100 Hz
42 (LG)	—	Sensor ground [Mass air flow sensor (bank 1), Intake air temperature sensor 1]	—	—	—
43 (W)	44 (R)	Throttle position sensor 1 (bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75 V
44 (R)	—	Sensor ground [Throttle position sensor (bank 1)]	—	—	—
45 (L)	—	Sensor ground [Electric wastegate control actuator (bank 1)]	—	—	—
46 (G)	204 (B)	Mass air flow sensor (bank 2)	Input	[Ignition switch: ON]	Approx. 3,300 Hz
				[Engine is running] • Warm-up condition • Idle speed	2,800 - 3,100 Hz
47 (SB)	204 (B)	Exhaust gas temperature sensor (bank 2)	Input	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	1.8 V
48 (B)	44 (R)	Throttle position sensor 2 (bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36 V
50 (BR)	100 (P)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
51 (P)	204 (B)	Engine oil pressure sensor	Input	[Engine is running] • Selector lever: N or P • Air conditioner switch: OFF • Engine oil temperature: 80°C (176°F) • Engine speed: 2,000 rpm	1.75 - 2.15 V
52 (R)	204 (B)	Battery current sensor	Input	[Ignition switch: ON]	1.7 V
				[Engine is running] • Battery: Fully charged*2 • Idle speed	2.3 V

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[VR30DDTT FOR MEXICO]

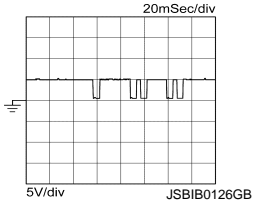
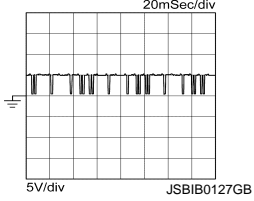
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
53 (V)	204 (B)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.6 - 1.0 V
54 (SB)	204 (B)	Battery temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.4 V
56 (Y)	204 (B)	Engine coolant temperature sensor 2	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
57 (W)	204 (B)	Electric wastegate position sensor (bank 1)	Input	[Ignition switch: ON]	3.1 V
				[Engine is running] • Warm-up condition • Idle speed	3.4 V
58 (W)	204 (B)	Turbocharger boost sensor (bank 1)	Input	[Ignition switch: ON]	1.8 - 2.4 V
59 (V)	204 (B)	Charge air cooler coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
61 (W)	204 (B)	Electric wastegate position sensor (bank 2)	Input	[Ignition switch: ON]	3.2 V
				[Engine is running] • Warm-up condition • Idle speed	3.6 V
62 (R)	204 (B)	Intake air temperature sensor 2	Input	[Ignition switch: ON]	2.6 V
				[Engine is running] • Warm-up condition • Idle speed	2.1 V
63 (L)	204 (B)	Turbocharger boost sensor (bank 2)	Input	[Ignition switch: ON]	1.4 V
				[Engine is running] • Warm-up condition • Idle speed	1.7 V
64 (—)	—	—	—	—	—
66 (P)	—	Sensor ground [Electric wastegate control actuator (bank 2)]	—	—	—
67 (LG)	204 (B)	Exhaust gas temperature sensor (bank 1)	Input	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	2.0 V
68 (R)	—	Sensor ground [Turbocharger boost sensor (bank 2)]	—	—	—

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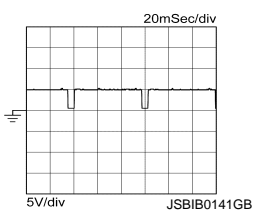
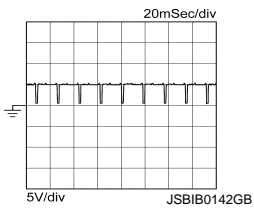
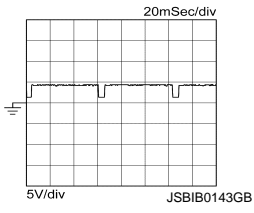
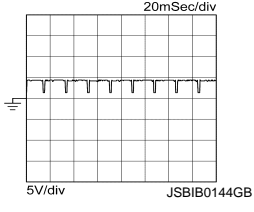
[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
69 (LG)	204 (B)	Multi-way control valve position sensor	Input	[Ignition switch: ON] Cold condition	4.5 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 60°C (140°F)	1.4 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 67°C (153°F)	2.2 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 86°C (187°F)	2.9 V
70 (V)	204 (B)	Refrigerant pressure sensor	Input	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.7 - 2.0 V
71 (W)	204 (B)	Engine coolant temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
75 (V)	204 (B)	Exhaust camshaft position sensor (bank 2)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.3 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.3 V★ 
76 (GR)	204 (B)	Sensor power supply [Mass air flow sensor (bank 2)]	—	[Ignition switch: ON]	5 V

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
77 (BG) ^{*3} (L) ^{*3}	204 (B)	Intake camshaft position sensor (bank 2)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.6 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.6 V★ 
78 (SB)	204 (B)	Intake camshaft position sensor (bank 2) [Electric intake valve timing control signal]	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	4.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.1 V★ 
79 (BR)	—	Sensor ground [Mass air flow sensor (bank 2)]	—	—	—
80 (P)	204 (B)	Sensor power supply (Fuel rail pressure sensor)	—	[Ignition switch: ON]	5 V
81 (Y)	204 (B)	Sensor power supply (Battery current sensor)	—	[Ignition switch: ON]	5 V
82 (G)	—	Sensor ground [Intake camshaft position sensor (bank 2), Exhaust camshaft position sensor (bank 2)]	—	—	—
83 (Y)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
84 (B)	—	Sensor ground (Knock sensor)	—	—	—

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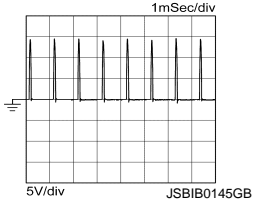
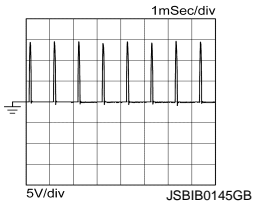
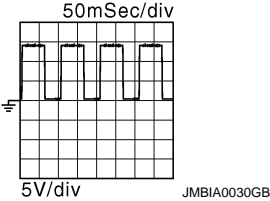
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Terminal No. (Wire color)		Description	Input/ Output	Condition	Value (Approx.)
+	—				
85 (W)	204 (B)	Sensor power supply [Intake camshaft position sensor (bank 2), Exhaust camshaft position sensor (bank 2)]	—	[Ignition switch: ON]	5 V
86 (W)	204 (B)	Knock sensor (bank 2)	Input	[Ignition switch: ON]	1.8 V
				[Engine is running] • Warm-up condition • Idle speed	2.4 V*1
87 (B)	—	ECM ground	—	—	—
88 (B)	—	ECM ground	—	—	—
89 (LG) ^{*3} (L) ^{*3}	90 (G)	Electric wastegate control actuator motor (+) (bank 2)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.1 V★ 
90 (G)	89 (LG) ^{*3} (L) ^{*3}	Electric wastegate control actuator motor (-) (bank 2)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.2 V
91 (BG)	204 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
92 (L)	93 (R)	Electric wastegate control actuator motor (+) (bank 1)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.8 V★ 
93 (R)	92 (L)	Electric wastegate control actuator motor (-) (bank 1)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	0.2 V
94 (W)	204 (B)	Air fuel ratio (A/F) sensor 1 heater (bank 1)	Output	[Ignition switch: ON]	11.1 V
				[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	10.1 V★ 
95 (GR)	—	ECM ground	—	—	—

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description	Input/ Output	Condition	Value (Approx.)
+	--	Signal name			
96 (R)	204 (B)	Throttle control motor power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
97 (GR)	—	Sensor ground (Multi-way control valve, Engine coolant temperature sensor 1, Charge air cooler coolant temperature sensor, Refrigerant pressure sensor)	—	—	—
98 (Y)	204 (B)	Heated oxygen sensor 2 (bank 2)	Input	[Engine is running] Revsing 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
99 (R)	—	Sensor ground [Heated oxygen sensor 2 (bank 1), Heated oxygen sensor 2 (bank 2)]	—	—	—
100 (P)	—	Sensor ground [Battery current sensor, Engine coolant temperature sensor 2, Engine oil temperature sensor, Exhaust gas temperature sensor (bank 1), Exhaust gas temperature sensor (bank 2)]	—	—	—
101 (L)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 1)	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.2 V Output voltage varies with air fuel ratio.
102 (P)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 1)	Input	[Ignition switch: ON]	1.8 V
103 (B)	—	Shield	—	—	—
104 (SB)	—	Sensor ground [Throttle position sensor (bank 2)]	—	—	—
105 (BR)	104 (SB)	Sensor power supply [Throttle position sensor (bank 2)]	—	[Ignition switch: ON]	5 V
106 (P)	104 (SB)	Throttle position sensor 1 (bank 2)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75 V
107 (LG)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 2)	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.2 V Output voltage varies with air fuel ratio.

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
108 (R)	204 (B)	Sensor power supply [Turbocharger speed sensor (bank 2)]	—	[Ignition switch: ON]	5 V
109 (G)	204 (B)	Sensor power supply [Turbocharger speed sensor (bank 1)]	—	[Ignition switch: ON]	5 V
110 (W)	204 (B)	Heated oxygen sensor 2 (bank 1)	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
111 (V)	204 (B)	Air fuel ratio (A/F) sensor 1 (bank 2)	Input	[Ignition switch: ON]	1.8 V
112 (LG)	104 (SB)	Throttle position sensor 2 (bank 2)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36 V
113 (Y)	204 (B)	Manifold absolute pres- sure sensor	Input	[Ignition switch: ON]	1.4 V
				[Engine is running] • Warm-up condition • Idle speed	1.0 V
114 (G)	—	Sensor ground (Manifold absolute pres- sure sensor)	—	—	—
116 (L)	—	Sensor ground [Turbocharger speed sensor (bank 1)]	—	—	—
117 (LG)	204 (B)	Charge air cooler cool- ing electric water pump 1	Input	[Ignition switch: ON]	0.7 - 3.6 V
118 (BG)	204 (B)	Charge air cooler cool- ing electric water pump 2	Input	[Ignition switch: ON]	0.7 - 3.6 V
119 (Y)	204 (B)	Turbocharger speed sensor (bank 1)	Input	[Engine is running] • Warm-up condition • 3,200 rpm	15,000 - 30,000 rpm
120 (W)	204 (B)	Turbocharger speed sensor (bank 2)	Input	[Engine is running] • Warm-up condition • 3,200 rpm	15,000 - 30,000 rpm
121 (V)	204 (B)	PNP signal	Input	[Ignition switch: ON] Selector lever: P or N	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] Selector lever: Except above	0 V

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)	
+	--	Signal name	Input/ Output			
123 (BG)	204 (B)	Throttle control motor re- lay	Output	[Ignition switch: ON → OFF]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V	EC6
				[Ignition switch: ON]	0 - 1.0 V	C
124 (R)	204 (B)	Fuel pump relay	Output	[Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5 V	D
				[Ignition switch: ON] More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)	E
125 (P)	204 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] A few seconds after turning ignition switch OFF	0 - 1.5 V	F
				[Ignition switch: OFF] More than a few seconds after turning ig- nition switch OFF	BATTERY VOLTAGE (11 - 14 V)	G
132 (B)	—	Sensor ground [Turbocharger speed sensor (bank 2)]	—	—	—	H
141 (R)	146 (G)	Multi-way control valve motor (+)	Output	[Ignition switch: ON] • Cold condition	0 V	I
142 (L)	204 (B)	Engine oil pressure con- trol solenoid valve	Output	[Engine is running]	12.5 V	J
143 (G)	204 (B)	Charge air cooler cool- ing electric water pump 1	Output	[Ignition switch: ON]	0 V	K
				[Engine is running] • Warm-up condition • Idle speed	0 - 3.3 V	
144 (BG)	204 (B)	Charge air cooler cool- ing electric water pump 2	Output	[Ignition switch: ON]	0 V	L
				[Engine is running] • Warm-up condition • Idle speed	0 - 3.3 V	
145 (BG)	204 (B)	Multi-way control valve power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	M
146 (G)	141 (R)	Multi-way control valve motor (-)	Output	[Ignition switch: ON] • Cold condition	0 V	N

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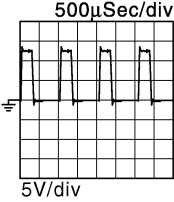
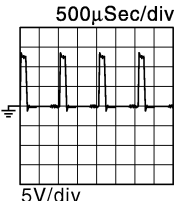
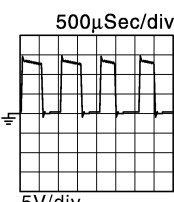
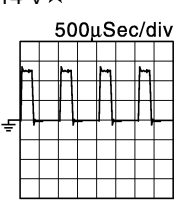
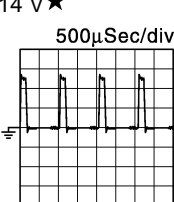
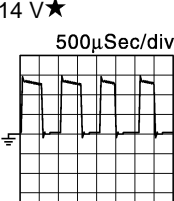
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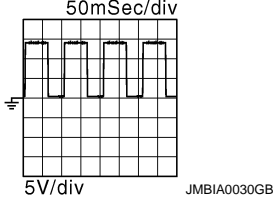
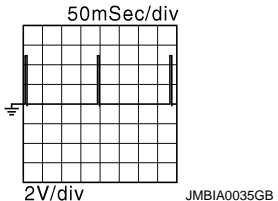
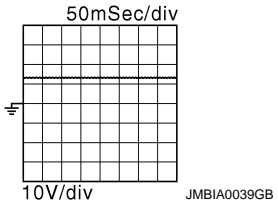
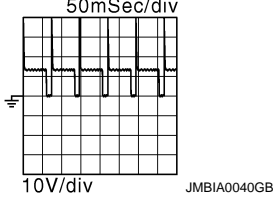
[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
147 (W)	148 (GR)	Throttle control motor (Open) (bank 2)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★ 
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★ 
148 (GR)	147 (W)	Throttle control motor (Close) (bank 2)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: In the middle of re- leasing operation	0 - 14 V★ 
149 (G)	150 (GR)	Throttle control motor (Open) (bank 1)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★ 
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★ 
150 (GR)	149 (G)	Throttle control motor (Close) (bank 1)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: In the middle of re- leasing operation	0 - 14 V★ 

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
151 (BR)	204 (B)	Air fuel ratio (A/F) sensor 1 heater (bank 2)	Output	[Ignition switch: ON]	12.5 V
				[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	10.1 V ★ 
153 (L)	204 (B)	Ignition signal No. 3	Output	[Ignition switch: ON]	0 V
154 (SB)		Ignition signal No. 6		[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	0 - 0.2 V★ 
161 (Y)		Ignition signal No. 1			
162 (GR)		Ignition signal No. 4			
164 (G)		Ignition signal No. 2			
168 (V)		Ignition signal No. 5			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm
155 (GR)	204 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★ 
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14 V)★ 
157 (W)	204 (B)	Exhaust valve timing control solenoid valve (bank 1)		[Ignition switch: ON]	12.4 V
				[Ignition switch: ON] • Warm-up condition • Idle speed	14 V
158 (G)	204 (B)	Exhaust valve timing control solenoid valve (bank 2)		[Ignition switch: ON]	12.4 V
				[Ignition switch: ON] • Warm-up condition • Idle speed	14 V

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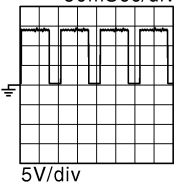
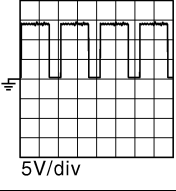
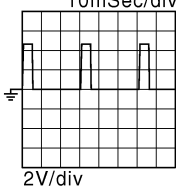
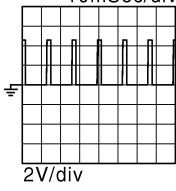
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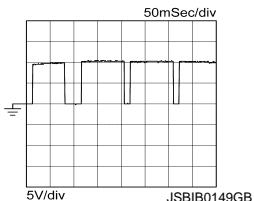
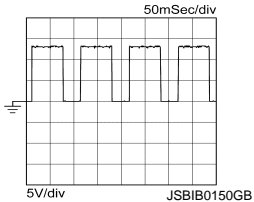
[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
163 (SB)	204 (B)	Heated oxygen sensor 2 heater (bank 2)	Output	[Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met • Engine: after warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10 V★ 
				[Ignition switch: ON] Engine stopped [Engine is running] Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
166 (L)	204 (B)	Heated oxygen sensor 2 heater (bank 1)	Output	[Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met • Engine: after warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10 V★ 
				[Ignition switch: ON] Engine stopped [Engine is running] Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
170 (P)	204 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
175 (P)	—	CAN-L	Input/ output	—	—
176 (L)	—	CAN-H	Input/ output	—	—
178 (V)	204 (B)	Engine speed output sig- nal	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 V★ 
				[Engine is running] Engine speed is 2,000 rpm	1.0 V★ 
182 (W)	204 (B)	Fuel pump control mod- ule (FPCM) check	Input	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	11.5 V
185 (SB)	204 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	--	Signal name	Input/ Output		
186 (SB)	187 (BG)	ICC steering switch (models with ICC system)	Input	[Ignition switch: ON] DYNAMIC DRIVER ASSISTANCE switch: Pressed	1.0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1.9 V
				[Ignition switch: ON] DISTANCE switch: Pressed	2.6 V
				[Ignition switch: ON] SET/COAST switch: Pressed	3.2 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3.7 V
				[Ignition switch: ON] ICC steering switch: OFF	4.2 V
		ASCD steering switch (models without ICC system)	Input	[Ignition switch: ON] CANCEL switch: Pressed	1 V
				[Ignition switch: ON] SET/COAST switch: Pressed	2 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] ASCD steering switch: OFF	4 V
187 (BG)	—	Sensor ground (ASCD/ICC steering switch)	—	—	—
188 (Y)	204 (B)	Fuel pump control module (FPCM)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	8.3 V
				[When cranking engine] Not cold state condition	4.0 V★ 
				[Engine is running] • Warm-up condition • Idle speed [Ignition switch: ON] For 1 second after turning ignition switch ON	4.0 V★ 
189 (Y)	—	Engine communication line-L	Input/ Output	—	—
190 (L)	—	Engine communication line-H	Input/ Output	—	—

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[VR30DDTT FOR MEXICO]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
191 (P)	204 (B)	Stop lamp switch	Input	[Ignition switch: OFF] Brake pedal: Fully released	0 V
				[Ignition switch: OFF] Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
192 (BG)	204 (B)	Brake pedal position switch	Input	[Ignition switch: ON] Brake pedal: Slightly depressed	0 V
				[Ignition switch: ON] Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
194 (W)	204 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
195 (BR)	204 (B)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.22 - 0.50 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.1 - 2.5 V
196 (R)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
197 (R)	204 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
198 (L)	204 (B)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
199 (B)	—	ECM ground	—	—	—
201 (B)	—	ECM ground	—	—	—
202 (Y)	204 (B)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.45 - 1.00 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.4 - 4.8 V
203 (G)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
204 (B)	—	ECM ground	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: This may vary depending on internal resistance of the tester.

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245, "VR30DDTT : How to Handle Battery"](#).

*3: Color of wire differs depending on production.

Fail safe

INFOID:000000013844125

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. <ul style="list-style-type: none"> • Engine output control 1: Driving at 70 km/h or more is possible. • Engine output control 2: Driving at 40 km/h or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode		<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control 1
C		Engine output control 2
D	Device fix mode	
E	Combustion control mode	Stratified charge combustion control at starting
F		<ul style="list-style-type: none"> • Idle speed control • Recovery speed control at decelerating • Idle neutral control*
G		<ul style="list-style-type: none"> • Ignition timing correction control • Retardation control

*: Not applicable

Fail Safe List

×:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior							Others
		Pattern							
		A	B	C	D	E	F	G	
U012E U042F	Engine communication	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	
P0010 P0020	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
		—	—	—	×	—	×	—	

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0011 P0021	Intake valve timing control	—	—	—	×	—	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: When VTC mechanism sticks, camshaft position does not change from position of stuck angle.
P0014 P0024	Exhaust valve timing control	—	—	—	×	—	—	—	—
P0046 P004B	Electric wastegate actuator motor	—	×	—	×	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)
P0078 P0084	Exhaust valve timing control solenoid valve	—	—	—	×	—	—	—	—
P0090	High pressure fuel pump	×	—	—	×	×	—	—	—
P0102 P0103 P010C P010D	Mass air flow sensor	—	×	—	×	—	—	×	—
P0107 P0108	Barometric pressure sensor (built-into ECM)	—	×	—	×	—	—	—	—
P0117 P0118	Engine coolant temperature sensor	—	—	—	—	—	×	—	—
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 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.
P0171 P0172 P0174 P0175	Fuel injection system	×	—	—	—	—	×	—	—
P0190	Fuel rail pressure sensor	×	—	—	×	—	×	—	—
P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	—	Exhaust valve timing control does not function.
P0201 P0202 P0203 P0204 P0205 P0206	Fuel injector	×	—	—	—	×	—	—	—
P0234 P1334	Turbocharger system	—	×	—	×	—	—	—	—
P0235	Turbocharger boost sensor	—	×	—	×	—	—	—	—
P0300 P0301 P0302 P0303 P0304 P0305 P0306	Misfire	×	—	—	—	—	×	—	—

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

DTC No.	Detected items	Vehicle behavior							Others	
		Pattern								
		A	B	C	D	E	F	G		
P0335	Crankshaft position sensor	—	—	—	×	×	—	—	—	EC6
		—	—	—	×	—	×	—		
P0340 P0345	Intake camshaft position sensor	—	—	—	×	×	—	—	—	C
		—	—	—	×	—	×	—		
P1140 P1145		×	—	—	×	—	—	×	—	
P0365 P0390	Exhaust camshaft position sensor	—	—	—	×	—	—	—	—	D
P0500	Vehicle speed sensor	×	—	—	—	—	×	—	—	E
P0524	Engine oil pressure	—	—	—	—	—	—	—	<ul style="list-style-type: none"> • ECM illuminates engine oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON. 	F
P0603 P0607	ECM	—	—	—	—	—	—	—	—	G
		—	×	—	—	—	—	—	ASCD operation may be deactivated.	
P0604		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	H
P0605		—	—	—	—	—	—	—	—	I
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P0606		—	—	—	—	—	—	—	—	J
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P060A		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	L
		—	×	—	×	—	—	—	<ul style="list-style-type: none"> • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • ASCD operation may be deactivated. 	
P060B		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	M
P062B		—	—	—	—	—	—	—	—	O
		×	—	—	—	×	—	—		
P0641	Sensor power supply	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	P
		—	—	—	×	—	×	—		
P0643		—	—	—	×	—	—	—	—	

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

DTC No.	Detected items	Vehicle behavior								
		Pattern							Others	
		A	B	C	D	E	F	G		
P14A4 P14A5 P14AD P14AE	Charge air cooler cooling electric water pump	—	—	—	—	—	—	—	Charge air cooler cooling electric water pump runs at the command speed.	
P14A7 P14B0		—	—	—	—	—	—	—		Charge air cooler cooling electric water pump runs at full speed.
P14A9 P14AA P14AC P14B2 P14B3 P14B5		—	—	—	—	—	—	—		Charge air cooler cooling electric water pump stops.
P1197	Out of gas	—	—	—	×	—	—	—	—	
P1233 P2101	Electric throttle control	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1236 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.	
P1238 P2119	Electric throttle control actuator	—	×	—	—	—	—	—	—	
		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1290 P2100 P2103	Throttle control motor relay	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
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						
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	—	—	—	×	—	—	—	—	
P23E9 P23EA P2614 P2615 P23EB P2616 P2617 P2618 P2619	Intake camshaft position sensor	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)	
		—	—	—	×	—	×	—		
		—	—	—	×	×	—	—		
		—	—	—	×	—	×	—		
P2562 P2566 P2586 P2590	Electric wastegate control valve position sensor	—	×	—	×	—	—	—	ECM stops the electric wastegate actuator control. (Wastegate valve opens)	
P2578 P2593	Turbocharger speed sensor	—	—	—	—	—	—	—	Torque have to be limited to the operating range that does not generate the over speed of the turbocharger.	

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

DTC No.	Detected items	Vehicle behavior							Others
		Pattern							
		A	B	C	D	E	F	G	
P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1	Electric intake valve timing control actuator				×	×			ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.
P34C4 P34C5	Electric intake valve timing control actuator	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)
P34C8	Electric intake valve timing control module	—	—	—	×	×	—	—	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)

DTC Inspection Priority Chart

INFOID:000000013844126

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	<ul style="list-style-type: none"> • U0101 U1000 U1001 CAN communication line • U012E U042F Engine communication line • P0097 P0098 Intake air temperature sensor 2 • P00B3 P00B4 Engine coolant temperature sensor 2 • P00E0 P00E1 Charge air cooler coolant temperature sensor • P0102 P0103 P010C P010D Mass air flow sensor • P0107 P0108 Barometric pressure sensor • P010A Manifold absolute pressure sensor • P0112 P0113 Intake air temperature sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor • P0190 FRP sensor • P0197 P0198 Engine oil temperature sensor • P0235 P0239 Turbocharger boost sensor • P0327 P0328 P0332 P0333 Knock sensor • P0335 Crankshaft position sensor • P0340 P0345 P1140 P1145 Intake camshaft position sensor • P0365 P0390 Exhaust camshaft position sensor • P0500 Vehicle speed sensor • P0520 Engine oil pressure sensor • P0544 P0545 P0546 P0547 P0548 P0549 P2081 P2083 Exhaust gas temperature sensor • P0603 P0604 P0605 P0606 P0607 P060A P060B P0611 P062B ECM • P062F Control module • P0641 P23E9 P23EA P23EB P2614 P2615 P2616 P2617 P2618 P2619 P34C8 Electric intake valve timing control module • P0643 Sensor power supply • P0850 Park/neutral position (PNP) switch • P1197 Out of gas* • P1220 Fuel pump control module (FPCM) • P1550 P1551 P1552 P1553 P1554 Battery current sensor • P1556 P1557 Battery temperature sensor • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor • P2562 P2566 P2586 P2590 Electric wastegate control valve position sensor • P2578 P2593 Turbocharger speed sensor • P26A6 P26A7 Multi-way control valve position sensor

Priority	Detected items (DTC)
2	<ul style="list-style-type: none"> • P0010 P0020 Electric intake valve timing control actuator • P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater • P0046 P004B Electric wastegate control actuator • P0078 P0084 Exhaust valve timing control solenoid valve • P0090 FRP control system • P0130 P0131 P0132 P014C P014D P014E P014F P0150 P0151 P0152 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0157 P0158 Heated oxygen sensor 2 • P023B P023C P14A2 P14A3 P14A4 P14A5 P14A6 P14A7 P14A8 P14A9 P14AA P14AC P14AD P14AE P14AF P14B0 P14B1 P14B2 P14B3 P14B5 Charge air cooler cooling electric water pump • P0444 EVAP canister purge volume control solenoid valve • P06DA P06DB Engine oil pressure control solenoid valve • P1217 Engine over temperature (OVERHEAT) • P1233 P2101 Electric throttle control function • P1236 P2118 Throttle control motor • P1290 P2100 P2103 Throttle control motor relay • P1805 Brake switch • P26A3 Multi-way control valve • P34A4 P34A5 P34A6 P34A7 P34A8 P34A9 P34AA P34AB P34AC P34AD P34B0 P34B1 P34C4 P34C5 Electric intake valve timing control actuator
3	<ul style="list-style-type: none"> • P0011 P0021 Intake valve timing control • P0014 P0024 Exhaust valve timing control • P0171 P0172 P0174 P0175 Fuel injection system function • P0201 P0202 P0203 P0204 P0205 P0206 Injector • P0234 P1334 Turbocharger system • P0300 - P0306 Misfire • P0420 P0430 Three way catalyst function • P0524 Engine oil pressure • P1212 TCS communication line • P1238 P2119 Electric throttle control actuator • P1564 ICC steering switch / ASCD steering switch • P1568 ICC command value • P1572 Brake pedal position switch • P1574 ICC vehicle speed sensor / ASCD vehicle speed sensor

NOTE:

*: If "P1197" is displayed with other DTC in priority 1, perform trouble diagnosis for "P1197" first.

DTC Index

INFOID:000000013844127

x:Applicable —: Not applicable

DTC ^{*1}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
U0101	LOST COMM (TCM)	—	1	×	EC6-1235
U012E	Communication error (lost)	—	2	×	EC6-1236
U042F	Communication error (invalid)	—	2	×	EC6-1238
U1000	CAN COMM CIRCUIT	—	2	—	EC6-1240
U1001	CAN COMM CIRCUIT	—	1	—	EC6-1242
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	Flashing^{*3}	—
P0010	A camshaft position actuator B1	—	2	×	EC6-1243
P0011	INT/V TIM CONT-B1	×	2	×	EC6-1245
P0014	EXH/V TIM CONT-B1	×	2	×	EC6-1248
P0020	A camshaft position actuator B2	—	2	×	EC6-1252
P0021	INT/V TIM CONT-B2	×	2	×	EC6-1254
P0024	EXH/V TIM CONT-B2	×	2	×	EC6-1248
P0031	A/F SEN1 HTR (B1)	—	2	×	EC6-1257

ECM

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
CONSULT GST*2					
P0032	A/F SEN1 HTR (B1)	—	2	×	EC6-1257
P0037	HO2S2 HTR (B1)	—	2	×	EC6-1260
P0038	HO2S2 HTR (B1)	—	2	×	EC6-1260
P0046	TC/SC BOOST CONTROL A	—	2	×	EC6-1263
P004B	TC/SC BOOST CONTROL B	—	2	×	EC6-1263
P0051	A/F SEN1 HTR (B2)	—	2	×	EC6-1257
P0052	A/F SEN1 HTR (B2)	—	2	×	EC6-1257
P0057	HO2S2 HTR (B2)	—	2	×	EC6-1260
P0058	HO2S2 HTR (B2)	—	2	×	EC6-1260
P0078	EX V/T ACT/CIRC-B1	—	2	×	EC6-1266
P0084	EX V/T ACT/CIRC-B2	—	2	×	EC6-1266
P0090	FUEL PUMP	—	2	×	EC6-1269
P0097	IAT SENSOR 2 B1	—	2	×	EC6-1272
P0098	IAT SENSOR 2 B1	—	2	×	EC6-1272
P00B3	RADIATOR COOLANT TEMP SEN	—	2	—	EC6-1276
P00B4	RADIATOR COOLANT TEMP SEN	—	2	—	EC6-1276
P00E0	Charge air cooler coolant temp sensor	—	2	—	EC6-1279
P00E1	Charge air cooler coolant temp sensor	—	2	—	EC6-1282
P0102	MAF SEN/CIRCUIT-B1	—	1	×	EC6-1285
P0103	MAF SEN/CIRCUIT-B1	—	1	×	EC6-1285
P0107	ABSL PRES SEN/CIRC	—	2	×	EC6-1292
P0108	ABSL PRES SEN/CIRC	—	2	×	EC6-1292
P010A	ABSL PRES SEN/CIRC	—	2	×	EC6-1293
P010C	MAF SEN/CIRCUIT-B2	—	1	×	EC6-1285
P010D	MAF SEN/CIRCUIT-B2	—	1	×	EC6-1285
P0112	IAT SEN/CIRCUIT-B1	—	2	×	EC6-1297
P0113	IAT SEN/CIRCUIT-B1	—	2	×	EC6-1297
P0117	ECT SEN/CIRC	—	1	×	EC6-1300
P0118	ECT SEN/CIRC	—	1	×	EC6-1300
P0122	TP SEN 2/CIRC-B1	—	1	×	EC6-1303
P0123	TP SEN 2/CIRC-B1	—	1	×	EC6-1303
P0130	A/F SENSOR1 (B1)	×	2	×	EC6-1307
P0131	A/F SENSOR1 (B1)	—	2	×	EC6-1311
P0132	A/F SENSOR1 (B1)	—	2	×	EC6-1314
P0137	HO2S2 (B1)	×	2	×	EC6-1317
P0138	HO2S2 (B1)	×	2	×	EC6-1323
P014C	A/F SENSOR1 (B1)	×	2	×	EC6-1331
P014D	A/F SENSOR1 (B1)	×	2	×	EC6-1331
P014E	A/F SENSOR1 (B2)	×	2	×	EC6-1331
P014F	A/F SENSOR1 (B2)	×	2	×	EC6-1331
P0150	A/F SENSOR1 (B2)	×	2	×	EC6-1307
P0151	A/F SENSOR1 (B2)	—	2	×	EC6-1311

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DTC ^{*1}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
CONSULT GST ^{*2}					
P0152	A/F SENSOR1 (B2)	—	2	×	EC6-1314
P0157	HO2S2 (B2)	×	2	×	EC6-1317
P0158	HO2S2 (B2)	×	2	×	EC6-1323
P0171	FUEL SYS-LEAN-B1	—	2	×	EC6-1337
P0172	FUEL SYS-RICH-B1	—	2	×	EC6-1342
P0174	FUEL SYS-LEAN-B2	—	2	×	EC6-1337
P0175	FUEL SYS-RICH-B2	—	2	×	EC6-1342
P0190	FUEL PRES SEN/CIRC	—	1	×	EC6-1346
P0197	EOT SEN/CIRC	—	2	×	EC6-1350
P0198	EOT SEN/CIRC	—	2	×	EC6-1350
P0201	INJECTOR CIRC-CYL1	—	2	×	EC6-1352
P0202	INJECTOR CIRC-CYL2	—	2	×	EC6-1352
P0203	INJECTOR CIRC-CYL3	—	2	×	EC6-1352
P0204	INJECTOR CIRC-CYL4	—	2	×	EC6-1352
P0205	INJECTOR CIRC-CYL5	—	2	×	EC6-1352
P0206	INJECTOR CIRC-CYL6	—	2	×	EC6-1352
P0222	TP SEN 1/CIRC-B1	—	1	×	EC6-1353
P0223	TP SEN 1/CIRC-B1	—	1	×	EC6-1353
P0227	TP SEN 2/CIRC-B2	—	1	×	EC6-1303
P0228	TP SEN 2/CIRC-B2	—	1	×	EC6-1303
P0234	TC SYSTEM-B1	—	1	×	EC6-1357
P0235	TURBO BOOST SENSOR	—	2	×	EC6-1359
P0239	TC/SC boost sensor B	—	2	×	EC6-1359
P023B	Charge air cooler coolant pump	—	2	—	EC6-1362
P023C	Charge air cooler coolant pump	—	2	—	EC6-1366
P0300	MULTI CYL MISFIRE	—	1 or 2	×	EC6-1370
P0301	CYL 1 MISFIRE	—	1 or 2	×	EC6-1370
P0302	CYL 2 MISFIRE	—	1 or 2	×	EC6-1370
P0303	CYL 3 MISFIRE	—	1 or 2	×	EC6-1370
P0304	CYL 4 MISFIRE	—	1 or 2	×	EC6-1370
P0305	CYL 5 MISFIRE	—	1 or 2	×	EC6-1370
P0306	CYL 6 MISFIRE	—	1 or 2	×	EC6-1370
P0327	KNOCK SEN/CIRC-B1	—	2	—	EC6-1377
P0328	KNOCK SEN/CIRC-B1	—	2	—	EC6-1377
P0332	KNOCK SEN/CIRC-B2	—	2	—	EC6-1377
P0333	KNOCK SEN/CIRC-B2	—	2	—	EC6-1377
P0335	CKP SEN/CIRCUIT	—	2	×	EC6-1380
P0340	CMP SEN/CIRC-B1	—	2	×	EC6-1384
P0345	CMP SEN/CIRC-B2	—	2	×	EC6-1384
P0365	CAMSHAFT POSITION SENSOR B B1	—	2	×	EC6-1389
P0390	Camshaft position sensor B bank2	—	2	×	EC6-1392
P0420	TW CATALYST SYS-B1	×	2	×	EC6-1395

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DTC*1 CONSULT GST*2	Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
P0430	TW CATALYST SYS-B2	×	2	×	EC6-1395
P0444	PURG VOLUME CONT/V	—	2	×	EC6-1400
P0500	VEHICLE SPEED SEN A*4	—	2	×	EC6-1403
P0520	EOP SENSOR/SWITCH	—	2	—	EC6-1405
P0524	ENGINE OIL PRESSURE	—	1	—	EC6-1408
P0544	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	EC6-1411
P0545	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	EC6-1414
P0546	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	EC6-1414
P0547	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	EC6-1417
P0548	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	EC6-1420
P0549	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	EC6-1420
P0603	ECM BACK UP/CIRCUIT	—	2	× or —	EC6-1423
P0604	ECM	—	1	×	EC6-1425
P0605	ECM	—	1 or 2	×	EC6-1426
P0606	CONTROL MODULE	—	1	× or —	EC6-1427
P0607	ECM	—	1 or 2	× or —	EC6-1429
P060A	CONTROL MODULE	—	1	×	EC6-1430
P060B	CONTROL MODULE	—	1	×	EC6-1432
P0611	FIC MODULE	—	2	×	EC6-1433
P062B	ECM	—	2	×	EC6-1434
P062F	CONTROL MODULE	—	1	×	EC6-1436
P0641	Sensor reference voltage A	—	2	×	EC6-1437
P0643	SENSOR POWER/CIRC	—	1	×	EC6-1439
P06DA	ENGINE OIL PRESSURE CONTROL	—	2	—	EC6-1442
P06DB	ENGINE OIL PRESSURE CONTROL	—	2	—	EC6-1442
P0850	P-N POS SW/CIRCUIT	—	2	×	EC6-1445
P1140	INTK TIM S/CIRC-B1	—	2	×	EC6-1448
P1145	INTK TIM S/CIRC-B2	—	2	×	EC6-1451
P1197	FUEL RUN OUT	—	2	—	EC6-1454
P1212	TCS/CIRC	—	2	—	EC6-1456
P1217	ENG OVER TEMP	—	1	×	EC6-1458
P1220	FPCM/CIRCUIT	—	1	—	EC6-1461
P1225	CTP LEARNING-B1	—	2	—	EC6-1464
P1226	CTP LEARNING-B1	—	2	—	EC6-1466
P1233	ETC FNCTN/CIRC-B2	—	1	×	EC6-1468
P1234	CTP LEARNING-B2	—	2	—	EC6-1464
P1235	CTP LEARNING-B2	—	2	—	EC6-1466
P1236	ETC MOT-B2	—	1	×	EC6-1471
P1238	ETC ACTR-B2	—	1	×	EC6-1473
P1239	TP SENSOR-B2	—	1	×	EC6-1475
P1290	ETC MOT PWR-B2	—	1	×	EC6-1479
P1334	TC SYSTEM-B2	—	1	×	EC6-1481

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DTC ^{*1}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
CONSULT GST ^{*2}					
P14A2	Charge air cooler cooling electric W/P	—	2	—	EC6-1483
P14A3	Charge air cooler cooling electric W/P	—	2	—	EC6-1487
P14A4	Charge air cooler cooling electric W/P	—	2	—	EC6-1491
P14A5	Charge air cooler cooling electric W/P	—	2	—	EC6-1495
P14A6	Charge air cooler cooling electric W/P	—	2	—	EC6-1499
P14A7	Charge air cooler cooling electric W/P	—	2	—	EC6-1503
P14A8	Charge air cooler cooling electric W/P	—	2	—	EC6-1507
P14A9	Charge air cooler cooling electric W/P	—	2	—	EC6-1511
P14AA	Charge air cooler cooling electric W/P	—	2	—	EC6-1513
P14AC	Charge air cooler cooling electric W/P	—	2	—	EC6-1515
P14AD	Charge air cooler cooling electric W/P	—	2	—	EC6-1517
P14AE	Charge air cooler cooling electric W/P	—	2	—	EC6-1521
P14AF	Charge air cooler cooling electric W/P	—	2	—	EC6-1525
P14B0	Charge air cooler cooling electric W/P	—	2	—	EC6-1529
P14B1	Charge air cooler cooling electric W/P	—	2	—	EC6-1533
P14B2	Charge air cooler cooling electric W/P	—	2	—	EC6-1537
P14B3	Charge air cooler cooling electric W/P	—	2	—	EC6-1539
P14B5	Charge air cooler cooling electric W/P	—	2	—	EC6-1541
P1550	BAT CURRENT SENSOR	—	2	—	EC6-1543
P1551	BAT CURRENT SENSOR	—	2	—	EC6-1546
P1552	BAT CURRENT SENSOR	—	2	—	EC6-1546
P1553	BAT CURRENT SENSOR	—	2	—	EC6-1550
P1554	BAT CURRENT SENSOR	—	2	—	EC6-1553
P1556	BAT TMP SEN/CIRC	—	2	—	EC6-1556
P1557	BAT TMP SEN/CIRC	—	2	—	EC6-1556
P1564	ASCD SW	—	1	—	EC6-1559 (without ICC) EC6-1562 (with ICC)
P1568	ICC COMMAND VALUE	—	1	—	EC6-1566
P1572	ASCD BRAKE SW	—	1	—	EC6-1568 (without ICC) EC6-1573 (with ICC)
P1574	ASCD VHL SPD SEN	—	1	—	EC6-1581 (without ICC) EC6-1583 (with ICC)
P1610	LOCK MODE	—	2	—	SEC-96
P1611	ID DISCORD,IMMU-ECM	—	2	—	SEC-98
P1612	CHAIN OF ECM-IMMU	—	2	—	SEC-99
P1805	BRAKE SW/CIRCUIT	—	2	—	EC6-1585
P2080	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	EC6-1588

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DTC*1	Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
CONSULT GST*2					
P2081	EXHAUST GAS TEMP SENSOR 1 B1	—	2	×	EC6-1591
P2082	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	EC6-1594
P2083	EXHAUST GAS TEMP SENSOR 1 B2	—	2	×	EC6-1597
P2100	ETC MOT PWR-B1	—	1	×	EC6-1600
P2101	ETC FNCTN/CIRC-B1	—	1	×	EC6-1602
P2103	ETC MOT PWR	—	1	×	EC6-1600
P2118	ETC MOT-B1	—	1	×	EC6-1606
P2119	ETC ACTR-B1	—	1	×	EC6-1608
P2122	APP SEN 1/CIRC	—	1	×	EC6-1610
P2123	APP SEN 1/CIRC	—	1	×	EC6-1610
P2127	APP SEN 2/CIRC	—	1	×	EC6-1613
P2128	APP SEN 2/CIRC	—	1	×	EC6-1613
P2132	TP SEN 1/CIRC-B2	—	1	×	EC6-1353
P2133	TP SEN 1/CIRC-B2	—	1	×	EC6-1353
P2135	TP SENSOR-B1	—	1	×	EC6-1475
P2138	APP SENSOR	—	1	×	EC6-1616
P23E9	A camshaft posi signal B2	—	2	×	EC6-1618
P23EA	A camshaft posi signal B2	—	2	×	EC6-1621
P23EB	A camshaft posi signal B2	—	2	×	EC6-1624
P2562	TC BOOST CONTROL POSITN SEN A	—	2	×	EC6-1628
P2566	TC BOOST CONTROL POSITN SEN A	—	2	×	EC6-1628
P2578	Turbocharger/Supercharger speed sensor A	—	2	—	EC6-1631
P2586	TC BOOST CONTROL POSITN SEN B	—	2	×	EC6-1635
P2590	TC BOOST CONTROL POSITN SEN B	—	2	×	EC6-1635
P2593	Turbocharger/Supercharger speed sensor B	—	2	—	EC6-1638
P2614	A camshaft posi signal B1	—	2	×	EC6-1642
P2615	A camshaft posi signal B1	—	2	×	EC6-1645
P2616	A camshaft posi signal B1	—	2	×	EC6-1648
P2617	Crankshaft position signal	—	2	×	EC6-1652
P2618	Crankshaft position signal	—	2	×	EC6-1655
P2619	Crankshaft position signal	—	2	×	EC6-1659
P26A3	ENGINE COOLANT BYPASS VALVE	—	1 or 2	×	EC6-1664
P26A6	ENGINE COOLANT B/V A POSI SEN	—	2	×	EC6-1666
P26A7	ENGINE COOLANT B/V A POSI SEN	—	2	×	EC6-1666
P34A4	A camshaft posi actuator temp sens B1	—	2	×	EC6-1669
P34A5	A camshaft posi actuator temp sens B1	—	2	×	EC6-1672
P34A6	A camshaft posi actuator temp sens B1	—	2	×	EC6-1675
P34A7	A camshaft posi actuator temp sens B1	—	2	×	EC6-1678
P34A8	A camshaft posi actuator temp sens B2	—	2	×	EC6-1681
P34A9	A camshaft posi actuator temp sens B2	—	2	×	EC6-1684
P34AA	A camshaft posi actuator temp sens B2	—	2	×	EC6-1687
P34AB	A camshaft posi actuator temp sens B2	—	2	×	EC6-1690

DTC ^{*1}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page
CONSULT GST ^{*2}					
P34AC	A camshaft posi actuator posi sens B1	—	2	×	EC6-1693
P34AD	A camshaft posi actuator posi sens B1	—	2	×	EC6-1697
P34B0	A camshaft posi actuator posi sens B2	—	2	×	EC6-1700
P34B1	A camshaft posi actuator posi sens B2	—	2	×	EC6-1704
P34C4	A camshaft posi actuator control B1	—	2	×	EC6-1707
P34C5	A camshaft posi actuator control B2	—	2	×	EC6-1708
P34C8	Camshaft position control module	—	2	×	EC6-1709

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: When the ECM is in the mode that displays SRT status, MIL may blink. For the details, refer to “How to Display SRT Status”.

*4: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

Test Value and Test Limit

INFOID:0000000013844128

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (lean to rich)
			P0133	88H	04H	Response rate: Response ratio (rich to lean)
			P2A00 or P2096	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A00 or P2097	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P0133	95H	04H	Response rate: Response ratio (lean to rich)
			P0133	96H	84H	Response rate: Response ratio (rich to lean)

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Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diagnosis
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage
	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (lean to rich)
			P0153	88H	04H	Response rate: Response ratio (rich to lean)
			P2A03 or P2098	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A03 or P2099	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1

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Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description	
				TID	Unit and Scaling ID		
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1	
			P0153	95H	04H	Response rate: Response ratio (lean to rich)	
			P0153	96H	84H	Response rate: Response ratio (rich to lean)	
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle	
			P0157	08H	0CH	Maximum sensor output voltage for test cycle	
			P0158	80H	0CH	Sensor output voltage	
			P0159	81H	0CH	Difference in sensor output voltage	
			P0159	82H	11H	Rear O2 sensor delay response diagnosis	
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle	
			P0164	08H	0CH	Maximum sensor output voltage for test cycle	
			P0166	80H	0CH	Sensor output voltage	
			P0165	81H	0CH	Difference in sensor output voltage	
	CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
				P0420	82H	01H	Switching time lag engine exhaust index value
				P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
P2423				84H	84H	O2 storage index in HC trap catalyst	
22H		Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index	
			P0430	82H	01H	Switching time lag engine exhaust index value	
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage	
			P2424	84H	84H	O2 storage index in HC trap catalyst	
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)	
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)	
			P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition	
			P0400	83H	96H	Low flow faults: Max EGR temp	
			P1402	84H	96H	High Flow Faults: EGR temp increase rate	
			P0402	85H	FCH	EGR differential pressure high flow	
			P0401	86H	37H	EGR differential pressure low flow	
			P2457	87H	96H	EGR temperature	

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100A	84H	10H	VEL slow response diagnosis
			P1090	85H	10H	VEL servo system diagnosis
			P0011	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)
			Advanced: P052A Retarded: P052B	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis
P0021			86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)	
		Advanced: P052C Retarded: P052D	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)	
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description	
				TID	Unit and Scaling ID		
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage	
			P0030	83H	0BH	A/F sensor heater circuit malfunction	
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage	
			P0141	81H	14H	Rear O2 sensor internal impedance	
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage	
	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage	
			P0036	83H	0BH	A/F sensor heater circuit malfunction	
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage	
			P0161	81H	14CH	Rear O2 sensor internal impedance	
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage	
	SECONDARY AIR	71H	Secondary air system	P0411	80H	01H	Secondary air injection system incorrect flow detected
				Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
P2445				82H	01H	Secondary air injection system pump stuck off	
P2448				83H	01H	Secondary air injection system high airflow	
Bank1: P2440 Bank2: P2442				84H	01H	Secondary air injection system switching valve stuck open	
P2440				85H	01H	Secondary air injection system switching valve stuck open	
P2444				86H	01H	Secondary air injection system pump stuck on	

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description	A EC6
				TID	Unit and Scaling ID		
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim	
			P0171 or P0172	81H	24H	The number of lambda control clamped	C
			P117A / P219A	82H	03H	Cylinder A/F imbalance monitoring	
			P219C	83H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #1 cylinder parameter	D
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #2 cylinder parameter	E
			P219E	85H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #3 cylinder parameter	F
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #4 cylinder parameter	G
			P21A0	87H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #5 cylinder parameter	H
			P21A2	89H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #7 cylinder parameter	I
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim	
			P0174 or P0175	81H	24H	The number of lambda control clamped	J
			P117B / P219B	82H	03H	Cylinder A/F imbalance monitoring	
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #2 cylinder parameter	K
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #4 cylinder parameter	L
			P21A1	88H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #6 cylinder parameter	M
		P21A3	8AH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #8 cylinder parameter	N	

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple cylinder misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

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< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 cylinder misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 cylinder misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 cylinder misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 cylinder misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 cylinder misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

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ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

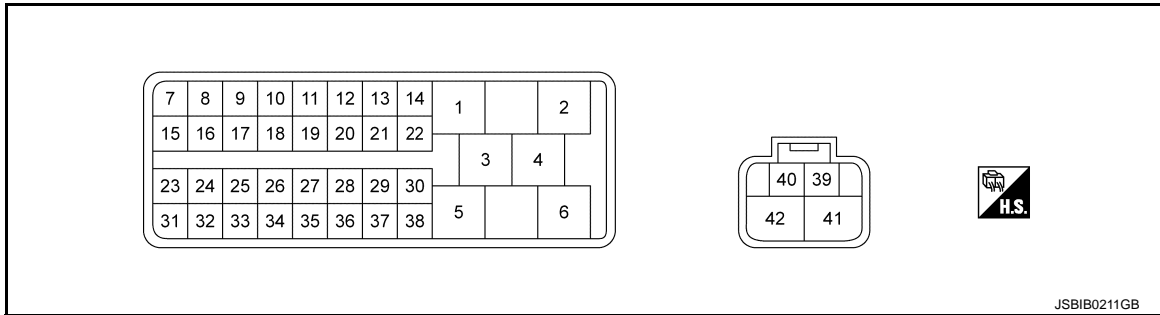
[VR30DDTT FOR MEXICO]

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

Reference Value

INFOID:000000013844129

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

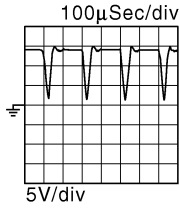
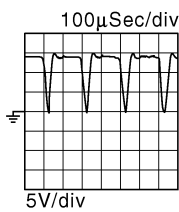
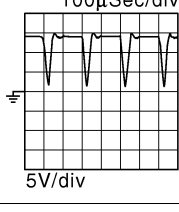
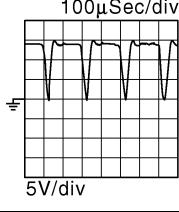
- Electric intake valve timing control module is located behind the IPDM E/R. For this inspection, remove hood edge cover (RH).
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No.		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
1 (W)	41 (B)	Electric intake valve timing control motor 1 phase 1	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
2 (B)	41 (B)	Electric intake valve timing control motor 2 phase 1	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
3 (R)	41 (B)	Electric intake valve timing control motor 1 phase 2	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
4 (W)	41 (B)	Electric intake valve timing control motor 2 phase 2	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
5 (B)	41 (B)	Electric intake valve timing control motor 1 phase 3	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
6 (R)	41 (B)	Electric intake valve timing control motor 2 phase 3	Input/Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
7 (Y)	41 (B)	Sensor power supply	—	[Ignition switch: ON]	5 V
8 (W)	41 (B)	Electric intake valve timing control motor 1 hall sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
9 (BG)	41 (B)	Electric intake valve timing control motor 1 temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.0 - 2.0 V
11 (B)	—	Shield	—	—	—
12 (L)	41 (B)	ENGINE communication line-H	Input/Output	—	—

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

[VR30DDTT FOR MEXICO]

Terminal No.		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
14 (Y)	41 (B)	Intake camshaft position sensor (bank 1) [electric intake valve timing control signal]	Input	[Engine is running] • Warm-up condition • Idle speed	3.8 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.8 V★ 
15 (G)	41 (B)	Electric intake valve timing control motor 1 hall sensor 3	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
16 (R)	41 (B)	Electric intake valve timing control motor 1 hall sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
17 (B)	—	Sensor ground	—	—	—
19 (Y)	—	ENGINE communication line-L	Input/Output	—	—
21 (L)	41 (B)	Intake camshaft position sensor (bank 2) [electric intake valve timing control signal]	Input	[Engine is running] • Warm-up condition • Idle speed	4.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.1 V★ 
23 (LG)	41 (B)	Electric intake valve timing control motor 2 hall sensor 3	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
24 (BR)	41 (B)	Electric intake valve timing control motor 2 hall sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
25 (V)	—	Sensor ground	—	—	—
28 (W)	41 (B)	Ignition switch	—	—	—

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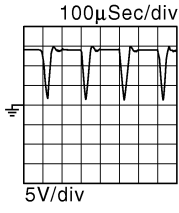
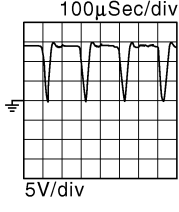
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ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

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[VR30DDTT FOR MEXICO]

Terminal No.		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
30 (G)	41 (B)	Crankshaft position sensor [electric intake valve timing control signal]	Input	[Engine is running] • Warm-up condition • Idle speed	3.1 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	3.1 V★ 
31 (GR)	41 (B)	Sensor power supply	—	[Ignition switch: ON]	5 V
32 (L)	—	Electric intake valve timing control motor 2 hall sensor 1	Input	[Engine is running] • Warm-up condition • Idle speed	5 V
33 (P)	—	Electric intake valve timing control motor 2 temperature sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.0 - 2.0 V
39 (R)	41 (B)	Power supply	—	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
40 (L)	41 (B)	Power supply	—	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
41 (B)	—	Ground	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

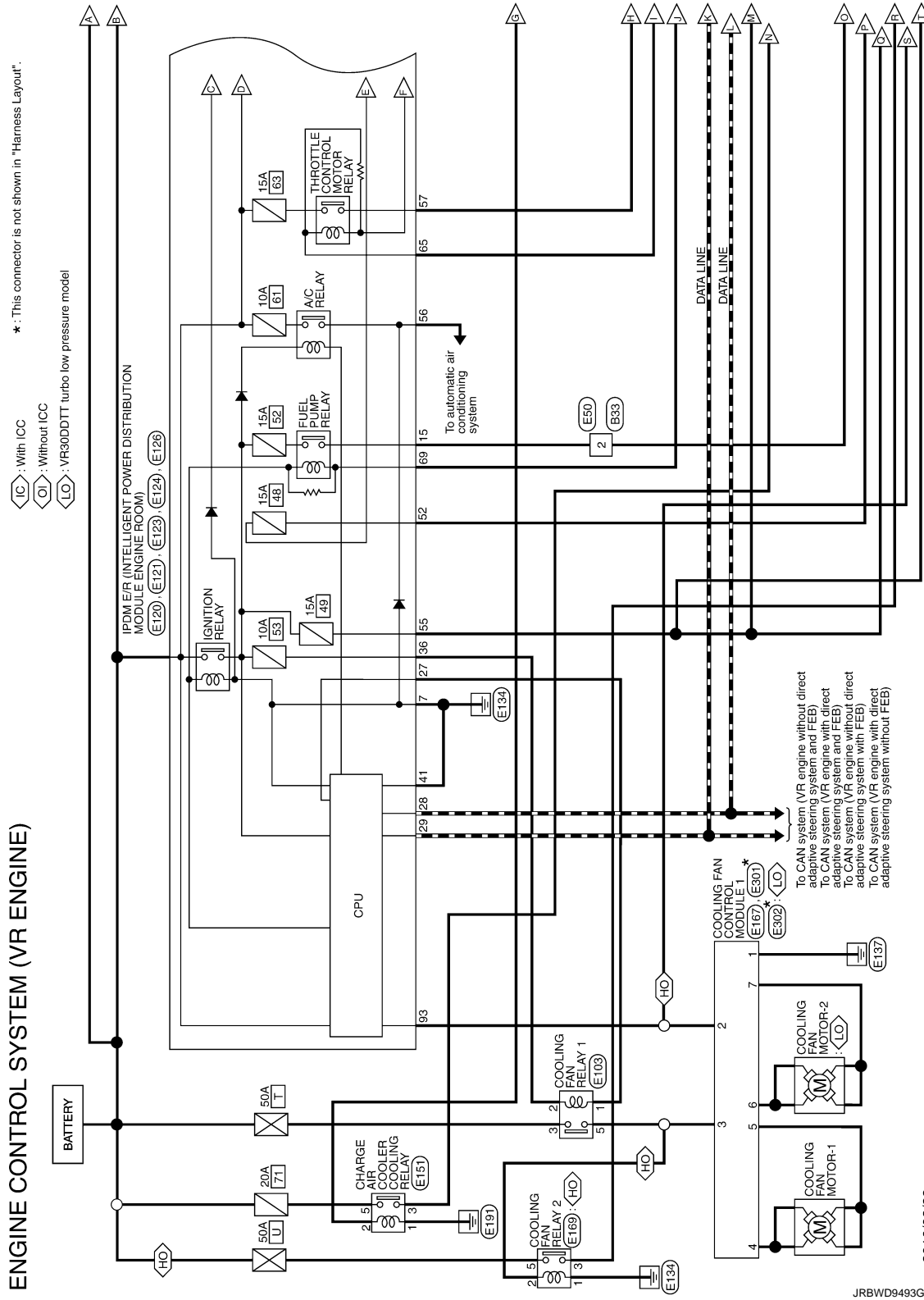
WIRING DIAGRAM

ENGINE CONTROL SYSTEM

Wiring Diagram

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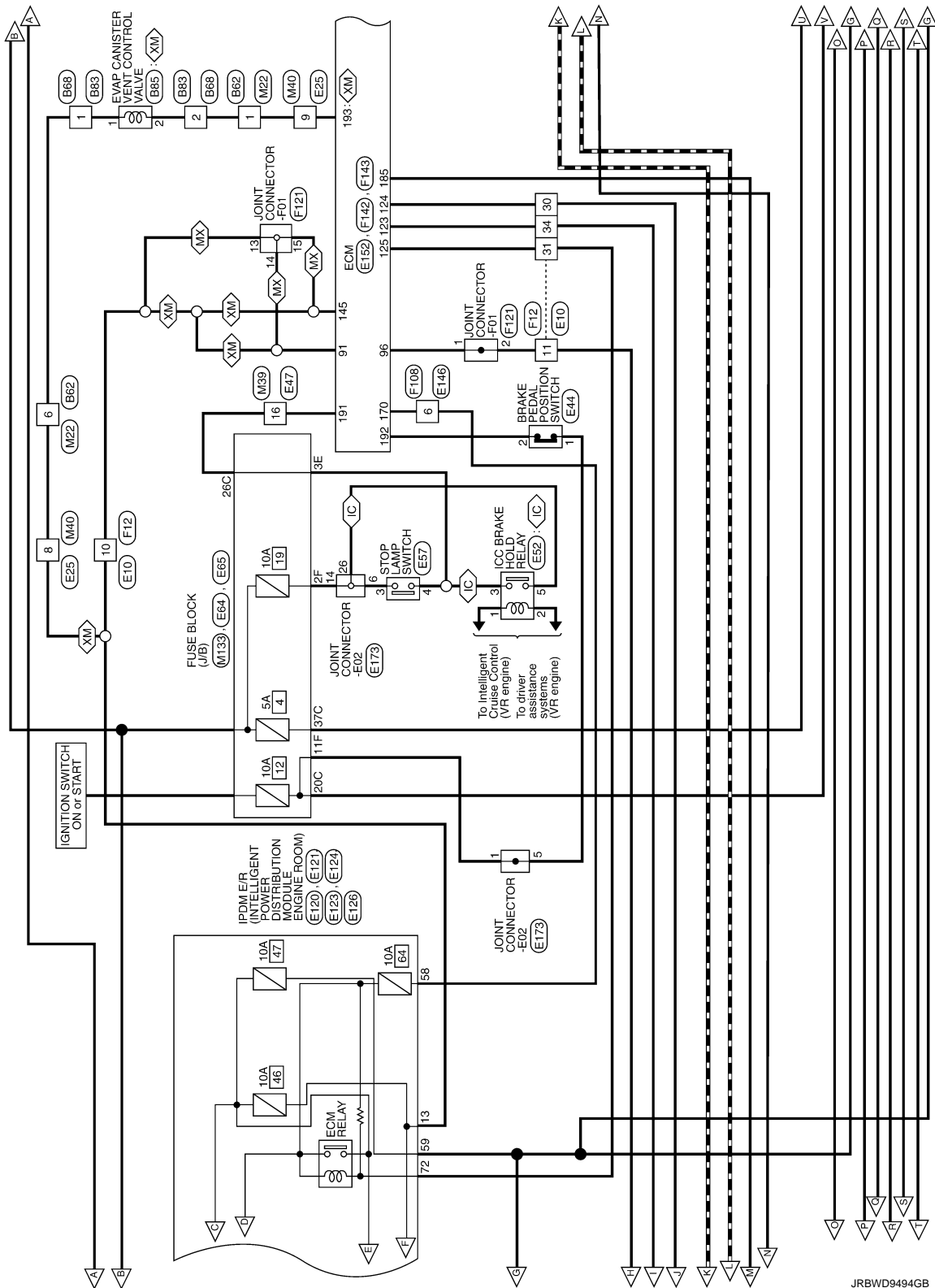
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ENGINE CONTROL SYSTEM

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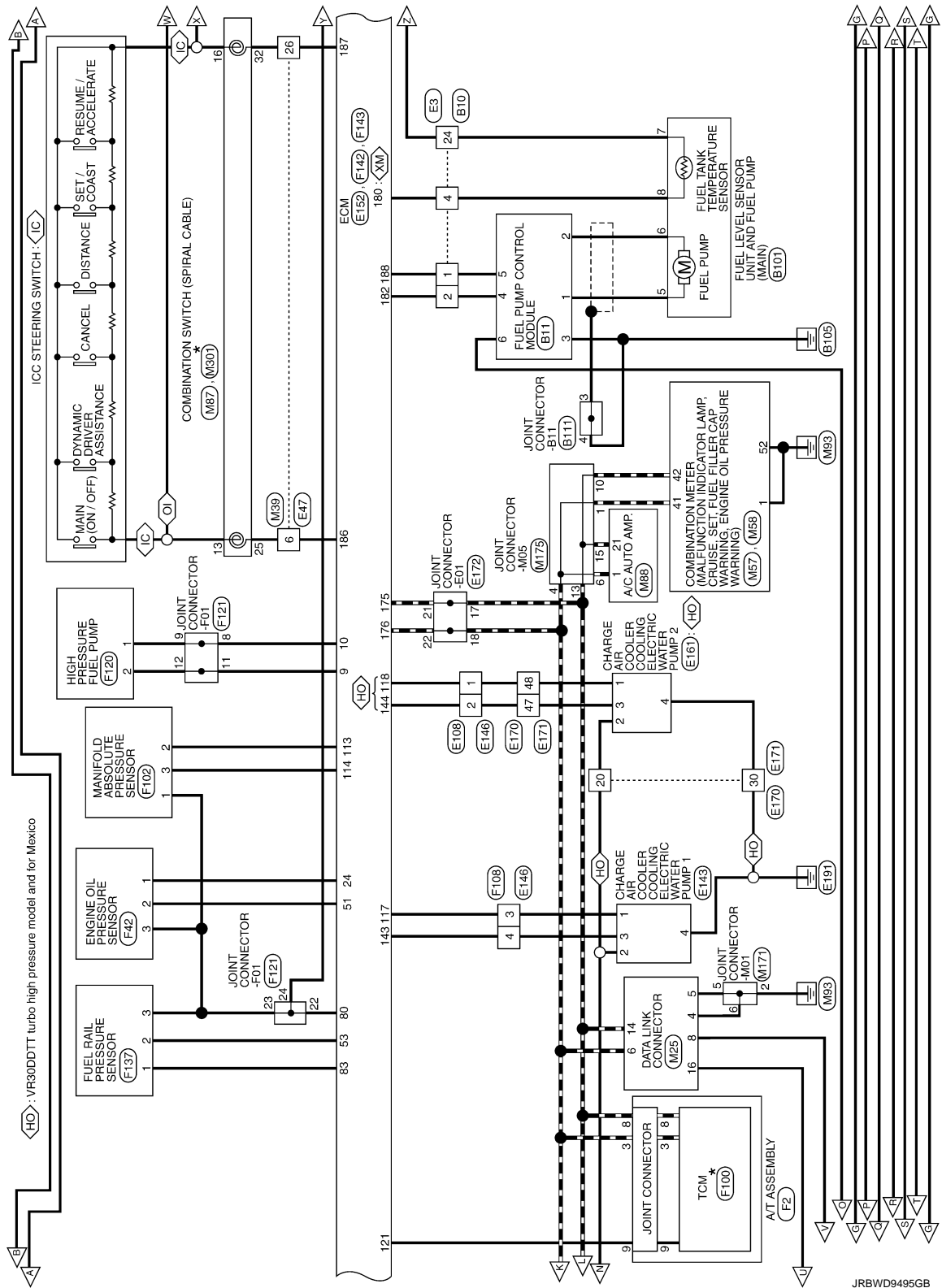


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ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[VR30DDTT FOR MEXICO]



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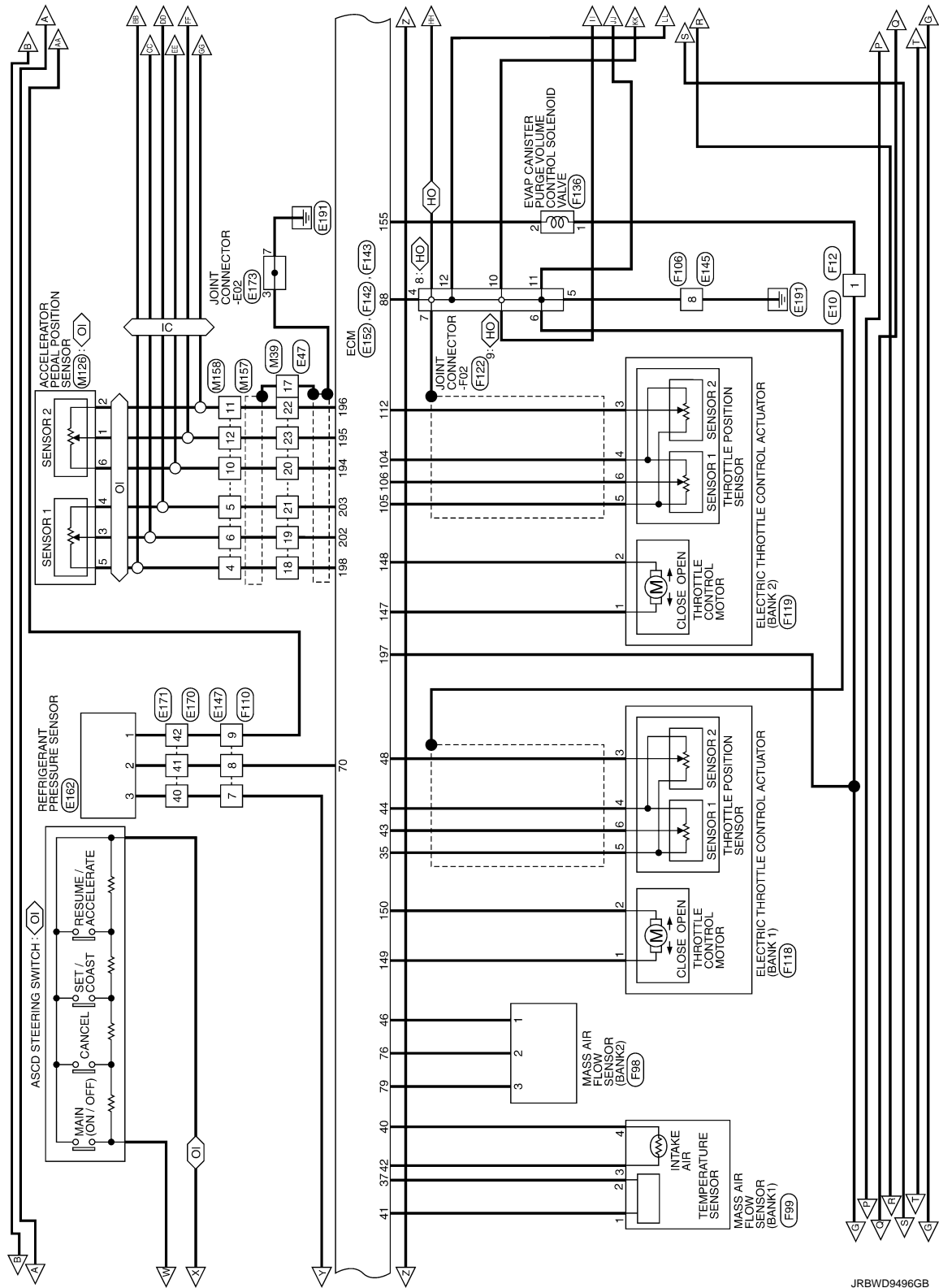
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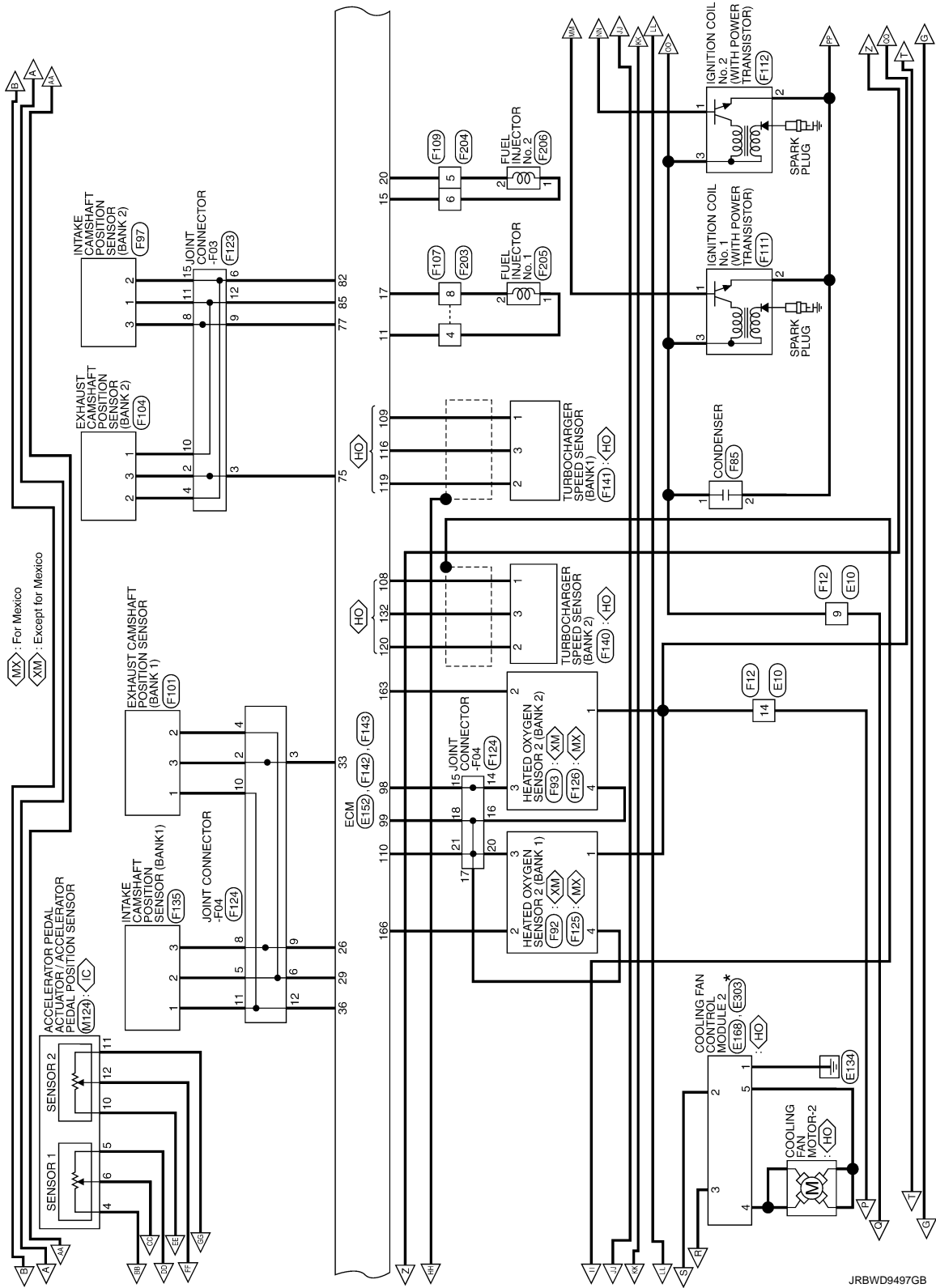


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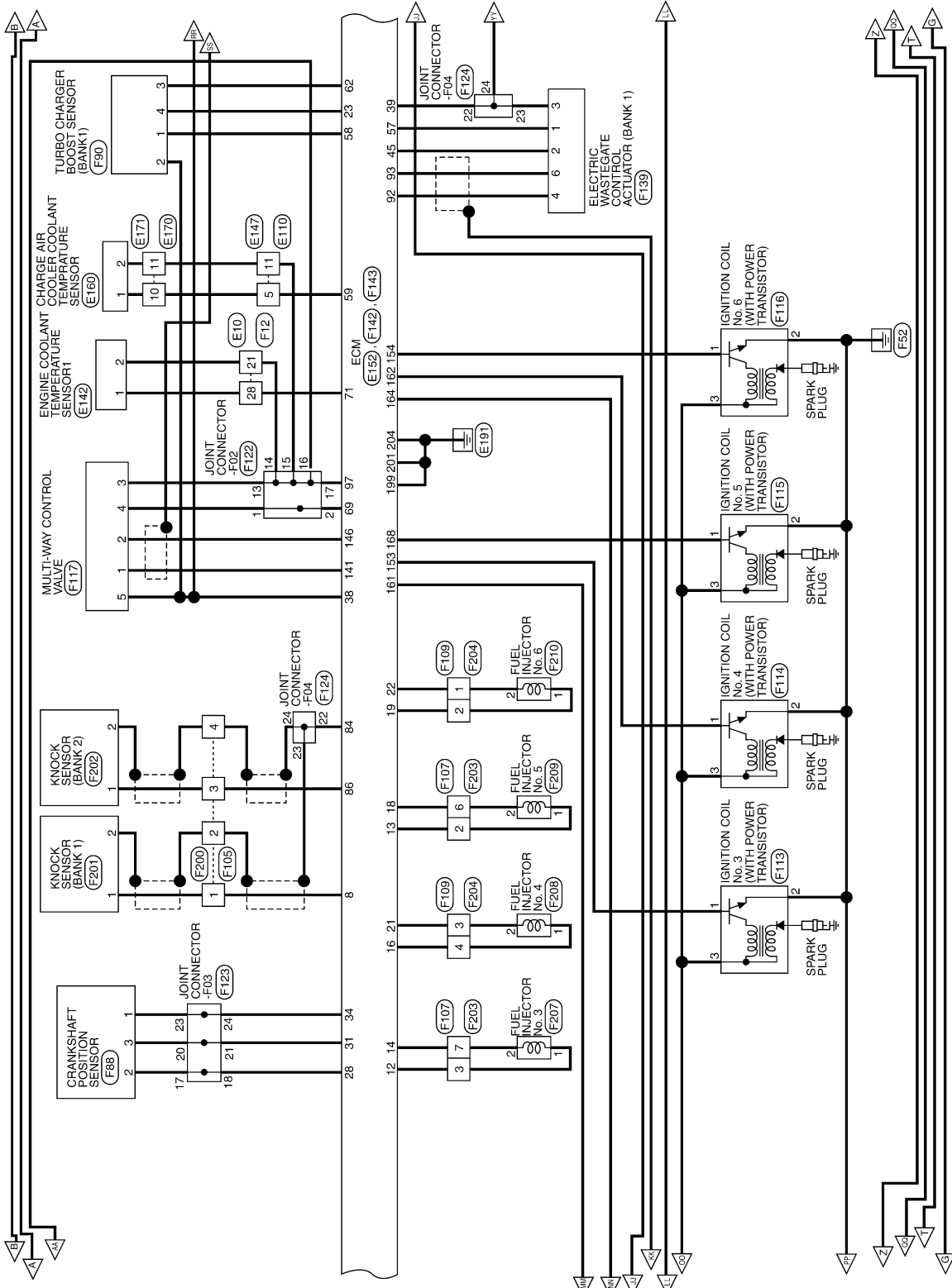
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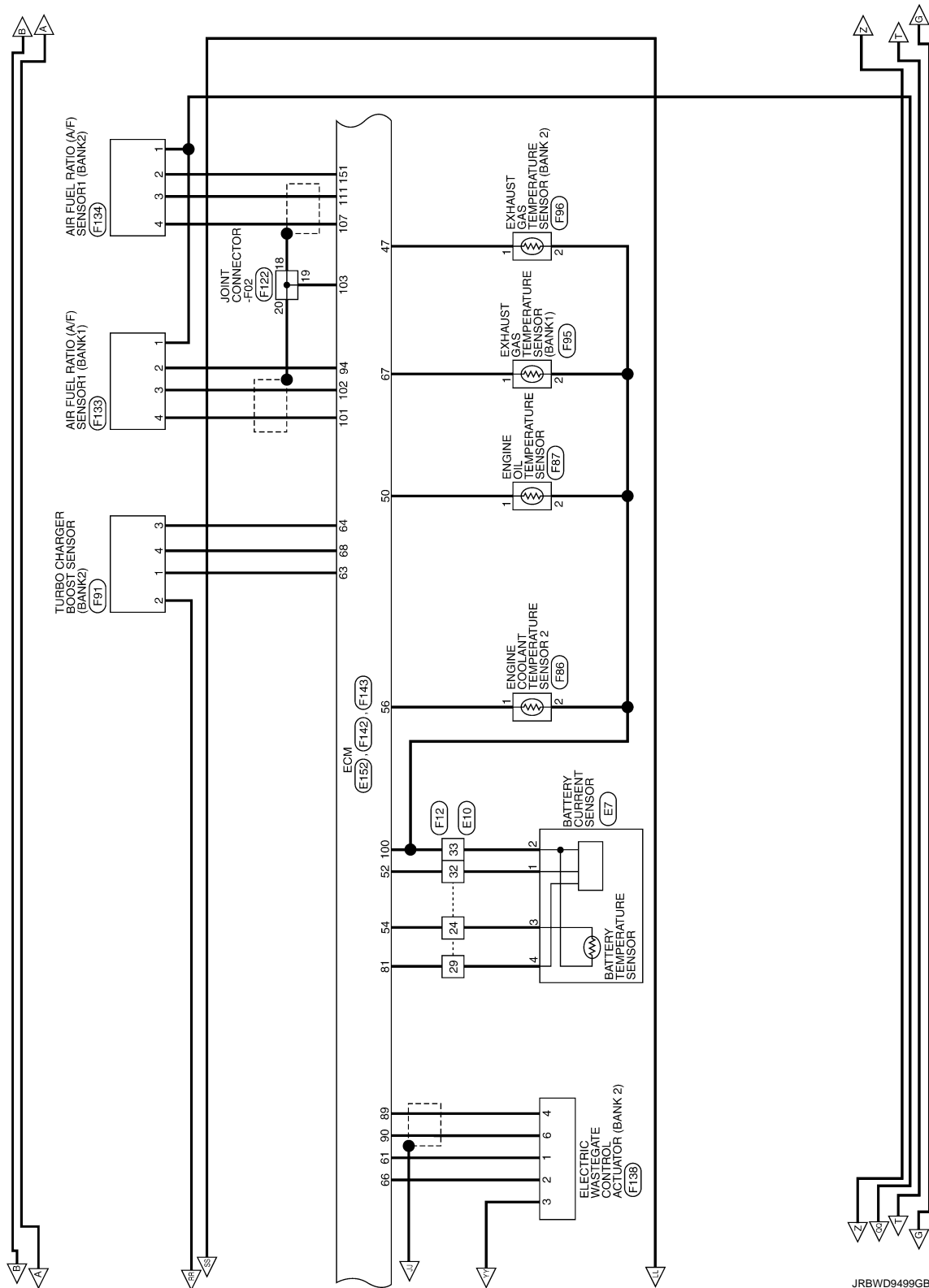


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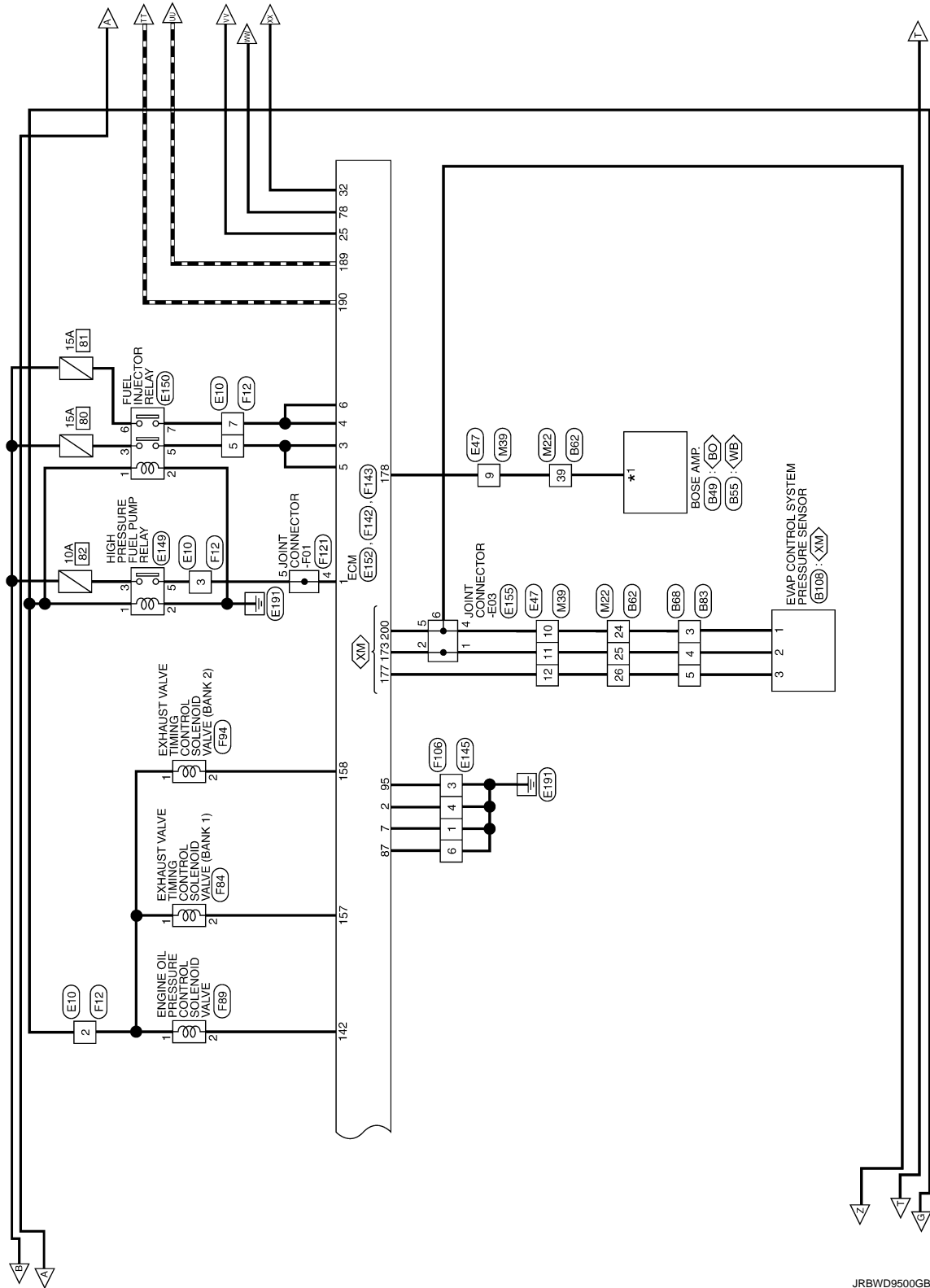
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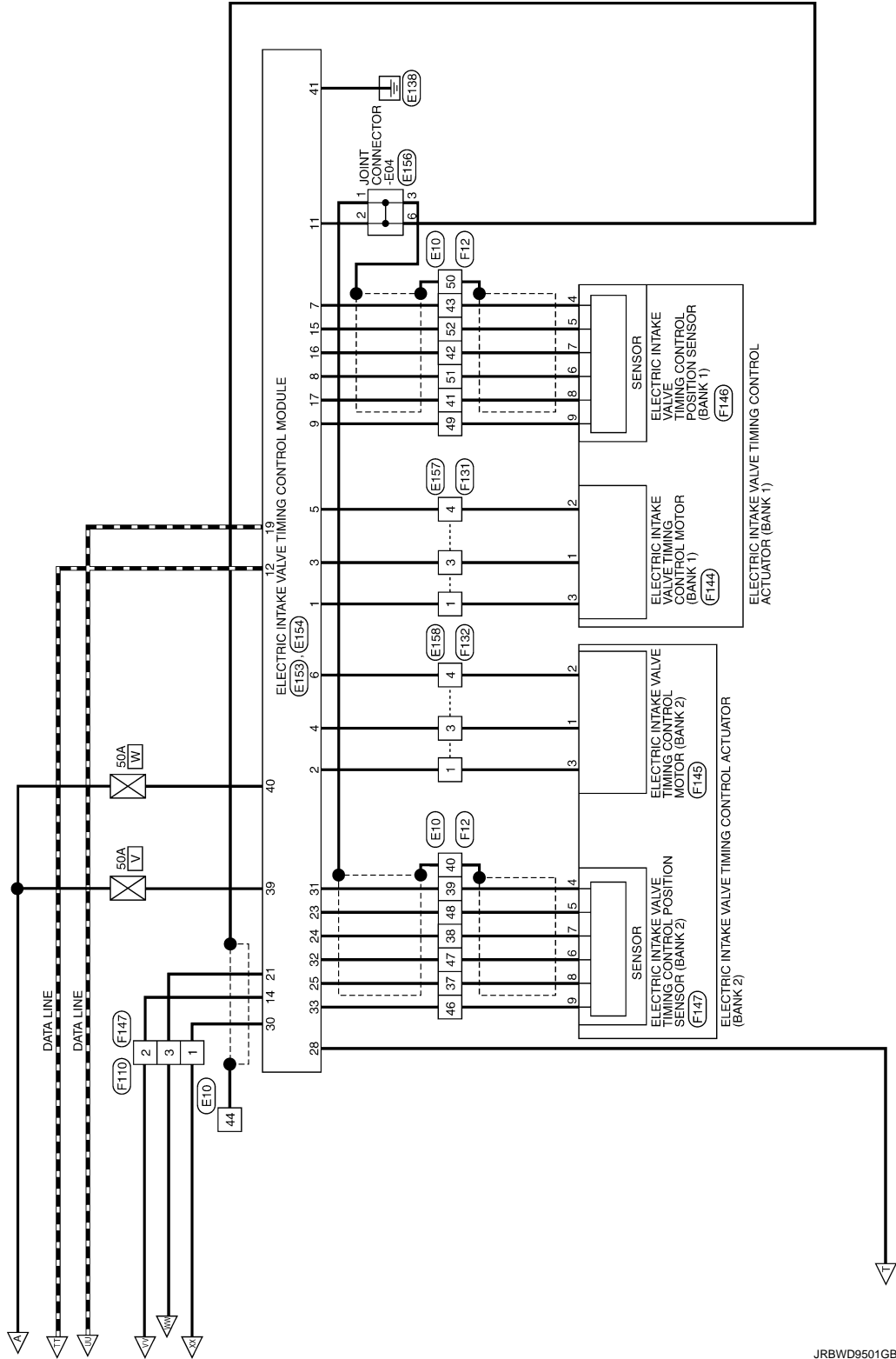
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ENGINE CONTROL SYSTEM

[VR30DDTT FOR MEXICO]

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*1 78 : <WB> : Without BOSE system
 19 : <EO> : With BOSE system



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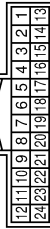
ENGINE CONTROL SYSTEM

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[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	B10
Connector Name	WIRE TO WIRE
Connector Type	TH24FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [With 2.0L turbo gasoline engine]
1	Y	- [With VR30 engine]
2	W	-
3	LG	-
4	P	- [With VR30 engine]
4	SB	- [With 2.0L turbo gasoline engine]
5	L	-
6	V	-
7	LG	-
8	R	-
9	W	-
10	B	-
11	G	-
12	R	-
13	GR	-
14	BG	-
15	BR	-
16	LG	-
17	V	-
18	BR	-
19	LG	- [With 2.0L turbo gasoline engine]
19	Y	- [With VR30 engine]
20	R	-
21	V	- [With 2.0L turbo gasoline engine]
21	L	- [With VR30 engine]
22	L	-
23	V	-
24	B	- [With VR30 engine]
24	R	- [With 2.0L turbo gasoline engine]

Connector No.	B11
Connector Name	FUEL PUMP CONTROL MODULE
Connector Type	TB06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	BR	-
3	B	-
4	W	-
5	Y	-
6	BR	-

Connector No.	B33
Connector Name	WIRE TO WIRE
Connector Type	M06FW-LC

Terminal No.	Color Of Wire	Signal Name [Specification]
2	BR	-
4	L	-
5	R	-

Connector No.	B49
Connector Name	ACTIVE NOISE CONTROL UNIT
Connector Type	TH32FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SHIELD	GND
2	P	CAN-L [For 2.0L turbo gasoline engine]
2	R	CAN-L [For VR30 engine]
3	B	ENGINE TYPE SIGNAL 1
4	B	ENGINE TYPE SIGNAL 2
4	G	FRONT MICROPHONE SIGNAL (+)
8	BG	REAR MICROPHONE SIGNAL (+)
9	B	SOUND SIGNAL FRONT LH (+)
12	R	SOUND SIGNAL FRONT RH (+)
13	LG	SOUND SIGNAL REAR LH (+)
14	B	SOUND SIGNAL REAR RH (+)
15	V	ACC
16	V	CAN-H
18	L	IGN
19	P	ENGINE SPEED SIGNAL
20	W	GND
23	B	FRONT MICROPHONE SIGNAL (-)
24	R	REAR MICROPHONE SIGNAL (-)
25	W	SOUND SIGNAL FRONT LH (-)
28	L	SOUND SIGNAL FRONT RH (-)
29	L	SOUND SIGNAL REAR LH (-)
30	P	SOUND SIGNAL REAR RH (-)
31	W	BAT
32	Y	BAT

Connector No.	B55
Connector Name	BOSE AMP.
Connector Type	TH40FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
43	W	REAR MICROPHONE GND
44	R	VOICE GUIDANCE SIGNAL (-)
45	R	SOUND SIGNAL LH (-)
46	B	SOUND SIGNAL RH (-)
52	R	FRONT MICROPHONE GND
54	LG	AV COMM (L)
56	V	ACC
58	B	ENGINE TYPE SIGNAL 1
63	BG	REAR MICROPHONE SIGNAL
64	G	VOICE GUIDANCE SIGNAL (+)
65	L	SOUND SIGNAL LH (+)
66	W	SOUND SIGNAL RH (+)
72	G	FRONT MICROPHONE SIGNAL
74	P	AV COMM (H)
78	W	ENGINE SPEED SIGNAL
79	SHIELD	SHIELD

Connector No.	B62
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	- [With 2.0L turbo gasoline engine and without BOSE system]
1	LG	- [With VR30 engine]
1	W	- [With 2.0L turbo gasoline engine and with BOSE system]

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

2	L	- [With VR30 engine]
2	SHIELD	- [With 2.0L turbo gasoline engine]
3	BR	- [With 2.0L turbo gasoline engine]
3	R	- [With VR30 engine and with BOSE system]
3	W	- [With VR30 engine and without BOSE system]
4	SHIELD	- [With VR30 engine]
4	Y	- [With 2.0L turbo gasoline engine]
5	G	- [With VR30 engine]
5	V	- [With 2.0L turbo gasoline engine]
6	BG	- [With VR30 engine]
6	BR	- [With 2.0L turbo gasoline engine]
7	B	- [With 2.0L turbo gasoline engine and with BOSE system]
7	W	- [With VR30 engine and without BOSE system]
7	Y	- [With 2.0L turbo gasoline engine and without BOSE system]
8	B	- [With VR30 engine and with BOSE system]
8	G	- [With VR30 engine and without BOSE system]
8	Y	- [With 2.0L turbo gasoline engine]
9	LG	- [With 2.0L turbo gasoline engine]
9	SHIELD	- [With VR30 engine]
10	V	- [With VR30 engine]
11	GR	- [With VR30 engine]
12	Y	- [With VR30 engine]
13	R	- [With VR30 engine]
14	BG	- [With VR30 engine]
15	BG	- [With 2.0L turbo gasoline engine]
15	GR	- [With VR30 engine]
16	V	- [With VR30 engine]
17	P	- [With VR30 engine]
18	L	- [With VR30 engine]
19	R	- [With VR30 engine]
20	GR	- [With VR30 engine]
21	R	- [With VR30 engine]
22	V	- [With VR30 engine]
23	W	- [With VR30 engine]
24	BG	- [With 2.0L turbo gasoline engine]
24	V	- [With VR30 engine]
25	L	- [With 2.0L turbo gasoline engine]
25	SB	- [With VR30 engine]
26	G	- [With VR30 engine]
26	W	- [With 2.0L turbo gasoline engine]
27	R	- [With VR30 engine]
29	LG	- [With 2.0L turbo gasoline engine]
30	LG	- [With VR30 engine]
30	P	- [With VR30 engine]
31	SHIELD	- [With VR30 engine]
32	L	- [With VR30 engine]
33	B	- [With VR30 engine]
33	LG	- [With 2.0L turbo gasoline engine]
34	SHIELD	- [With VR30 engine]

35	LG	- [With VR30 engine]
35	W	- [With 2.0L turbo gasoline engine]
36	R	- [With VR30 engine]
36	W	- [With 2.0L turbo gasoline engine]
37	P	- [With 2.0L turbo gasoline engine and without BOSE system]
37	R	- [With VR30 engine]
37	W	- [With 2.0L turbo gasoline engine and with BOSE system]
38	W	- [With VR30 engine]
38	W	- [With 2.0L turbo gasoline engine]
39	P	- [With VR30 engine and without BOSE system]
39	R	- [With 2.0L turbo gasoline engine]
39	W	- [With VR30 engine and with BOSE system]
40	G	- [With VR30 engine]
41	L	- [With VR30 engine]
42	R	- [With VR30 engine]
43	SHIELD	- [With VR30 engine]
44	P	- [With 2.0L turbo gasoline engine]
45	B	- [With 2.0L turbo gasoline engine]
45	G	- [With VR30 engine]
46	SHIELD	- [With VR30 engine]
47	G	- [With VR30 engine]
48	BG	- [With VR30 engine]
49	G	- [With VR30 engine]
50	V	- [With VR30 engine]
51	GR	- [With VR30 engine]
52	W	- [With 2.0L turbo gasoline engine]
52	Y	- [With VR30 engine]
53	R	- [With VR30 engine]
54	GR	- [With VR30 engine]
55	L	- [With VR30 engine]
56	V	- [With VR30 engine]
57	R	- [With VR30 engine]
58	LG	- [With VR30 engine]
59	P	- [With VR30 engine]
61	L	- [With VR30 engine]
62	P	- [With 2.0L turbo gasoline engine]
62	V	- [With VR30 engine]
63	L	- [With VR30 engine]
64	W	- [With VR30 engine]
66	LG	- [With VR30 engine]
68	L	- [With VR30 engine]
69	P	- [With VR30 engine]
71	GR	- [With 2.0L turbo gasoline engine]
71	R	- [With VR30 engine]
72	G	- [With VR30 engine]
72	Y	- [With 2.0L turbo gasoline engine]
73	R	- [With 2.0L turbo gasoline engine]
73	SHIELD	- [With VR30 engine]
74	BG	- [With 2.0L turbo gasoline engine]
74	L	- [With VR30 engine]
75	GR	- [With 2.0L turbo gasoline engine]

75	V	- [With VR30 engine]
76	GR	- [With VR30 engine]
76	R	- [With 2.0L turbo gasoline engine]
77	P	- [With 2.0L turbo gasoline engine]
78	L	- [With VR30 engine]
79	R	- [With VR30 engine]
80	GR	- [With 2.0L turbo gasoline engine]
80	W	- [With VR30 engine]
81	B	- [With VR30 engine]
81	R	- [With 2.0L turbo gasoline engine]
82	G	- [With 2.0L turbo gasoline engine]
82	SHIELD	- [With VR30 engine]
83	R	- [With 2.0L turbo gasoline engine]
83	W	- [With VR30 engine]
84	BR	- [With VR30 engine]
84	SHIELD	- [With 2.0L turbo gasoline engine]
85	BG	- [With VR30 engine]
85	G	- [With 2.0L turbo gasoline engine]
86	R	- [With 2.0L turbo gasoline engine]
86	W	- [With VR30 engine]
87	LG	- [With VR30 engine]
87	SHIELD	- [With 2.0L turbo gasoline engine]
89	LG	- [With VR30 engine]
90	P	- [With 2.0L turbo gasoline engine]
90	V	- [With VR30 engine]
92	L	- [With 2.0L turbo gasoline engine]
92	W	- [With VR30 engine]
93	R	- [With VR30 engine]
93	SHIELD	- [With 2.0L turbo gasoline engine]
94	R	- [With VR30 engine]
95	L	- [With 2.0L turbo gasoline engine]
95	Y	- [With VR30 engine]
96	R	- [With 2.0L turbo gasoline engine]
96	W	- [With VR30 engine]
97	L	- [With VR30 engine]
97	W	- [With 2.0L turbo gasoline engine and with BOSE system]
97	W	- [With 2.0L turbo gasoline engine and without BOSE system]
98	LG	- [With VR30 engine]
99	BR	- [With VR30 engine and with BOSE system]
99	P	- [With 2.0L turbo gasoline engine]
99	Y	- [With VR30 engine and without BOSE system]
100	BR	- [With VR30 engine]
100	W	- [With 2.0L turbo gasoline engine]

Connector No.	BB8
Connector Name	WIRE TO WIRE
Connector Type	NS06FW-CS



2	1
6	5
4	3

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	- [With VR30 engine]
1	BR	- [With 2.0L turbo gasoline engine]
2	LG	- [With VR30 engine]
2	P	- [With 2.0L turbo gasoline engine]
3	BG	- [With 2.0L turbo gasoline engine]
3	V	- [With VR30 engine]
4	L	- [With 2.0L turbo gasoline engine]
4	SB	- [With VR30 engine]
5	G	- [With VR30 engine]
5	R	- [With 2.0L turbo gasoline engine]

Connector No.	BB3
Connector Name	WIRE TO WIRE
Connector Type	NS06MW-CS



1	2
3	4
5	6

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	- [With VR30 engine]
1	BR	- [With 2.0L turbo gasoline engine]
2	LG	- [With VR30 engine]
2	P	- [With 2.0L turbo gasoline engine]
3	V	- [With VR30 engine]
3	W	- [With 2.0L turbo gasoline engine]
4	L	- [With 2.0L turbo gasoline engine]
4	SB	- [With VR30 engine]
5	G	- [With VR30 engine]
5	R	- [With 2.0L turbo gasoline engine]

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ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[VR30DDTT FOR MEXICO]

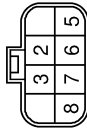
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	885
Connector Name	MAP CANISTER VENT CONTROL VALVE
Connector Type	E02FB-R5



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	VCC
2	LG	GND

Connector No.	B101
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP (MAIN)
Connector Type	H508FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
2	W	-
3	Y	-
5	G	- [With VR30 engine]
6	BR	- [With 2.0L turbo gasoline engine]
7	B	- [With 2.0L turbo gasoline engine]
8	P	-

Connector No.	B108
Connector Name	MAP CONTROL SYSTEM PRESSURE SENSOR
Connector Type	E03FGY-R5



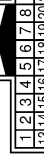
Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	SB	-
3	G	-

Connector No.	B111
Connector Name	JOINT CONNECTOR-B11
Connector Type	TR04FW-J



Terminal No.	Color Of Wire	Signal Name [Specification]
3	SHIELD	-
4	B	-

Connector No.	E3
Connector Name	WIRE TO WIRE
Connector Type	TH24MVA-NH



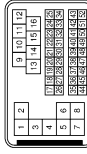
Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [With 2.0L turbo gasoline engine]
1	Y	- [With VR30 engine]
2	W	-
3	LG	-
4	P	- [With VR30 engine]
4	SB	- [With 2.0L turbo gasoline engine]
5	L	-
6	Y	-
7	LG	-
8	BG	-
9	W	-
10	B	-
11	G	-
12	R	-
13	GR	-
14	G	-
15	LG	- [With 2.0L turbo gasoline engine]
15	V	- [With VR30 engine]
16	Y	-
17	P	-
18	BR	-
19	LG	- [With 2.0L turbo gasoline engine]
19	V	- [With VR30 engine]
20	GR	-
21	R	- [With 2.0L turbo gasoline engine]
21	V	- [With VR30 engine]
22	L	-
23	P	-
24	B	- [With VR30 engine]
24	BR	- [With 2.0L turbo gasoline engine]

Connector No.	E7
Connector Name	BATTERY CURRENT SENSOR
Connector Type	RH04FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	BG	-
4	LG	-

Connector No.	E10
Connector Name	WIRE TO WIRE
Connector Type	SA336MB-RS8-SH28



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
3	LG	-
4	R	-
5	G	-
7	V	-
8	W	-
9	W	-
10	BG	-
11	LG	-
12	BG	-
13	L	-
14	Y	-
15	LG	-
16	G	-
17	L	-

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ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

18	P	-	-
19	GR	-	-
20	G	-	-
21	GR	-	-
22	W	-	-
23	G	-	-
24	BG	-	-
25	V	-	-
26	BR	-	-
27	W	-	-
28	BG	-	-
29	LG	-	-
30	G	-	-
31	Y	-	-
32	R	-	-
33	B	-	-
34	V	-	-
35	LG	-	-
36	W	-	-
37	V	-	-
38	BR	-	-
39	GR	-	-
40	SHIELD	-	-
41	B	-	-
42	R	-	-
43	Y	-	-
44	SHIELD	-	-
45	Y	-	-
46	P	-	-
47	L	-	-
48	LG	-	-
49	BG	-	-
50	SHIELD	-	-
51	W	-	-
52	G	-	-

Connector No.	E25
Connector Name	WIRE TO WIRE
Connector Type	TH80PW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
6	V	-
7	L	-
8	BG	- [With VR30 engine]
9	BR	- [With 2.0L turbo gasoline engine]
9	B	- [With 2.0L turbo gasoline engine]
9	GR	- [With VR30 engine] (Color of wire differs depending on production)
9	LG	- [With VR30 engine] (Color of wire differs depending on production)
10	BR	-
11	L	-
12	GR	- [With VR30 engine]
12	P	- [With 2.0L turbo gasoline engine]
13	SHIELD	- [With 2.0L turbo gasoline engine]
13	W	- [With VR30 engine]
14	B	-
15	GR	- [With 2.0L turbo gasoline engine]
15	SB	- [With VR30 engine]
16	BR	- [With 2.0L turbo gasoline engine]
16	Y	- [With VR30 engine]
17	BR	- [With VR30 engine]
17	GR	- [With 2.0L turbo gasoline engine]
18	G	- [With 2.0L turbo gasoline engine]
18	P	- [With VR30 engine]
19	V	-
31	W	- [With 2.0L turbo gasoline engine]
31	Y	- [With VR30 engine]
32	G	- [With 2.0L turbo gasoline engine]
32	GR	- [With VR30 engine]
33	L	- [With VR30 engine]
33	Y	- [With 2.0L turbo gasoline engine]
34	P	-
35	GR	-
36	R	-
37	L	- [With 2.0L turbo gasoline engine]
37	V	- [With VR30 engine]
38	L	- [With VR30 engine]

76	G	-	-
77	Y	-	-
78	LG	-	- [With 2.0L turbo gasoline engine and with ADAS]
78	P	-	- [With VR30 engine]
78	V	-	- [With 2.0L turbo gasoline engine and without ADAS]
79	SR	-	-
80	LG	-	-
81	R	-	-
82	V	-	-
83	BR	-	- [With 2.0L turbo gasoline engine]
83	R	-	- [With VR30 engine]
84	LG	-	-
86	BG	-	-
87	G	-	-
89	LG	-	-
90	G	-	- [With VR30 engine]
90	GR	-	- [With 2.0L turbo gasoline engine]
91	G	-	-
93	BG	-	-
94	GR	-	- [With VR30 engine]
94	L	-	- [With 2.0L turbo gasoline engine]
95	BG	-	- [With VR30 engine]
95	P	-	- [With 2.0L turbo gasoline engine and without gateway]
95	R	-	- [With 2.0L turbo gasoline engine and with gateway]
96	W	-	-
97	LG	-	-
98	L	-	-
99	LG	-	- [With 2.0L turbo gasoline engine]
99	P	-	- [With VR30 engine]
100	SHIELD	-	-

Connector No.	E44
Connector Name	BRAKE PEDAL POSITION SWITCH
Connector Type	S02FL



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [Color of wire differs depending on production]
1	V	- [Color of wire differs depending on production]
2	BG	- [With VR30 engine]
2	BR	- [With 2.0L turbo gasoline engine]

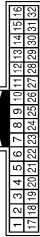
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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	E47
Connector Name	WIRE TO WIRE
Connector Type	TH32MW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [Color of wire differs depending on production]
1	Y	- [Color of wire differs depending on production]
2	V	-
3	L	-
4	P	- [Without Gateway]
4	R	- [With Gateway]
5	W	-
6	SB	-
7	BR	- [Color of wire differs depending on production]
7	L	- [Color of wire differs depending on production]
8	W	-
9	BG	- [Without BOSE system]
9	V	- [With BOSE system]
10	V	-
11	SB	-
12	G	-
13	G	-
15	BR	-
16	P	-
17	SHIELD	-
18	L	-
19	Y	-
20	W	-
21	G	-
21	R	-
22	R	-
23	BR	-
24	R	-
25	L	-
26	BG	-
27	LG	-
28	BR	-
29	W	-
30	Y	-
31	G	-
32	GR	-

Connector No.	E50
Connector Name	WIRE TO WIRE
Connector Type	M06MW-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	L	-
4	L	-
5	V	-

Connector No.	E52
Connector Name	ICC BRAKE HOLD RELAY
Connector Type	MSD2FL-M2-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	G	-
3	V	-
5	BR	- [With 2.0L turbo gasoline engine]
5	L	- [With VR30 engine]

Connector No.	E57
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [With ASCD]
1	L	- [With ADAS]
2	GR	- [With ASCD]
2	LG	- [With ADAS]
3	BR	-
4	V	-

Connector No.	E64
Connector Name	FUSE BLOCK (J/B)
Connector Type	MS08FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
1E	G	-
2E	P	-
3E	V	-
4E	GR	-
6E	L	-
7E	BG	-

Connector No.	E65
Connector Name	FUSE BLOCK (J/B)
Connector Type	TH12FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
10F	W	-
11F	G	- [Color of wire differs depending on production]
11F	R	- [Color of wire differs depending on production]
12F	W	- [With VR30 engine]
12F	Y	- [With 2.0L turbo gasoline engine]
1F	R	-
2F	BR	-
3F	P	-
5F	P	-
6F	L	-
7F	R	-
8F	L	-
9F	L	-

Connector No.	E103
Connector Name	COOLING FAN RELAY 1
Connector Type	24384_4GA0A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	SB	-
3	BR	-
5	R	-

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[VR30DDTT FOR MEXICO]

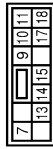
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	E108
Connector Name	WIRE TO WIRE
Connector Type	RS06FB-PR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	SHIELD	-
3	W	-
5	R	-
6	B	-

Connector No.	E120
Connector Name	IPM4 (R) INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	NS12FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
7	B/W	-
9	P	-
10	LG	-
11	V	-
13	BG	-
14	SB	-
15	BR	-
17	GR	-
18	L	-

Connector No.	E121
Connector Name	IPM4 (R) INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	TH32FW-AH



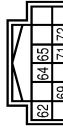
Terminal No.	Color Of Wire	Signal Name [Specification]
19	L	- [With 2.0L turbo gasoline engine]
21	P	- [With VR30 engine]
22	BG	-
23	GR	- [With VR30 engine]
23	LG	- [With 2.0L turbo gasoline engine and without Ami (heat shield)]
23	P	- [With 2.0L turbo gasoline engine and with Ami (heat shield)]
27	GR	-
28	P	-
29	L	-
31	G	-
32	SB	-
33	SB	-
34	Y	-
35	G	-
36	SB	- [With VR30 engine]
36	W	- [With 2.0L turbo gasoline engine]
37	GR	-
38	BR	-
41	GR	-
43	V	-

Connector No.	E123
Connector Name	IPM4 (R) INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	NS10FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
52	Y	-
54	SB	-
55	W	-
56	L	-
57	LG	- [With VR30 engine]
58	P	- [With 2.0L turbo gasoline engine]
59	R	-
61	GR	-

Connector No.	E124
Connector Name	IPM4 (R) INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	TH12FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
62	G	-
64	SB	-
65	V	-
69	G	-
71	W	-
72	Y	-

Connector No.	E126
Connector Name	IPM4 (R) INTELLIGENT POWER DISTRIBUTION MODULE ENGINE (ROOM)
Connector Type	TH16FW-AH



Terminal No.	Color Of Wire	Signal Name [Specification]
85	L	-
90	BR	-
93	V	-
94	Y	-
96	P	- [With VR30 engine]
96	SB	- [With 2.0L turbo gasoline engine]

Connector No.	E142
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR 2
Connector Type	ED2FGY-BS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	IMCV_TWI1
2	GR	GND

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ENGINE CONTROL SYSTEM

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[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	E143
Connector Name	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1
Connector Type	RS04FG



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	R	-
3	G	-
4	B	-

Connector No.	E145
Connector Name	WIRE TO WIRE
Connector Type	RS08MB-PR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
3	B	-
4	B	-
6	B	-
8	B	-

Connector No.	E146
Connector Name	WIRE TO WIRE
Connector Type	RH06MB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	BG	-
3	LG	-
4	G	-
6	P	-

Connector No.	E147
Connector Name	WIRE TO WIRE
Connector Type	RH12MB



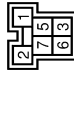
Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	Y	-
3	L	-
5	BR	- [With VR30 engine and with ISS]
5	V	- [Except with VR30 engine and with ISS]
7	B	- [Color of wire differs depending on production]
7	Sb	- [Color of wire differs depending on production]
8	L	-
9	W	-
10	BR	-
11	GR	- [With VR30 engine and with ISS]
11	V	- [Except with VR30 engine and with ISS]

Connector No.	E149
Connector Name	HIGH PRESSURE FUEL PUMP RELAY
Connector Type	MS02FL-M2-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	G	-
5	LG	-

Connector No.	E150
Connector Name	FUEL INJECTOR RELAY
Connector Type	MO6FBR-6-LC



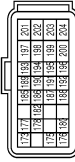
Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	L	-
5	G	-
6	R	-
7	V	-

Connector No.	E151
Connector Name	CHARGE AIR COOLER COOLING RELAY
Connector Type	MS02FL-M2-LC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	R	-
3	R	-
5	BG	-

Connector No.	E152
Connector Name	ECM
Connector Type	RH24FB-R28-L-RH



Terminal No.	Color Of Wire	Signal Name [Specification]
173	SB	FUEL TANK PRESSURE SENSOR
175	P	CAN-H
176	L	CAN-L
177	G	SENSOR POWER SUPPLY (FUEL TANK PRESSURE SENSOR)
178	V	TACHO METER SIGNAL
180	B	FUEL TANK TEMPERATURE SENSOR
182	W	FUEL PUMP CONTROL MODULE (PCM) CHECK
183	SB	IGNITION SWITCH
186	SB	ASCSD STEERING SWITCH
187	BG	SENSOR GROUND (ASCSD STEERING SWITCH)
188	Y	FUEL PUMP CONTROL MODULE (PCM)
189	Y	ENGINE COMMUNICATION LINE-L
190	L	ENGINE COMMUNICATION LINE-H
191	P	STOP LAMP SWITCH
192	BG	BRAKE PEDAL POSITION SWITCH
193	GR	

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ENGINE CONTROL SYSTEM

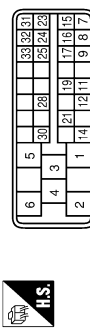
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[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

133	LG	SENSOR POWER SUPPLY
134	W	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 3 - PHASES 1
135	BR	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 2 - PHASES 2
136	R	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 1 - PHASES 3
137	R	SENSOR GROUND
138	L	ECM POWER SUPPLY
139	L	ECM GROUND
140	B	SENSOR POWER SUPPLY
141	B	ECM GROUND
200	V	SENSOR GROUND
201	B	ECM GROUND
202	Y	ACCELERATOR PEDAL POSITION SENSOR 1
203	G	SENSOR GROUND
204	B	ECM GROUND

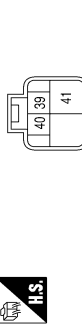
Connector No.	E153
Connector Name	ELECTRIC INFLAME VALVE TIMING CONTROL MODULE
Connector Type	AAA3ZF4H8-LV-RH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 1 - PHASE 1
2	B	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 2 - PHASE 2
3	R	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 3 - PHASE 3
4	W	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 1 - PHASES 1
5	B	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 2 - PHASES 2
6	R	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 3 - PHASES 3
7	Y	SENSOR POWER SUPPLY
8	W	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 1 - PHASES 1
9	BG	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 2 - PHASES 2
10	BR	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 3 - PHASES 3
11	B	SHIELD
12	L	ENGINE COMMUNICATION LINE-H
13	L	ENGINE COMMUNICATION LINE-L
14	Y	SENSOR POWER SUPPLY
15	G	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 1 - PHASES 1
16	R	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 2 - PHASES 2
17	B	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 3 - PHASES 3
18	B	SENSOR GROUND
19	Y	ENGINE COMMUNICATION LINE-L
20	Y	ENGINE COMMUNICATION LINE-H
21	L	SENSOR POWER SUPPLY
22	L	ENGINE COMMUNICATION LINE-L
23	LG	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 1 - PHASES 1
24	BR	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 2 - PHASES 2
25	V	SENSOR GROUND
26	W	IGNITION SWITCH
28	W	IGNITION SWITCH
30	G	COMMON GROUND FOR ELECTRIC INFLAME VALVE TIMING CONTROL SIGNAL

31	GR	SENSOR POWER SUPPLY
32	L	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 2 - PHASES 2
33	P	ELECTRIC INFLAME VALVE TIMING CONTROL MOTOR 1 - PHASES 3

Connector No.	E154
Connector Name	ELECTRIC INFLAME VALVE TIMING CONTROL MODULE
Connector Type	SI02ZF8-SMZ



Terminal No.	Color Of Wire	Signal Name [Specification]
39	R	POWER SUPPLY
40	L	POWER SUPPLY
41	B	GROUND

Connector No.	E155
Connector Name	JOINT CONNECTOR-E03
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	SB	-
4	V	-
5	V	-
6	B	-

Connector No.	E156
Connector Name	JOINT CONNECTOR-E04
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SHIELD	-
2	B	-
3	SHIELD	-
6	SHIELD	-

Connector No.	E157
Connector Name	WIRE TO WIRE
Connector Type	X04FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
3	R	-
4	B	-

Connector No.	E158
Connector Name	WIRE TO WIRE
Connector Type	X04FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
3	W	-
4	R	-

Connector No.	E160
Connector Name	WIRE AIR COOLER COOLANT TEMPERATURE SENSOR
Connector Type	ED2ZCF-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	GR	-

Connector No.	E161
Connector Name	WIRE AIR COOLER COOLANT TEMPERATURE SENSOR
Connector Type	RS04FG



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ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	- [With VR30 Hi output engine]
2	SR	- [With VR30 Hi output engine]
3	BG	- [With VR30 Hi output engine]
4	B	- [With VR30 Hi output engine]

Connector No.	E162
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	L	-
3	P	-

Connector No.	E167
Connector Name	COOLING FAN CONTROL MODULE 1
Connector Type	SZ03FGY-SN22



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	V	-
3	R	-

Connector No.	E168
Connector Name	COOLING FAN CONTROL MODULE 2
Connector Type	SZ02FGY-SN22



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	Y	-
3	L	-

Connector No.	E169
Connector Name	COOLING FAN RELAY 2
Connector Type	24347_9F900



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	R	-
3	L	-
5	GR	-

Connector No.	E170
Connector Name	WIRE TO WIRE
Connector Type	SMA358AP-RS1D-S172



Terminal No.	Color Of Wire	Signal Name [Specification]
10	V	-
11	GR	-
19	V	-
20	SB	-
27	P	-
28	SHIELD	-
29	B	-
30	B	-
31	P	-
24	B	-
26	L	-
27	P	-
28	SHIELD	-
29	B	-
30	B	-

Terminal No.	Color Of Wire	Signal Name [Specification]
31	P	-
32	B	-
33	V	-
34	GR	-
40	P	-
41	L	-
42	W	-
43	B	-
44	L	-
45	Y	-
47	BG	-
48	GR	-

Connector No.	E171
Connector Name	WIRE TO WIRE
Connector Type	SMA316P-RS1D-S122



Terminal No.	Color Of Wire	Signal Name [Specification]
10	V	-
11	GR	-
19	V	-
20	SB	-
22	B	-
24	B	-
26	L	-
27	P	-
28	SHIELD	-
18	L	-
19	W	-
20	BG	-
21	P	-
22	L	-
33	V	-
34	G	-
35	R	-
36	B	-

Terminal No.	Color Of Wire	Signal Name [Specification]
37	BG	-
38	V	-
39	Y	-
40	P	-
41	L	-
42	W	-
43	B	-
44	L	-
45	Y	-
47	BG	-
48	GR	-

Connector No.	E172
Connector Name	JOINT CONNECTOR-B11
Connector Type	SGA28FLB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	W	-
4	V	-
5	GR	-
6	Y	-
7	W	-
8	L	-
9	GR	-
10	V	-
11	W	-
12	L	-
15	W	-
16	BG	-
17	P	-
18	L	-
19	W	-
20	BG	-
21	P	-
22	L	-
23	SB	- [Color of wire differs depending on production]
24	W	- [Color of wire differs depending on production]
24	BG	- [Color of wire differs depending on production]

ENGINE CONTROL SYSTEM

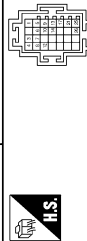
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[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

24	LG	- [Color of wire differs depending on production]
25	P	-
26	Y	-
28	L	-

Connector No.	E173
Connector Name	JOINT CONNECTOR-E02
Connector Type	SGA28FDG-VJ



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [Color of wire differs depending on production]
1	R	- [Color of wire differs depending on production]
3	B	-
4	B	-
5	G	-
6	BR	-
7	B	-
8	B	-
9	G	-
10	B	-
11	G	-
12	G	-
13	B	-
14	BR	-
17	G	-
21	G	-
25	R	-
26	L	-

Connector No.	E301
Connector Name	COOLING FAN CONTROL MODULE 1
Connector Type	6188-0259



Terminal No.	Color Of Wire	Signal Name [Specification]
4	-	-
5	-	-

Connector No.	E302
Connector Name	COOLING FAN CONTROL MODULE 1
Connector Type	6188-0259



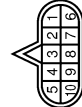
Terminal No.	Color Of Wire	Signal Name [Specification]
7	-	-

Connector No.	E303
Connector Name	COOLING FAN CONTROL MODULE 2
Connector Type	6188-0259



Terminal No.	Color Of Wire	Signal Name [Specification]
4	-	-
5	-	-

Connector No.	F2
Connector Name	A/T ASSEMBLY
Connector Type	BR10FG-DGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	RELAY POWER SUPPLY (With 2.0L turbo engine)
1	GR	IGNITION POWER SUPPLY (With VR30 engine)
2	P	BATTERY POWER SUPPLY (MEMORY BACK-UP)
3	L	CAN-H
4	R	CAN-L
5	B	GROUND (With 2.0L turbo gasoline engine)
5	BR	GROUND (With VR30 engine)
6	GR	IGNITION POWER SUPPLY
7	BC	BACK-UP AMP RELAY
8	P	CAN-L
9	V	STARTER RELAY
10	B	GROUND

Connector No.	F12
Connector Name	WIRE TO WIRE
Connector Type	SA235P-RSE-5428



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	GR	-
3	BG	-
4	R	-
5	G	-
7	L	-
8	W	-
9	W	-
10	BG	-
11	R	-
12	LG	-
13	L	-
14	Y	-
15	LG	-
16	Y	-
17	Y	-
18	B	-
19	GR	-
20	BR	-
21	GR	-
22	W	-
23	G	-
24	S8	-
25	V	-
26	W	-
27	V	-
28	W	-
29	Y	-
30	R	-
31	P	-
32	R	-
33	P	-
34	BG	-
35	LG	-
36	S8	-
37	V	-

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ENGINE CONTROL SYSTEM



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[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)



38	BR	-	-	-	-
39	GR	-	-	-	-
40	SHIELD	-	-	-	-
41	B	-	-	-	-
42	R	-	-	-	-
43	Y	-	-	-	-
45	Y	-	-	-	-
46	P	-	-	-	-
47	L	-	-	-	-
48	LG	-	-	-	-
49	BG	-	-	-	-
50	SHIELD	-	-	-	-
51	W	-	-	-	-
52	G	-	-	-	-

Connector No.	F42
Connector Name	ENGINE OIL PRESSURE SENSOR
Connector Type	RHD3FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	GND
2	P	VOUT
3	P	VCC

Connector No.	F84
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)
Connector Type	EDZFG-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	POWER SUPPLY
2	W	CV/TC/ECM

Connector No.	F85
Connector Name	COMPRESSOR
Connector Type	MD2EW-GY4C



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	B	-

Connector No.	F86
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR 1
Connector Type	EDZFG-RS




Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	TW
2	B	GND-TW

Connector No.	F87
Connector Name	ENGINE OIL TEMPERATURE SENSOR
Connector Type	EDZFG-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	TO
2	B	GND-TO

Connector No.	F88
Connector Name	CRANKSHAFT POSITION SENSOR
Connector Type	RHD3FB






Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	Y	-
3	W	-

Connector No.	F89
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	RHDZFLGY




Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	L	-

Connector No.	F90
Connector Name	TURBOCHARGER BOOST SENSOR (BANK 1)
Connector Type	RHD4FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	L	-
3	R	-
4	GR	-

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ENGINE CONTROL SYSTEM

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[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F91
Connector Name	TURBOCHARGER BOOST SENSOR (BANK 2)
Connector Type	RH04FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	L	-
3	W	-
4	R	-

Connector No.	F92
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 1)
Connector Type	RH04FDGYP



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	L	-
3	W	-
4	R	-

Connector No.	F93
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 2)
Connector Type	RH04FDGYP



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	SB	-
3	L	-
4	R	-

Connector No.	F94
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)
Connector Type	EDZFG-BS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	G	-

Connector No.	F95
Connector Name	EXHAUST GAS TEMPERATURE SENSOR (BANK 1)
Connector Type	HS02MW-1V



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	B	-

Connector No.	F96
Connector Name	EXHAUST GAS TEMPERATURE SENSOR (BANK 2)
Connector Type	HS02MW-1V



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	B	-

Connector No.	F97
Connector Name	INTAKE CAMSHAFT POSITION SENSOR (BANK 2)
Connector Type	RH03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	G	-
3	L	-

Connector No.	F98
Connector Name	MASS AIR FLOW SENSOR (BANK 2)
Connector Type	RH04FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	GR	-
3	BR	-

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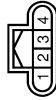
ENGINE CONTROL SYSTEM

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[VR30DDTT FOR MEXICO]

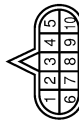
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F99
Connector Name	MASS AIR FLOW SENSOR (BANK 1)
Connector Type	RH04FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	Y	-
3	LG	-
4	P	-

Connector No.	F100
Connector Name	TCM
Connector Type	SP10FG



Terminal No.	Color Of Wire	Signal Name [Specification]
1	-	IGNITION POWER SUPPLY
2	-	BATTERY POWER SUPPLY (MEMORY BACK-UP)
3	-	K-LINE
4	-	GROUND
5	-	IGNITION POWER SUPPLY
6	-	BACK-UP DAMP RELAY
7	-	STARTER RELAY
8	-	GROUND
9	-	GROUND
10	-	GROUND

Connector No.	F101
Connector Name	EXHAUST GAS OXIDATION POSITION SENSOR (BANK 1)
Connector Type	RH03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	BR	-
3	G	-

Connector No.	F102
Connector Name	MANIFOLD ABSOLUTE PRESSURE SENSOR
Connector Type	RH04FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	Y	-
3	G	-

Connector No.	F104
Connector Name	EXHAUST GAS OXIDATION POSITION SENSOR (BANK 2)
Connector Type	RH03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	G	-
3	R	-

Connector No.	F105
Connector Name	WIRE TO WIRE
Connector Type	RS04FL



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	SHIELD	-
3	W	-
4	SHIELD	-

Connector No.	F106
Connector Name	WIRE TO WIRE
Connector Type	RS08FB-PR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BC	-
3	GR	-
4	GR	-
5	B	-
8	B	-

Connector No.	F107
Connector Name	WIRE TO WIRE
Connector Type	RH08FB



Terminal No.	Color Of Wire	Signal Name [Specification]
2	LG	-
3	W	-
4	BR	-
6	L	-
7	R	-
8	Y	-

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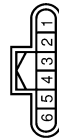
ENGINE CONTROL SYSTEM

[VR30DDTT FOR MEXICO]

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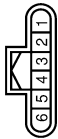
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F108
Connector Name	WIRE TO WIRE
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	BG	-
3	LG	-
4	G	-
6	P	-

Connector No.	F109
Connector Name	WIRE TO WIRE
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	L	-
3	P	-
4	V	-
5	SB	-
6	GR	-

Connector No.	F110
Connector Name	WIRE TO WIRE
Connector Type	RH12FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	Y	-
3	SB	-
5	BR	- [With VR30 engine and with ISS]
5	V	- [Except with VR30 engine and with ISS]
7	P	-
8	V	-
9	W	-
10	BR	-
11	GR	- [With VR30 engine and with ISS]
11	V	- [Except with VR30 engine and with ISS]

Connector No.	F111
Connector Name	IGNITION COIL No. 1 (WITH POWER TRANSFORMER)
Connector Type	ED3FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	B	-
3	W	-

Connector No.	F112
Connector Name	IGNITION COIL No. 2 (WITH POWER TRANSFORMER)
Connector Type	ED3FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	BR	-
3	BG	-

Connector No.	F113
Connector Name	IGNITION COIL No. 3 (WITH POWER TRANSFORMER)
Connector Type	ED3FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	B	-
3	W	-

Connector No.	F114
Connector Name	IGNITION COIL No. 4 (WITH POWER TRANSFORMER)
Connector Type	ED3FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	BR	-
3	BG	-

Connector No.	F115
Connector Name	IGNITION COIL No. 5 (WITH POWER TRANSFORMER)
Connector Type	ED3FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	B	-
3	W	-

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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F116
Connector Name	(IGNITION COIL NO. 6 WITH POWER TRANSISTOR)
Connector Type	ED3FGY4S



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	BR	-
3	BG	-

Connector No.	F117
Connector Name	MULTI-WAY CONTROL VALVE
Connector Type	ED5FGY4S



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	G	-
3	GR	-
4	LG	-
5	L	-

Connector No.	F118
Connector Name	(ELECTRIC INJECTOR CONTROL ACTUATOR (BANK 1))
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	GR	-
3	B	-
4	R	-
5	G	-
6	W	-

Connector No.	F119
Connector Name	(ELECTRIC INJECTOR CONTROL ACTUATOR (BANK 2))
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	GR	-
3	LG	-
4	SB	-
5	BR	-
6	P	-

Connector No.	F120
Connector Name	HIGH PRESSURE FUEL PUMP
Connector Type	H502FLGT-VR



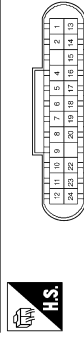
Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	R	-

Connector No.	F121
Connector Name	JOINT CONNECTOR-F01
Connector Type	SAA24FB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
4	R	-
5	BG	-
8	B	-
9	B	-
11	R	-
12	R	-
13	BG	-
14	BG	-
15	BG	-
16	L	-
17	L	-
18	V	-
22	P	-
23	P	-
24	P	-

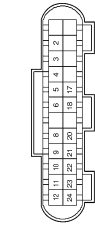
Connector No.	F122
Connector Name	JOINT CONNECTOR-F02
Connector Type	SAA24FB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	LG	-
4	B	-
5	B	-
6	SHIELD	-
7	SHIELD	-
8	SHIELD	-
9	SHIELD	-
10	SHIELD	-
11	SHIELD	-
12	SHIELD	-
13	GR	-
14	GR	-
15	GR	-
16	W	-
17	GR	-
18	SHIELD	-
19	B	-
20	SHIELD	-
22	B	-
23	SHIELD	-
24	SHIELD	-

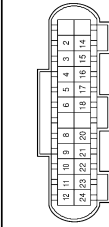
ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F123
Connector Name	JOINT CONNECTOR-F03
Connector Type	SAAZ4FB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
2	R	-
3	V	-
4	G	-
5	G	-
6	G	-
8	L	-
9	BG	- (Color of wire differs depending on production)
10	L	- (Color of wire differs depending on production)
11	W	-
12	W	-
17	Y	-
18	Y	-
20	W	-
21	W	-
22	R	-
23	R	-
24	R	-

Connector No.	F124
Connector Name	JOINT CONNECTOR-F04
Connector Type	SAAZ4FB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
2	G	-
3	G	-
4	BR	-
5	BR	-
6	BR	-
8	SB	-
9	SB	-
10	GR	-
11	GR	-
12	GR	-
14	L	-
15	Y	-
16	R	-
17	R	-
18	R	-
20	W	-
21	W	-
22	BG	-
23	BG	-
24	R	-

Connector No.	F125
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 1)
Connector Type	RHQ4FB-P-BR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	POWER_SUPPLY
2	L	HEATER-
3	W	SENSOR+
4	R	SENSOR-

Connector No.	F126
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 2)
Connector Type	RHQ4FB-P-BR



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	POWER_SUPPLY
2	SB	HEATER-
3	L	SENSOR+
4	R	SENSOR-

Connector No.	F131
Connector Name	WIRE TO WIRE
Connector Type	XCHMGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	W	-
3	B	-
4	B	-

Connector No.	F132
Connector Name	WIRE TO WIRE
Connector Type	XCHMGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
3	R	-
4	B	-

Connector No.	F133
Connector Name	AIR FUEL RATIO (A/F) SENSOR (BANK 1)
Connector Type	RHQ4FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	W	-
3	P	-
4	L	-

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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F134
Connector Name	AIR FUEL RATIO (AF) SENSOR (BANK 2)
Connector Type	RH03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	BR	-
3	V	-
4	LG	-

Connector No.	F135
Connector Name	INTAKE CAM/SHAFT POSITION SENSOR (BANK 1)
Connector Type	RH03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	BR	-
3	SB	-

Connector No.	F136
Connector Name	MAP DAMPER FORCE VOLUME CONTROL VALVE/SOLENOID VALVE
Connector Type	ED2FL-85



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	GR	-

Connector No.	F137
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	RH03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	V	-
3	P	-

Connector No.	F138
Connector Name	ELECTRICAL WATER/INTE CONTROL ACTUATOR (BANK 2)
Connector Type	SGZ06FGY-5



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	P	-
3	R	-
4	L	- [Color of wire differs depending on production]
4	LG	- [Color of wire differs depending on production]
6	G	-

Connector No.	F139
Connector Name	ELECTRICAL WATER/INTE CONTROL ACTUATOR (BANK 1)
Connector Type	SGZ06FGY-5



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	L	-
3	BG	-
4	L	-
6	R	-

Connector No.	F140
Connector Name	TURBOCHARGER SPEED SENSOR (BANK 2)
Connector Type	ED4FGY-85



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	- [With VR30 Hi output engine]
2	W	- [With VR30 Hi output engine]
3	B	- [With VR30 Hi output engine]

Connector No.	F141
Connector Name	TURBOCHARGER SPEED SENSOR (BANK 1)
Connector Type	ED4FGY-85



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [With VR30 Hi output engine]
2	Y	- [With VR30 Hi output engine]
3	L	- [With VR30 Hi output engine]

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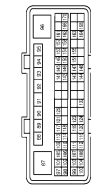
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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F142
Connector Name	ECM
Connector Type	RH76GQ-828-FHV2-RH



Terminal No.	Color Of Wire	Signal Name [Specification]
87	B	ECM GROUND
88	B	ECM GROUND
89	L	ECM GROUND
89	LG	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (BANK 2)
90	G	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (BANK 2)
91	BG	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (BANK 1)
92	L	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (BANK 1)
93	R	A/F SENSOR 1 HEATER (BANK 1)
94	W	A/F SENSOR 1 HEATER (BANK 1)
95	GR	ECM GROUND
96	R	THROTTLE CONTROL MOTOR POWER SUPPLY
97	GR	SENSOR GROUND
98	Y	HEATED OXYGEN SENSOR 2 (BANK 2)
99	R	SENSOR GROUND
100	P	SENSOR GROUND
101	L	A/F SENSOR 1 (BANK 1)
102	P	A/F SENSOR 1 (BANK 1)
103	B	A/F SENSOR SHIELD
104	SB	SENSOR GROUND (THROTTLE POSITION SENSOR) (BANK 2)
105	BR	SENSOR POWER SUPPLY (THROTTLE POSITION SENSOR) (BANK 2)
106	P	THROTTLE POSITION SENSOR (BANK 2)
107	LG	A/F SENSOR 1 (BANK 2)
108	R	A/F SENSOR 1 (BANK 2)
108	G	SENSOR POWER SUPPLY
109	G	SENSOR POWER SUPPLY
110	W	HEATED OXYGEN SENSOR 2 (BANK 1)
111	V	A/F SENSOR 1 (BANK 2)
112	LG	THROTTLE POSITION SENSOR 2 (BANK 2)
113	Y	MANIFOLD ABSOLUTE PRESSURE SENSOR
114	G	SENSOR GROUND
116	L	SENSOR GROUND
117	LG	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1
118	BG	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2
119	Y	TURBOCHARGER SPEED SENSOR (BANK 1)
120	W	TURBOCHARGER SPEED SENSOR (BANK 2)
121	V	PNP SIGNAL
123	BG	THROTTLE MOTOR RELAY

124	R	FUEL PUMP RELAY
125	P	ECM RELAY (SELF SHUT-OFF)
132	B	SENSOR GROUND
141	L	MULTI-WAY CONTROL VALVE MOTOR (H)
142	L	MULTI-WAY CONTROL VALVE MOTOR (H)
143	G	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1
144	BG	CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2
145	BG	MULTI-WAY CONTROL VALVE POWER SUPPLY
146	G	MULTI-WAY CONTROL VALVE MOTOR (L)
147	W	THROTTLE CONTROL MOTOR (H) (BANK 2)
148	GR	THROTTLE CONTROL MOTOR (H) (BANK 2)
149	G	THROTTLE CONTROL MOTOR (H) (BANK 1)
150	GR	THROTTLE CONTROL MOTOR (H) (BANK 1)
151	BR	A/F SENSOR 1 HEATER (BANK 2)
153	L	IGNITION SIGNAL No. 3
154	SB	IGNITION SIGNAL No. 6
155	GR	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
157	W	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)
158	G	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)
161	Y	IGNITION SIGNAL No. 1
162	GR	IGNITION SIGNAL No. 4
163	SB	HEATED OXYGEN SENSOR HEATER 2 (BANK 2)
164	G	IGNITION SIGNAL No. 2
166	L	HEATED OXYGEN SENSOR HEATER 2 (BANK 1)
168	V	IGNITION SIGNAL No. 5
170	P	POWER SUPPLY FOR ECM

Connector No.	F143
Connector Name	ECM
Connector Type	RH76BR-828-FHV2-RH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	HIGH PRESSURE FUEL PUMP POWER SUPPLY
2	GR	ECM GROUND
3	G	FUEL INJECTOR DRIVER POWER SUPPLY A1
4	L	FUEL INJECTOR DRIVER POWER SUPPLY A2
5	LG	FUEL INJECTOR DRIVER POWER SUPPLY B1
6	V	FUEL INJECTOR DRIVER POWER SUPPLY B2
7	BG	ECM GROUND
8	W	KNOCK SENSOR (BANK 1)

9	R	HIGH PRESSURE FUEL PUMP (LO)
10	BR	HIGH PRESSURE FUEL PUMP (HI)
11	BR	FUEL INJECTOR No. 3 (HI)
12	W	FUEL INJECTOR No. 3 (HI)
13	LG	FUEL INJECTOR No. 5 (HI)
14	R	FUEL INJECTOR No. 3 (LO)
15	GR	FUEL INJECTOR No. 4 (HI)
16	V	FUEL INJECTOR No. 4 (HI)
17	Y	FUEL INJECTOR No. 1 (LO)
18	L	FUEL INJECTOR No. 5 (LO)
19	L	FUEL INJECTOR No. 6 (HI)
20	SB	FUEL INJECTOR No. 2 (LO)
21	P	FUEL INJECTOR No. 4 (LO)
22	W	FUEL INJECTOR No. 6 (LO)
23	GR	SENSOR GROUND (TURBOCHARGER BOOST SENSOR) (BANK 2)
24	W	SENSOR GROUND (ENGINE OIL PRESSURE SENSOR)
25	Y	INTAKE CAMSHAFT POSITION SENSOR (BANK 1)
26	SB	INTAKE CAMSHAFT POSITION SENSOR (BANK 2)
28	Y	SENSOR GROUND (CRANKSHAFT POSITION SENSOR)
29	BR	SENSOR GROUND (CAMSHAFT POSITION SENSOR (BANK 1))
31	W	CRANKSHAFT POSITION SENSOR
32	G	CRANKSHAFT POSITION SENSOR (ENGINE OIL VALVE CONTROL SYSTEM)
33	G	EXHAUST CAMSHAFT POSITION SENSOR (BANK 1)
34	R	SENSOR POWER SUPPLY (CRANKSHAFT POSITION SENSOR (POSI))
35	G	SENSOR POWER SUPPLY (THROTTLE POSITION SENSOR) (BANK 1)
36	GR	SENSOR POWER SUPPLY (CAMSHAFT POSITION SENSOR (BANK 1))
37	Y	SENSOR POWER SUPPLY (MASS AIR FLOW SENSOR) (MASS AIR FLOW SENSOR)
38	L	SENSOR POWER SUPPLY (MULTI-WAY CONTROL VALVE MOTOR)
39	BS	SENSOR POWER SUPPLY (ELECTRIC WASTEGATE CONTROL ACTUATOR)
40	P	INTAKE AIR TEMPERATURE SENSOR 1 (BANK 1)
41	R	MASS AIR FLOW SENSOR (BANK 1)
42	LG	SENSOR GROUND (MASS AIR FLOW SENSOR) (MASS AIR FLOW SENSOR)
43	W	THROTTLE POSITION SENSOR (BANK 1)
44	R	SENSOR GROUND (ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1))
45	L	SENSOR GROUND (ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2))
46	G	MASS AIR FLOW SENSOR (BANK 2)
47	SB	EXHAUST GAS TEMPERATURE SENSOR (BANK 2)
48	B	THROTTLE POSITION SENSOR 2 (BANK 1)
50	BR	ENGINE OIL TEMPERATURE SENSOR
51	P	ENGINE OIL PRESSURE SENSOR
52	R	BATTERY CURRENT SENSOR
53	V	FUEL RAIL PRESSURE SENSOR
54	SB	BATTERY TEMPERATURE SENSOR
56	Y	ENGINE COOLANT TEMPERATURE SENSOR 1
57	W	ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)
58	W	TURBOCHARGER BOOST SENSOR (BANK 1)
59	V	CHARGE AIR COOLER COOLING TEMPERATURE SENSOR
61	W	ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)
62	R	INTAKE AIR TEMPERATURE SENSOR 2 (BANK 1)
63	L	TURBOCHARGER BOOST SENSOR (BANK 2)

64	W	INTAKE AIR TEMPERATURE SENSOR 2 (BANK 2)
66	P	SENSOR GROUND (ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2))
67	LG	EXHAUST GAS TEMPERATURE SENSOR (BANK 1)
68	R	SENSOR GROUND
69	GR	MULTI-WAY CONTROL VALVE POSITION SENSOR
70	V	ENGINE COOLANT TEMPERATURE SENSOR
71	W	REFRIGERANT PRESSURE SENSOR
75	V	EXHAUST CAMSHAFT POSITION SENSOR (BANK 2)
76	BG	SENSOR POWER SUPPLY (MASS AIR FLOW SENSOR (BANK 2))
77	BG	SENSOR POWER SUPPLY (MASS AIR FLOW SENSOR (BANK 1))
78	L	MASS AIR FLOW SENSOR (MASS AIR FLOW SENSOR)
79	BR	MASS AIR FLOW SENSOR (MASS AIR FLOW SENSOR)
80	P	SENSOR GROUND (MASS AIR FLOW SENSOR (BANK 2))
81	Y	SENSOR POWER SUPPLY (FUEL RAIL PRESSURE SENSOR)
82	G	SENSOR GROUND
83	Y	SENSOR GROUND (FUEL RAIL PRESSURE SENSOR)
85	W	SENSOR POWER SUPPLY (CAMSHAFT POSITION SENSOR (BANK 2))
86	W	KNOCK SENSOR (BANK 2)

Connector No.	F144
Connector Name	ELECTRIC INK VALVE TIMING CONTROL MOTOR (BANK 1)
Connector Type	PHY03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	W	-

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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F145
Connector Name	ELECTRIC INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 2)
Connector Type	PHY03FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	W	-

Connector No.	F146
Connector Name	ELECTRIC INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 3)
Connector Type	PEB06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
4	Y	-
5	G	-
6	W	-
7	R	-
8	B	-
9	BG	-

Connector No.	F147
Connector Name	ELECTRIC INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 2)
Connector Type	PEB06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
4	GR	-
5	LG	-
6	L	-
7	BR	-
8	V	-
9	P	-

Connector No.	F200
Connector Name	WIRE TO WIRE
Connector Type	RS04ML



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	SHIELD	-
3	W	-
4	SHIELD	-

Connector No.	F201
Connector Name	KNOCK SENSOR (BANK 1)
Connector Type	ED7FG-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	SHIELD	-

Connector No.	F202
Connector Name	KNOCK SENSOR (BANK 2)
Connector Type	ED7FG-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	SHIELD	-

Connector No.	F203
Connector Name	WIRE TO WIRE
Connector Type	RH08MB



Terminal No.	Color Of Wire	Signal Name [Specification]
2	G	-
3	G	-
4	G	-
5	W	-
6	R	-
7	R	-
8	GR	-

Connector No.	F204
Connector Name	WIRE TO WIRE
Connector Type	RH08MB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	-
2	G	-
3	BG	-
4	G	-
5	BR	-
6	G	-

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ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	F205
Connector Name	FUEL INJECTOR No. 1
Connector Type	HS02FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	GR	-

Connector No.	F206
Connector Name	FUEL INJECTOR No. 2
Connector Type	HS02FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	BR	-

Connector No.	F207
Connector Name	FUEL INJECTOR No. 3
Connector Type	HS02FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	R	-

Connector No.	F208
Connector Name	FUEL INJECTOR No. 4
Connector Type	HS02FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	BG	-

Connector No.	F209
Connector Name	FUEL INJECTOR No. 5
Connector Type	HS02FGY



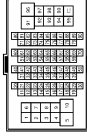
Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	W	-

Connector No.	F210
Connector Name	FUEL INJECTOR No. 6
Connector Type	HS02FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	V	-

Connector No.	M22
Connector Name	WIRE TO WIRE
Connector Type	TH80AW-C316-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	L	- [With VR30 engine]
3	BR	- [With 2.0L turbo gasoline engine]
4	R	- [With VR30 engine]
5	Y	- [With 2.0L turbo gasoline engine]
6	V	- [With VR30 engine]
7	LG	- [With VR30 engine]
8	G	- [With 2.0L turbo gasoline engine]
9	LG	- [With VR30 engine]
10	V	- [With VR30 engine]
11	GR	-
12	V	-
13	LG	-
14	LG	-
15	BR	- [With 2.0L turbo gasoline engine]
16	P	- [With VR30 engine]
17	V	- [With DCM]
18	L	- [Without DCM]
19	G	-
20	GR	-
21	R	-
22	V	-
23	L	-
24	BG	- [With 2.0L turbo gasoline engine]
25	V	- [With VR30 engine]
26	L	- [With 2.0L turbo gasoline engine]

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[VR30DDTT FOR MEXICO]

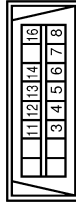
ENGINE CONTROL SYSTEM (VR ENGINE)

25	SB	- [With VR30 engine]
26	G	- [With VR30 engine]
27	W	- [With 2.0L turbo gasoline engine]
29	LG	- [With VR30 engine]
30	SB	- [With VR30 engine]
30	W	- [With 2.0L turbo gasoline engine]
31	SHIELD	-
32	L	-
33	B	- [With VR30 engine]
33	LG	- [With 2.0L turbo gasoline engine]
34	SHIELD	-
35	LG	- [With VR30 engine]
35	W	- [With 2.0L turbo gasoline engine]
36	R	- [With VR30 engine]
36	V	- [With 2.0L turbo gasoline engine]
37	R	- [With VR30 engine]
37	V	- [With 2.0L turbo gasoline engine]
38	W	-
39	P	- [With VR30 engine and without BOSE system]
39	R	- [With 2.0L turbo gasoline engine]
39	V	- [With VR30 engine and with BOSE system]
40	G	-
41	L	-
42	R	-
43	SHIELD	-
44	P	-
45	B	- [With 2.0L turbo gasoline engine]
45	G	- [With VR30 engine]
46	SHIELD	-
47	G	-
48	BG	- [Except with VR30 engine and with BOSE system]
48	BR	- [With VR30 engine and with BOSE system]
49	G	-
50	V	-
51	V	-
52	L	- [With 2.0L turbo gasoline engine]
52	Y	- [With VR30 engine]
53	R	-
54	GR	-
55	L	-
56	P	-
57	R	-
58	LG	-
59	SB	-
61	L	-
62	P	- [With 2.0L turbo gasoline engine]
62	V	- [With VR30 engine]
63	L	-
64	W	-

66	R	-
68	L	-
69	P	- [With 2.0L turbo gasoline engine]
71	GR	- [With VR30 engine]
71	R	- [With 2.0L turbo gasoline engine]
72	G	- [With VR30 engine]
72	V	- [With 2.0L turbo gasoline engine]
73	LG	- [With 2.0L turbo gasoline engine]
73	SHIELD	- [With VR30 engine]
74	L	- [With VR30 engine]
74	LG	- [With 2.0L turbo gasoline engine]
75	D	-
76	SB	- [With 2.0L turbo gasoline engine]
76	V	- [With VR30 engine]
77	Y	-
78	L	-
79	G	-
80	GR	- [With 2.0L turbo gasoline engine]
80	W	- [With VR30 engine]
81	B	- [With VR30 engine]
81	R	- [With 2.0L turbo gasoline engine]
82	G	- [With 2.0L turbo gasoline engine]
82	SHIELD	- [With VR30 engine]
83	R	- [With 2.0L turbo gasoline engine]
83	W	- [With VR30 engine]
84	BR	- [With VR30 engine]
84	SHIELD	- [With 2.0L turbo gasoline engine]
85	BR	- [With VR30 engine]
85	G	- [With 2.0L turbo gasoline engine]
86	R	- [With 2.0L turbo gasoline engine]
86	V	- [With VR30 engine]
87	LG	- [With 2.0L turbo gasoline engine]
87	SHIELD	- [With VR30 engine]
89	BR	- [With VR30 engine]
89	LG	- [With 2.0L turbo gasoline engine]
90	SB	- [With 2.0L turbo gasoline engine]
90	V	- [With VR30 engine]
92	L	- [With 2.0L turbo gasoline engine]
92	W	- [With VR30 engine]
93	R	- [With VR30 engine]
93	SHIELD	- [With 2.0L turbo gasoline engine]
94	R	-
95	L	- [With 2.0L turbo gasoline engine]
95	Y	- [With VR30 engine]
96	R	- [With 2.0L turbo gasoline engine]
96	W	- [With VR30 engine]
97	L	- [With 2.0L turbo gasoline engine]
97	R	- [With VR30 engine]
98	BR	-
99	BR	- [With VR30 engine and with BOSE system]

99	P	- [With 2.0L turbo gasoline engine]
99	Y	- [With VR30 engine and without BOSE system]
100	BR	- [With VR30 engine]
100	W	- [With 2.0L turbo gasoline engine]

Connector No.	IM25
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW



Terminal No.	Color Of Wire	Signal Name [Specification]
3	LG	M_CAN_L
4	B	EARTH
5	B	EARTH
6	L	CAN_H
7	V	KLINE [With 2.0L turbo gasoline engine]
7	W	KLINE [With VR30 engine]
8	W	IGN_SW
11	SB	M_CAN_H
12	L	CAN_L
13	L	CAN_H
14	P	CAN_L
16	W	POWER

Connector No.	IM39
Connector Name	WIRE TO WIRE
Connector Type	TH32FW-WH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W/B	-
2	SB	-
3	L	-
4	P	- [Without Gateway]
4	R	- [With Gateway]
5	BR	-
6	SB	-
7	L	-
8	W	-
9	P	- [Without BOSE system]
9	V	- [With BOSE system]
10	V	-
11	SB	-
12	G	-
13	G	-
15	R	-
16	SB	-
17	SHIELD	-
18	W	-
19	Y	-
20	L	-
21	G	-
22	R	-
23	BR	-
24	R	-
25	L	-
26	Y	-
27	LG	-
28	BR	-
29	W/B	-
30	Y	-
31	W	-
32	L	- [With Anti-theft diode]
32	LG	- [Without Anti-theft diode]

ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

Connector No.	M40
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-C516-TM4



Terminal No.	Color Of Wire	Signal Name (Specification)
1	BG	-
6	W/B	-
7	V	-
8	BG	- [With VR30 engine]
8	BR	- [With 2.0L turbo gasoline engine]
9	LG	- [With VR30 engine]
9	P	- [With 2.0L turbo gasoline engine]
10	W	-
11	W	- [With VR30 engine]
11	Y	- [With 2.0L turbo gasoline engine]
12	B	- [With VR30 engine]
12	BR	- [With 2.0L turbo gasoline engine]
13	GR	- [With VR30 engine]
13	SHIELD	- [With 2.0L turbo gasoline engine]
14	B	-
14	B	- [With 2.0L turbo gasoline engine]
15	BG	- [With VR30 engine]
16	B	- [With VR30 engine]
16	BR	- [With 2.0L turbo gasoline engine]
17	LG	-
18	B	- [With VR30 engine]
18	W/B	- [With 2.0L turbo gasoline engine]
19	Y	-
31	W	-
32	G	- [With 2.0L turbo gasoline engine]
32	V	- [With VR30 engine]
33	L	- [With VR30 engine]
33	V	- [With 2.0L turbo gasoline engine]
34	P	-
35	BG	-
36	G	-
37	B	- [With VR30 engine]
37	L	- [With 2.0L turbo gasoline engine]
38	L	- [With VR30 engine]
38	P	- [With 2.0L turbo gasoline engine and without gateway]
38	R	- [With 2.0L turbo gasoline engine and with gateway]

39	R	-
39	Y	- [With 2.0L turbo gasoline engine]
40	GR	- [With VR30 engine]
41	L	-
44	BR	-
45	L	- [With 2.0L turbo gasoline engine]
45	W	- [With VR30 engine]
46	G	- [With VR30 engine]
46	Y	- [With 2.0L turbo gasoline engine]
47	BG	- [With 2.0L turbo gasoline engine]
47	R	- [With VR30 engine]
48	SHIELD	-
49	B	- [With VR30 engine]
49	G	- [With 2.0L turbo gasoline engine]
50	B	- [With 2.0L turbo gasoline engine]
50	BR	- [With VR30 engine]
51	L	-
52	W	-
53	G	-
54	SB	- [With 2.0L turbo gasoline engine]
54	Y	- [With VR30 engine]
55	B	- [With 2.0L turbo gasoline engine]
55	P	- [With VR30 engine]
56	BG	- [With VR30 engine]
56	GR	- [With 2.0L turbo gasoline engine]
57	GR	- [With VR30 engine]
57	P	- [With 2.0L turbo gasoline engine]
58	B	-
59	SB	-
61	W/B	-
64	Y	-
65	R	- [Color of wire differs depending on production]
66	V	- [Color of wire differs depending on production]
67	LG	-
68	BG	-
69	L	-
70	R	-
71	V	- [With VR30 engine]
71	W	- [With 2.0L turbo gasoline engine]
72	L	- [With 2.0L turbo gasoline engine]
72	LG	- [With VR30 engine]
73	R	- [With VR30 engine]
73	W	- [With 2.0L turbo gasoline engine]
74	BR	- [With VR30 engine]
74	L	- [With 2.0L turbo gasoline engine]
75	B	- [With VR30 engine]
75	P	- [With 2.0L turbo gasoline engine and without gateway]
75	R	- [With 2.0L turbo gasoline engine and with gateway]
76	W/B	-

77	SB	-
78	LG	- [With VR30 engine]
78	LG	- [With 2.0L turbo gasoline engine]
79	R	-
80	G	-
81	R	-
82	LG	- [With 2.0L turbo gasoline engine]
83	BR	- [With VR30 engine]
83	R	- [With 2.0L turbo gasoline engine]
84	V	-
86	V	-
87	G	-
89	V	-
90	G	- [With VR30 engine]
90	V	- [With 2.0L turbo gasoline engine]
91	W	-
92	G	-
93	BR	-
94	GR	- [With VR30 engine]
94	L	- [With 2.0L turbo gasoline engine]
95	BR	- [With VR30 engine]
95	P	- [With 2.0L turbo gasoline engine and without gateway]
95	R	- [With 2.0L turbo gasoline engine and with gateway]
96	W	-
97	LG	-
98	Y	-
99	BR	-
99	LG	- [With 2.0L turbo gasoline engine]
100	SHIELD	-

Connector No.	M57
Connector Name	COMBINATION METER
Connector Type	TH40FW-WH



Terminal No.	Color Of Wire	Signal Name (Specification)
1	B	GROUND
5	GR	STOP/START OFF SWITCH INDICATOR SIGNAL
7	G	SECURITY SIGNAL
8	B	-
11	W	ALTERNATOR SIGNAL

12	G	LED HEADLAMP (RH) WARNING SIGNAL
13	BR	LED HEADLAMP (LH) WARNING SIGNAL
14	V	ACC POWER SUPPLY
16	V	AIR BAG SIGNAL
17	BR	METER CONTROL SWITCH GROUND
18	SB	TRIP/RESET SIGNAL
21	B	STEERING SWITCH SIGNAL GROUND
22	P	STEERING SWITCH SIGNAL A
23	W/B	STEERING SWITCH SIGNAL B
24	L	WASHER LEVEL SWITCH SIGNAL
25	LG	BRAKE FLUID LEVEL SWITCH SIGNAL
26	V	PARKING BRAKE SWITCH SIGNAL
27	G	PASSENGER SEAT BELT WARNING SIGNAL
28	W	SEAT BELT BUCKLE SWITCH SIGNAL (DRIVER SIDE)
30	G	MANUAL MODE SIGNAL [With 2.0L turbo gasoline engine]
30	SB	MANUAL MODE SIGNAL [With VR30 engine]
31	G	NON-MANUAL MODE SIGNAL [With VR30 engine]
31	L	NON-MANUAL MODE SIGNAL [With 2.0L turbo gasoline engine]
32	BG	MANUAL MODE SHIFT UP SIGNAL
33	GR	MANUAL MODE SHIFT DOWN SIGNAL [With VR30 engine]
33	P	MANUAL MODE SHIFT DOWN SIGNAL [With 2.0L turbo gasoline engine]
34	BG	PADDLE SHIFTER UP SWITCH SIGNAL
35	G	PADDLE SHIFTER DOWN SWITCH SIGNAL
36	V	ILLUMINATION CONTROL SWITCH SIGNAL (+)
37	GR	ILLUMINATION CONTROL SWITCH SIGNAL (-)
38	R	VEHICLE SPEED SIGNAL (8-PULSE)

Connector No.	M58
Connector Name	COMBINATION METER
Connector Type	TH12FW-WH



Terminal No.	Color Of Wire	Signal Name (Specification)
41	L	CAN-H
42	P	CAN-L
43	B	ILLUMINATION CONTROL SIGNAL
44	Y	FUEL LEVEL SENSOR GROUND
45	W	BATTERY POWER SUPPLY
46	BG	IGNITION SIGNAL [Except with VR30 engine and without BS]
46	R	IGNITION SIGNAL [With VR30 engine and without BS]
47	SB	AV COMMUNICATION SIGNAL (H)

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ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[VR30DDTT FOR MEXICO]

ENGINE CONTROL SYSTEM (VR ENGINE)

48	LG	AV COMMUNICATION SIGNAL (L)
51	BR	FUEL LEVEL SENSOR SIGNAL
52	B	GROUND

Connector No.	M87
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TH08FEQ-1V



Terminal No.	Color Of Wire	Signal Name [Specification]
24	P	-
25	SB	-
31	W/B	-
32	Y	-
33	B	-

Connector No.	M88
Connector Name	A/C AUTO AMP.
Connector Type	TH40FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	CAN-H
2	B	GROUND
3	W	BATTERY POWER SUPPLY
7	G	AMBIENT SENSOR SIGNAL
9	R	SUNLOAD SENSOR SIGNAL
13	SB	ACC POWER SUPPLY [With 2.0L turbo gasoline engine]
16	P	ACC POWER SUPPLY [With VR30 engine]
17	R	DOOR MOTOR POWER SUPPLY
18	P	BLOWER MOTOR CONTROL SIGNAL

20	L	HEATED STEERING WHEEL RELAY CONTROL SIGNAL
21	P	CAN-L
22	B	GROUND
23	R	IGNITION POWER SUPPLY [With VR30 engine and with ISS]
23	W	IGNITION POWER SUPPLY [Except with VR30 engine and with ISS]
26	B	SENSOR GROUND
27	LG	IN VEHICLE SENSOR SIGNAL
28	BR	INTAKE SENSOR SIGNAL
30	BG	EXHAUST GAS/OUTSIDE DOOR REFLECTING SENSOR SIGNAL
37	B	GROUND
38	BG	IGNITER (ON/OFF) CONTROL SIGNAL
40	BG	ECV CONTROL SIGNAL

Connector No.	M124
Connector Name	ACCELERATOR PEDAL ACTUATOR/ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH12FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	BATTERY
2	G	IGNITION
3	L	ITS COMM-H
4	W	-
5	G	-
6	Y	-
7	B	GROUND
9	Y	ITS COMM-L
10	L	-
11	R	-
12	BR	-

Connector No.	M126
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	APS2_OUT
2	R	APS2_GND
3	Y	APS2_OUT
4	G	APS2_GND
5	W	APS1_IN
6	L	APS2_IN

Connector No.	M133
Connector Name	FUSE BLOCK (J/B)
Connector Type	TH40FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
10C	V	-
12C	L	-
13C	L	-
14C	Y	-
15C	R	-
16C	R	-
17C	L	-
18C	BG	- [Without DRPO]
19C	P	- [With DRPO]
19C	B	-
19C	R	-
20C	W	-
21C	L	-
22C	L	-

23C	L	-
25C	LG	-
26C	SB	-
27C	P	-
28C	W	-
29C	W	-
29C	R	-
30C	R	-
31C	W	-
32C	R	-
32C	B	- [With VR30 engine]
32C	R	- [With 2.0L turbo gasoline engine]
34C	W/B	-
35C	SB	-
36C	R	-
37C	W	-
38C	SB	-
39C	V	-
3C	P	-
40C	G	-
4C	P	-
5C	P	-
6C	G	-
7C	G	-
8C	G	-
9C	V	-

Connector No.	M157
Connector Name	WIRE TO WIRE
Connector Type	TH12FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	G	- [With VR30 engine]
2	L	- [With 2.0L turbo gasoline engine]
3	L	-
4	W	- [With VR30 engine]
4	Y	- [With 2.0L turbo gasoline engine]
5	BR	- [With 2.0L turbo gasoline engine]
5	G	- [With VR30 engine]

ENGINE CONTROL SYSTEM

[VR30DDTT FOR MEXICO]

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM (VR ENGINE)

6	G	- [With 2.0L turbo gasoline engine]
7	Y	- [With VR30 engine]
7	B	-
9	Y	-
10	L	- [With VR30 engine]
10	R	- [With 2.0L turbo gasoline engine]
11	R	- [With 2.0L turbo gasoline engine]
11	R	- [With VR30 engine]
12	BR	- [With VR30 engine]
12	W	- [With 2.0L turbo gasoline engine]

Connector No.	M158
Connector Name	WIRE TO WIRE
Connector Type	TH12MW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	
2	G	
3	L	
4	W	
5	G	
6	Y	
7	B	
9	Y	
10	L	
11	R	
12	BR	

Connector No.	M171
Connector Name	JOINT CONNECTOR-M01
Connector Type	24342_4GA2A



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	
2	B	
3	B	
4	B	
5	B	
6	B	
7	B	
8	B	
9	B	
10	G	
11	G	
14	B	
15	B	
16	SB	- [With VR30 engine]
17	Y	- [With 2.0L turbo gasoline engine]
17	SB	- [With VR30 engine]
18	SB	- [With 2.0L turbo gasoline engine]
19	G	- [With 2.0L turbo gasoline engine]
20	G	
22	LG	- [With VR30 engine]
23	SB	- [With 2.0L turbo gasoline engine]
23	LG	- [With VR30 engine]
23	SB	- [With 2.0L turbo gasoline engine]
24	CG	- [With VR30 engine]
24	SB	- [With 2.0L turbo gasoline engine]

Connector No.	M175
Connector Name	JOINT CONNECTOR-M05
Connector Type	NH20H-LDC



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	
2	L	
3	L	
4	L	
5	L	
6	L	
7	L	
8	L	
10	P	
11	P	
12	P	
13	P	
14	P	
15	P	
16	R	- [With VR30 engine]
16	R	- [With 2.0L turbo gasoline engine]
17	R	- [With VR30 engine]
17	R	- [With 2.0L turbo gasoline engine]
19	W	- [Except with VR30 engine and with LSS]
20	R	- [With VR30 engine and with LSS]
20	W	- [Except with VR30 engine and with LSS]

Connector No.	M303
Connector Name	COMBINATION SWITCH (SPRINKLER CABLE)
Connector Type	TK08FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
13	L	
14	L	
15	L	
16	L	
17	L	
18	L	
19	L	
20	L	

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DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

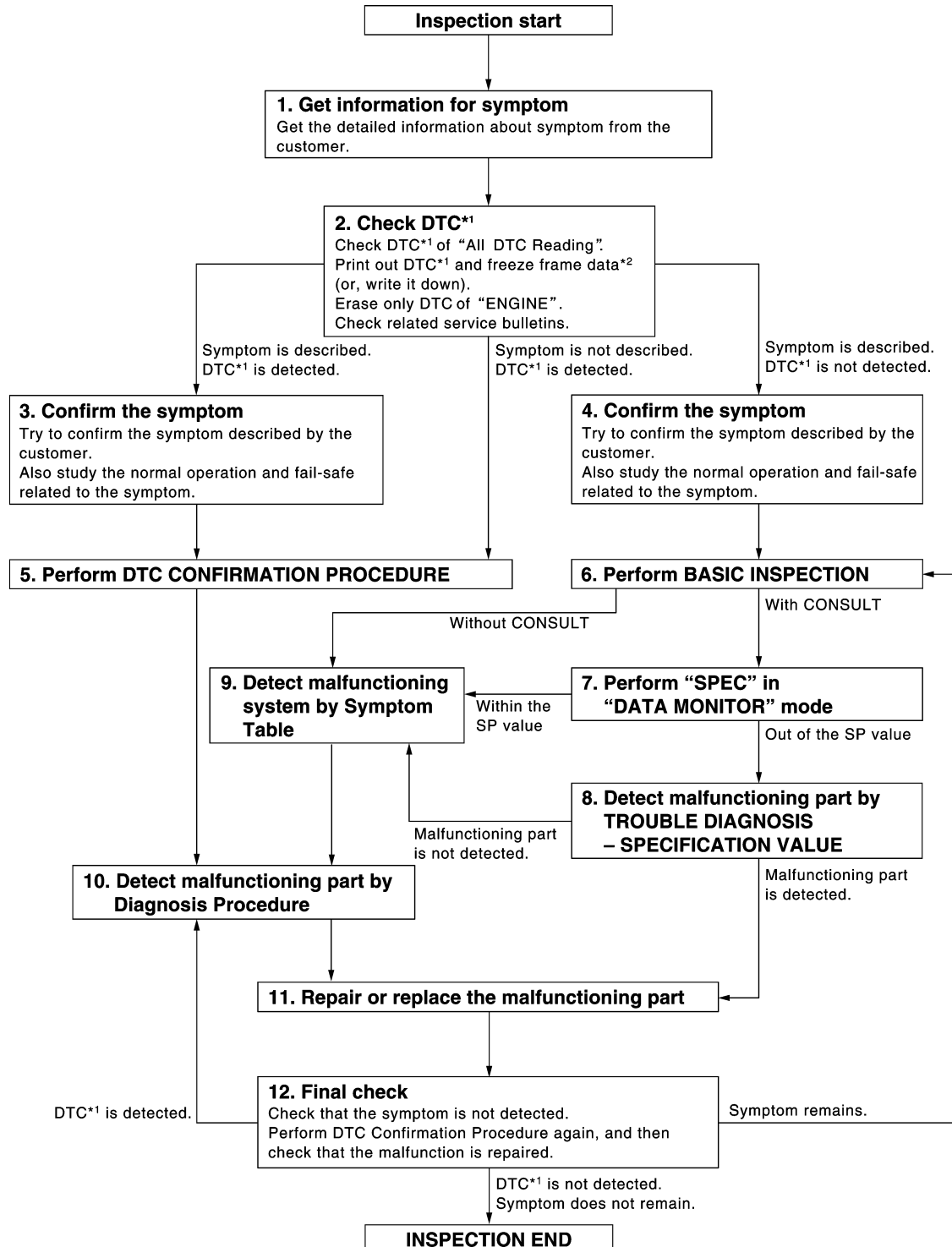
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000013844131

OVERALL SEQUENCE



JSBIA1812GB

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

A

DETAILED FLOW

1. GET INFORMATION FOR SYMPTOM

EC6

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 [EC6-1193, "Diagnostic Work Sheet"](#).)

C

>> GO TO 2.

D

2. CHECK DTC

With CONSULT

E

1. Check DTC of "All DTC Reading".
2. 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". Refer to "How to Erase DTC and 1st Trip DTC" in [EC6-1093, "CONSULT Function"](#)
 - Turn ignition switch OFF.
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to [EC6-1748, "Symptom Table"](#).)
3. Check related service bulletins for information.

F

G

Are any symptoms described and any DTCs detected?

H

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.

I

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

Also study the normal operation and fail-safe related to the symptom. Refer to [EC6-1754, "Description"](#) and [EC6-1132, "Fail safe"](#).

J

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

K

>> GO TO 5.

4. CONFIRM THE SYMPTOM

L

Try to confirm the symptom described by the customer.

Also study the normal operation and fail-safe related to the symptom. Refer to [EC6-1754, "Description"](#) and [EC6-1132, "Fail safe"](#).

M

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

N

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

O

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then check that DTC is detected again.

If two or more DTCs are detected, refer to [EC6-1137, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

P

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.

If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

DIAGNOSIS AND REPAIR WORKFLOW

[VR30DDTT FOR MEXICO]

< BASIC INSPECTION >

Is DTC detected?

YES >> GO TO 10.

NO >> Check according to [GI-45, "Intermittent Incident"](#).

6. PERFORM BASIC INSPECTION

Perform [EC6-1195, "Work Procedure"](#).

Do you have CONSULT?

YES >> GO TO 7.

NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT

Check that "MASS AIR FLOW SENSOR (Hz)", "MASS AIR FLOW SENSOR B2 (Hz)", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA-B2" are within the SP value using CONSULT "SPEC" in "DATA MONITOR" mode of "ENGINE". Refer to [EC6-1220, "Component Function Check"](#).

Is the measurement value within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to [EC6-1221, "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 [EC6-1748, "Symptom Table"](#) 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 [GI-48, "Circuit Inspection"](#).

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to [EC6-1107, "Reference Value"](#).

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

With CONSULT

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to "How to Erase DTC and 1st Trip DTC" in [EC6-1093, "CONSULT Function"](#).

>> GO TO 12.

12. FINAL CHECK

With CONSULT

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been completely repaired.

DIAGNOSIS AND REPAIR WORKFLOW

[VR30DDTT FOR MEXICO]

< BASIC INSPECTION >

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

YES-2 >> Symptom remains: GO TO 6.

NO >> Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM. Refer to "How to Read DTC and 1st Trip DTC" in [EC6-1093, "CONSULT Function"](#),

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Diagnostic Work Sheet

INFOID:000000013844132

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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 an incident. 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 steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
Weather conditions,
Symptoms

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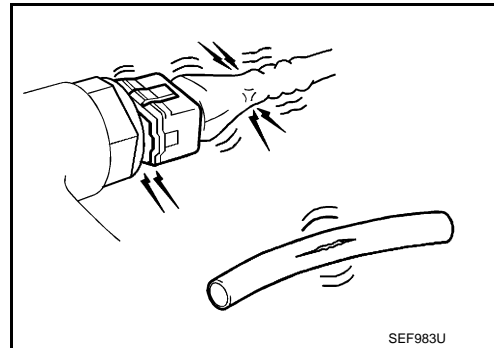
Work Procedure

INFOID:000000013844133

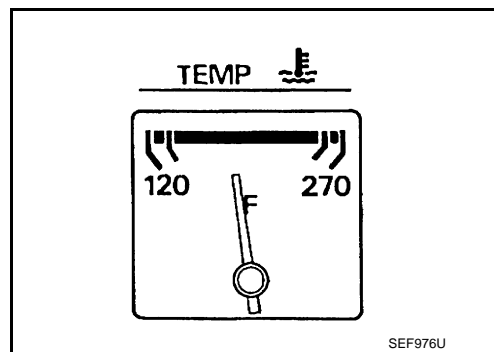
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1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Wiring harness for improper connections, pinches and cut
 - Vacuum hoses for splits, kinks and improper connections
 - Hoses and ducts for leaks
 - Air cleaner clogging
 - Gasket
3. Confirm that electrical or mechanical loads are not applied.
 - Headlamp switch is OFF.
 - Air conditioner switch is OFF.
 - Rear window defogger switch is OFF.
 - Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.



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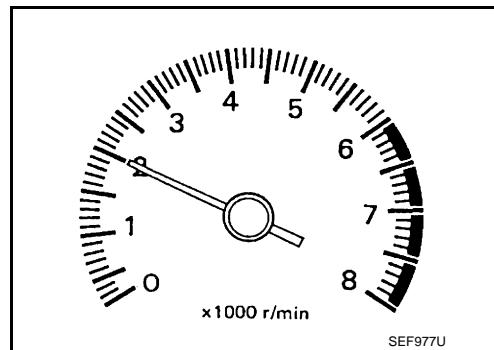


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5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT or GST.

Are any DTCs detected?

- YES >> GO TO 2.
- NO >> GO TO 3.



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2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnosis Procedure.

>> GO TO 3

3.CHECK IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

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BASIC INSPECTION

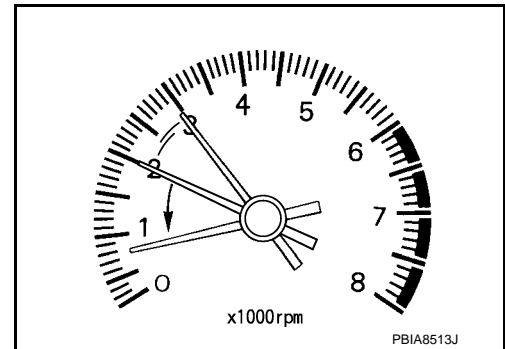
[VR30DDTT FOR MEXICO]

< 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 [EC6-1755, "Inspection"](#).
For specification, refer to [EC6-1762, "Idle Speed"](#).

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 4.



4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC6-1204, "Description"](#).

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC6-1205, "Description"](#).

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC6-1206, "Description"](#).

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7.CHECK IDLE SPEED AGAIN

- Start engine and warm it up to normal operating temperature.
- Check idle speed.
For procedure, refer to [EC6-1755, "Inspection"](#).
For specification, refer to [EC6-1762, "Idle Speed"](#).

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC6-1387, "Component Inspection"](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC6-1382, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4.

9.CHECK ECM FUNCTION

- Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to [SEC-95, "Description"](#).

>> GO TO 4.

10.CHECK IGNITION TIMING

- Run engine at idle.

BASIC INSPECTION

[VR30DDTT FOR MEXICO]

< BASIC INSPECTION >

2. Check ignition timing with a timing light.

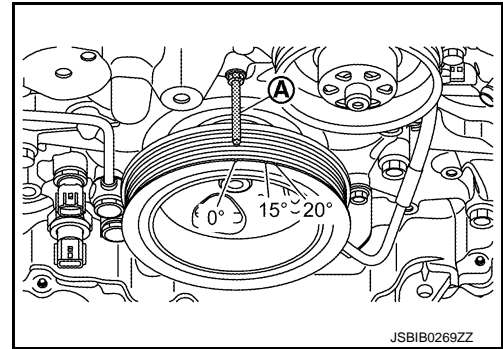
(A) :Timing indicator

For procedure, refer to [EC6-1756, "Inspection"](#).

For specification, refer to [EC6-1762, "Ignition Timing"](#).

Is the inspection result normal?

- YES >> GO TO 19.
NO >> GO TO 11.



11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform [EC6-1204, "Description"](#).

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC6-1205, "Description"](#).

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC6-1206, "Description"](#).

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 IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

For procedure, refer to [EC6-1755, "Inspection"](#).

For specification, refer to [EC6-1762, "Idle Speed"](#).

Is the inspection result normal?

- YES >> GO TO 15.
NO >> GO TO 17.

15.CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.

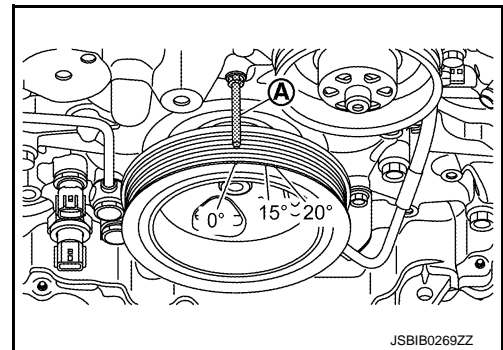
(A) :Timing indicator

For procedure, refer to [EC6-1756, "Inspection"](#).

For specification, refer to [EC6-1762, "Ignition Timing"](#).

Is the inspection result normal?

- YES >> GO TO 19.
NO >> GO TO 16.



16.CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-238, "Exploded View"](#).

Is the inspection result normal?

- YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

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BASIC INSPECTION

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

17.DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC6-1387, "Component Inspection"](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC6-1382, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace. Then GO TO 4.

18.CHECK ECM FUNCTION

1. Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to [SEC-95, "Description"](#).

>> GO TO 4.

19.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to [EC6-1200, "Description"](#).

>> INSPECTION END

SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

Special Repair Requirement List

INFOID:000000013844134

×:Applicable

EC6

Part name	Service performed		Service Manual item	Reference
	Replace-ment	Removal		
ECM	×	—	Additional service when replacing ECM	EC6-1200
Accelerator pedal position sensor	×	× ^{*1}	Accelerator pedal released position learning	EC6-1204
Electric throttle control actuator	×	× ^{*1, 2}	Throttle valve closed position learning	EC6-1205
			Idle air volume learning	EC6-1206
Electric intake valve timing control module	×	× ^{*1}	Electric intake valve timing control actuator refer-ence position learning	EC6-1209
Electric intake valve timing control actuator	×	× ^{*1}	Electric intake valve timing control actuator refer-ence position learning	EC6-1209
Crankshaft position sensor	×	—	Electric intake valve timing control actuator refer-ence position learning	EC6-1209
Intake camshaft position sensor	×	—	Electric intake valve timing control actuator refer-ence position learning	EC6-1209
Exhaust camshaft position sensor	×	—	Electric intake valve timing control actuator refer-ence position learning	EC6-1209
engine mechanical parts • timing chain • intake/exhaust camshaft • intake/exhaust camshaft sprocket • Piston • Connecting rod • Crankshaft	×	×	Electric intake valve timing control actuator refer-ence position learning	EC6-1209
Turbocharger	×	—	Turbocharger wastegate control actuator initializa-tion	EC6-1210
A/F sensor 1	×	—	Idle air volume learning	EC6-1206
O2 sensor 2	×	—	Idle air volume learning	EC6-1206
Mass air flow sensor	×	—	Idle air volume learning	EC6-1206
Repair or replacement of parts affecting air-fuel ratio	×	—	Idle air volume learning	EC6-1206
Engine oil	×	—	Engine oil data reset	EC6-1211

*1:Harness connector disconnection is included.

*2:Carbon deposit cleaning is included.

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:000000013844135

When replacing ECM, the following procedure must be performed. (For details, refer to [EC6-1200, "Work Procedure"](#).)

PROGRAMMING OPERATION

NOTE:

After replacing with a blank ECM, programming is required to write ECM information. Be sure to follow the procedure to perform the programming.

BEFORE REPLACEMENT

When replacing ECM, perform "SAVING DATA FOR REPLC CPU" in "WORK SUPPORT" of "ENGINE" by using CONSULT to save current ECM data before replacement.

AFTER REPLACEMENT

After replacing ECM, the following items must be performed:

- Write data after replace CPU
- Accelerator pedal released position learning
- Throttle valve closed position learning
- Idle air volume learning
- Electric intake valve timing control actuator reference position learning
- Turbocharger wastegate control actuator initialization
- Engine oil data reset

Work Procedure

INFOID:000000013844136

1. SAVE ECM DATA

ⓑ With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select "SAVING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
5. Follow the instruction of CONSULT display.

NOTE:

- Necessary data in ECM is copied and saved to CONSULT.
- Go to Step 2 regardless of with or without success in saving data.

>> GO TO 2.

2. CHECK ECM PART NUMBER

Check ECM part number to see whether it is blank ECM or not.

NOTE:

- Part number of blank ECM is 23703 - xxxxxx.
- Check part number when ordering ECM or the one included in the label on the container box.

Is the ECM a blank ECM?

- YES >> GO TO 3.
NO >> GO TO 5.

3. SAVE ECM PART NUMBER

Read out the part number from the old ECM and save the number, following the programming instructions. Refer to "CONSULT Operation Manual".

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 4.

>> GO TO 4.

4. PERFORM ECM PROGRAMMING

ADDITIONAL SERVICE WHEN REPLACING ECM

[VR30DDTT FOR MEXICO]

< BASIC INSPECTION >

After replacing ECM, perform the ECM programming. Refer to CONSULT Operation Manual".

NOTE:

- Refer to [EC6-1759, "Removal and Installation"](#) for replacement of ECM.
- During programming, maintain the following conditions:
 - Ignition switch: ON
 - Electric load: OFF
 - Brake pedal: Not depressed
 - Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.)

>> GO TO 6.

5. REPLACE ECM

Replace ECM. Refer to [EC6-1759, "Removal and Installation"](#).

>> GO TO 6.

6. PERFORM INITIALIZATION OF IVIS (NATS) SYSTEM AND REGISTRATION OF ALL IVIS (NATS) IGNITION KEY IDS

Refer to [SEC-95, "Description"](#).

>> GO TO 7.

7. CHECK ECM DATA STATUS

Check if the data is successfully copied from the ECM at Step 1 (before replacement) and saved in CONSULT.

Is the data saved successfully?

YES >> GO TO 8.

NO >> GO TO 9.

8. WRITE ECM DATA

Ⓜ With CONSULT

1. Select "WRITING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
2. Follow the instruction of CONSULT display.

NOTE:

The data saved by "SAVING DATA FOR REPLC CPU" is written to ECM.

>> GO TO 10.

9. PERFORM VIN REGISTRATION

Refer to [EC6-1203, "Description"](#).

>> GO TO 10.

10. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to [EC6-1204, "Description"](#).

>> GO TO 11.

11. ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR REFERENCE POSITION LEARNING

Refer to [EC6-1209, "Description"](#).

>> GO TO 12.

12. TURBOCHARGER WASTEGATE CONTROL ACTUATOR INITIALIZATION

Refer to [EC6-1210, "Description"](#).

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

>> GO TO 13.

13.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to [EC6-1205, "Description"](#).

>> GO TO 14.

14.PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC6-1206, "Description"](#).

>> GO TO 15.

15.CHANGE ENGINE OIL

Change engine oil, then perform ENGINE OIL DATE RESET. Refer to [EC6-1211, "Description"](#).

NOTE:

When replacing ECM, OCS data cannot be transferred. In addition, ENGINE OIL DATE RESET is performed, and therefore oil change is required.

>> GO TO 16.

16.ERASE 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. Check "Self-diagnostic result" of "ENGINE".

Is any DTC detected?

- YES >> Erase DTC.
NO >> END

VIN REGISTRATION**Description**

INFOID:0000000013844137

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).
(For details, refer to [EC6-1203, "Work Procedure"](#).)

Work Procedure

INFOID:0000000013844138

1. CHECK VIN

Check the VIN of the vehicle and note it. Refer to [GI-36, "Information About Identification or Model Code"](#).

>> GO TO 2.

2. PERFORM VIN REGISTRATION** With CONSULT**

1. Turn ignition switch ON and engine stopped.
2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.
3. Follow the instruction of CONSULT display.

>> END

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ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:000000013844139

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time the harness connector of the accelerator pedal position sensor or ECM is disconnected. (For details, refer to [EC6-1204, "Work Procedure"](#).)

Work Procedure

INFOID:000000013844140

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 >

[VR30DDTT FOR MEXICO]

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:000000013844141

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected or electric throttle control actuator is cleaned. (For details, refer to [EC6-1205, "Work Procedure"](#).)

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Work Procedure

INFOID:000000013844142

1. START

Ⓜ With CONSULT

1. Turn ignition switch ON.
2. Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode.
3. Follow the instructions on the CONSULT display.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

ⓧ Without CONSULT

1. Start the engine.
NOTE:
Coolant temperature is less than 25°C (77°F) before engine starts.
2. Warm up the engine until engine coolant temperature reaches more than 65°C (149°F).
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

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IDLE AIR VOLUME LEARNING

Description

INFOID:000000013844143

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps engine idle speed within the specific range. It must be performed under the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

(For details, refer to [EC6-1206, "Work Procedure"](#).)

Work Procedure

INFOID:000000013844144

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 - 105°C (158 - 221°F)
- Selector lever: P or N
- Electric load switch: OFF
(Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.

- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- With CONSULT: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V.
- Without CONSULT: Drive vehicle for 10 minutes.

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

With CONSULT

1. Perform Accelerator Pedal Released Position Learning. Refer to [EC6-1204, "Work Procedure"](#).
2. Perform Throttle Valve Closed Position Learning. [EC6-1205, "Work Procedure"](#).
3. Start engine and warm it up to normal operating temperature.
4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

- YES >> GO TO 3.
NO >> GO TO 4.

3. CHECK IDLE SPEED AND IGNITION TIMING

1. Start engine and warm it up to normal operating temperature.
2. Let it idle for 20 seconds.
3. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to [EC6-1762, "Idle Speed"](#) and [EC6-1762, "Ignition Timing"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART-I

Check the following

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

- YES >> GO TO 5.

IDLE AIR VOLUME LEARNING

[VR30DDTT FOR MEXICO]

< BASIC INSPECTION >

NO >> Repair or replace malfunctioning part.

5.DETECT MALFUNCTIONING PART-II

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to [EC6-1220. "Description"](#). If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again:

- Engine stalls.
- Erroneous idle.

>> INSPECTION END

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MIXTURE RATIO SELF-LEARNING VALUE CLEAR

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

INFOID:000000013844145

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in "Diagnosis Procedure". (For details, refer to [EC6-1208, "Work Procedure"](#).)

Work Procedure

INFOID:000000013844146

1. START

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
3. Clear mixture ratio self-learning value by touching "CLEAR".

With GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (bank 1) harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
6. Select Service \$03 with GST. Make sure DTC P0102 is detected.
7. Select Service \$04 with GST to erase the DTC P0102.

>> END

ELECTRIC IVT CONTROL ACTUATOR POSITION LEARNING

Description

INFOID:000000013844147

Electric intake valve timing control (IVT) module requires the learning of camshaft reference position.

This learning must be performed where the following operations are performed:

- Replacement of electric IVT control module
- Replacement of intake/Exhaust camshaft position sensor
- Replacement of crankshaft position sensor
- Removal and installation of timing chain
- Replacement of the mechanical parts listed below:
 - Replacement of timing chain
 - Replacement of intake/exhaust camshaft
 - Replacement of intake/exhaust camshaft sprocket
 - Replacement of piston
 - Replacement of connecting rod
 - Replacement of crankshaft

(For details, refer to [EC6-1209, "Work Procedure"](#).)

NOTE:

If learning is not performed after the replacement of the above listed parts, the engine may not be able to be started.

Work Procedure

INFOID:000000013844148

1. START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR REFERENCE POSITION LEARNING**With CONSULT**

1. Turn ignition switch ON.
2. On CONSULT screen, select All DTC Reading and check that any DTC is not detected.
3. Select "ENGINE" >> "Work support" >> "Electric intake valve timing control learning".
4. Touch "Start" and start the engine within 10 seconds.
5. Let the engine be idle.
6. Check that "COMPLETED" is displayed.

Is the learning completed normally?

YES >> END

NO >> Check that DTC is not detected and restart the learning.

3. PERFORM ELECTRIC IVT CONTROL ACTUATOR REFERENCE POSITION LEARNING**Without CONSULT**

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator harness connector (actuator side).
3. Turn ignition switch ON and wait at least 70 seconds.
4. Turn ignition switch OFF.
5. Reconnect the disconnected harness connector.
6. Start engine and let it idle at least 15 seconds.
7. Turn ignition switch OFF.
8. Check and erase DTC.

>> END

TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE DATA INITIALIZATION

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

TURBOCHARGER WASTEGATE CONTROL SOLENOID VALVE DATA INITIALIZATION

Description

INFOID:000000013844149

ECM learns a turbocharger wastegate valve position at every engine start to perform more accurate boost control.

Learning value of turbocharger wastegate valve position must be initialized where the following operations are performed:

- Replacement of turbocharger
- Replacement of ECM

(For details, refer to [EC6-1210, "Work Procedure"](#).)

Work Procedure

INFOID:000000013844150

1. PRECONDITIONING

Check that the engine is cold [coolant temperature: 50 °C (122 °F) or less].

Is the engine cold?

YES >> GO TO 2.

NO >> Park the vehicle at a cold place and cool down the engine. And then, GO TO 2.

2. INITIALIZING A LEARNING VALUE

With CONSULT

1. Start the engine and let it idle at least 10 seconds.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "WASTEGATE ACTUATOR".
3. Operate the actuator from the fully closed position to the fully open position and check that actual value is within the range of (- 0.00052) – (+ 0.00052) m when the target value is set at 0 m.

>> END

ENGINE OIL DATA RESET

Description

INFOID:000000013844151

The oil control system allows calculating the remaining distance to drive before oil change request. The engine oil data reset must be performed after engine oil is changed. (For details, refer to [EC6-1211, "Work Procedure"](#).)

CAUTION:

Never reset data except when changing engine oil.

NOTE:

Data cannot be reset until the vehicle travels 10 km (6.2 mile) from the previous data reset.

Work Procedure

INFOID:000000013844152

1. START

1. Turn ignition switch ON.
2. Check information display of the combination meter.

Is Distance to Engine Oil Change displayed?

- YES >> GO TO 3.
- NO >> GO TO 2.

2. SELECT OIL CONTROL SYSTEM MODE

Push the Display next switch and select oil control system mode.

- >> GO TO 3.

3. RESET ENGINE OIL DATA

1. Press and hold the Display Next switch at least 1 second while Distance to Engine Oil Change is displayed.
2. Stop pressing the Display Next switch, and a few seconds later, check that the value of Distance to Engine Oil Change is reset.

- >> END

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FUEL PRESSURE CHECK

Work Procedure

INFOID:000000013844153

FUEL PRESSURE RELEASE

1. FUEL PRESSURE RELEASE

① With CONSULT

1. Turn ignition switch ON.
2. Select ENGINE using CONSULT.
3. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.

② Without CONSULT

1. Remove fuel pump fuse.

NOTE:

- For the fuse number, refer to [EC6-1157, "Wiring Diagram"](#).
- For the fuse arrangement, refer to [PG-196, "Fuse, Connector and Terminal Arrangement"](#).

2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

>> INSPECTION END

LOW 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.

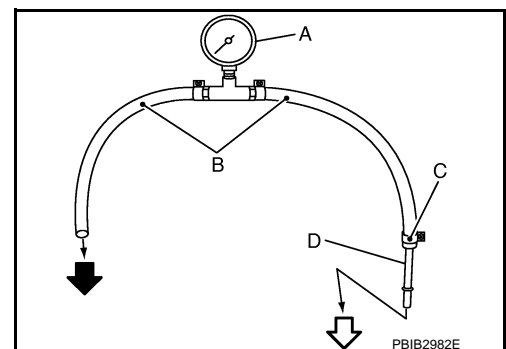
NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because this models do not have fuel return system.

1. FUEL PRESSURE CHECK

1. Release fuel pressure to zero.
2. 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 fuel tube (engine side)
 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 CHECK

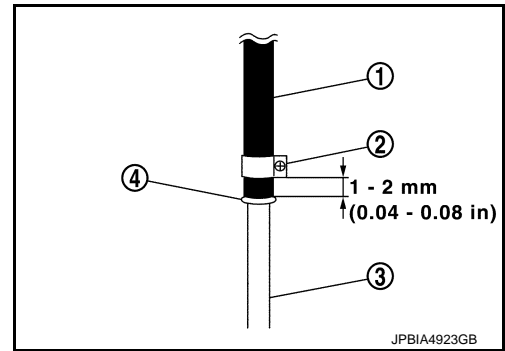
[VR30DDTT FOR MEXICO]

< BASIC INSPECTION >

4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) (3) 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: 1.0 - 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 high pressure fuel pump does not come off.

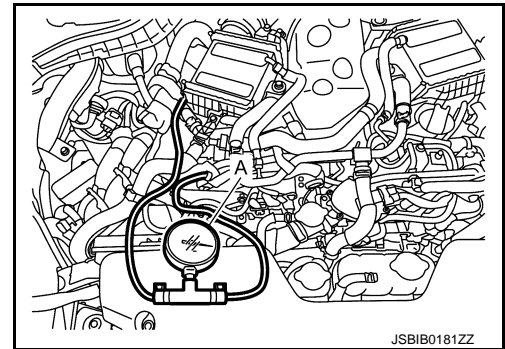
5. Connect fuel tube adapter to quick connector.

A :Fuel pressure gauge

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 (5.0 bar, 5.1 kg/cm², 73 psi)

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 2.

2.CHECK FUEL HOSES

Check the following.

- Fuel hoses for clogging
- Fuel filter for clogging
- 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.

HIGH FUEL PRESSURE CHECK

NOTE:

Since the fuel pressure gauge kit cannot be connected, follow the method shown below to check high fuel pressure.

Ⓜ WITH CONSULT

1. Start engine.
2. Check "FUEL PRES SEN" in "DATA MONITOR" mode with CONSULT.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Idle	0.73 – 1.0 V
	Revvng engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

FUEL PRESSURE CHECK

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< BASIC INSPECTION >

⊗ WITHOUT CONSULT

1. Start the engine.
2. Check fuel rail pressure sensor signal voltage.

+		-	Condition	Value (Approx.)
Fuel rail pressure sensor				
Connector	Terminal			
F137	2	Ground	Engine speed: idle	0.73 – 1.0 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

HOW TO SET SRT CODE

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

HOW TO SET SRT CODE

Description

INFOID:000000013844154

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)	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	Three way catalyst function	P0420, P0430
HO2S	Air fuel ratio (A/F) sensor 1	P014C, P014D, P014E, P014F
	Air fuel ratio (A/F) sensor 1	P0130, P0150
	Heated oxygen sensor 2	P0138, P0158
	Heated oxygen sensor 2	P0137, P0157
EGR/VVT SYSTEM	Intake valve timing control function	P0011, P0021
	Exhaust valve timing control function	P0014, P0024

*1: Though displayed on the CONSULT screen, "HO2S HTR" is not SRT item.

SRT SERVICE PROCEDURE

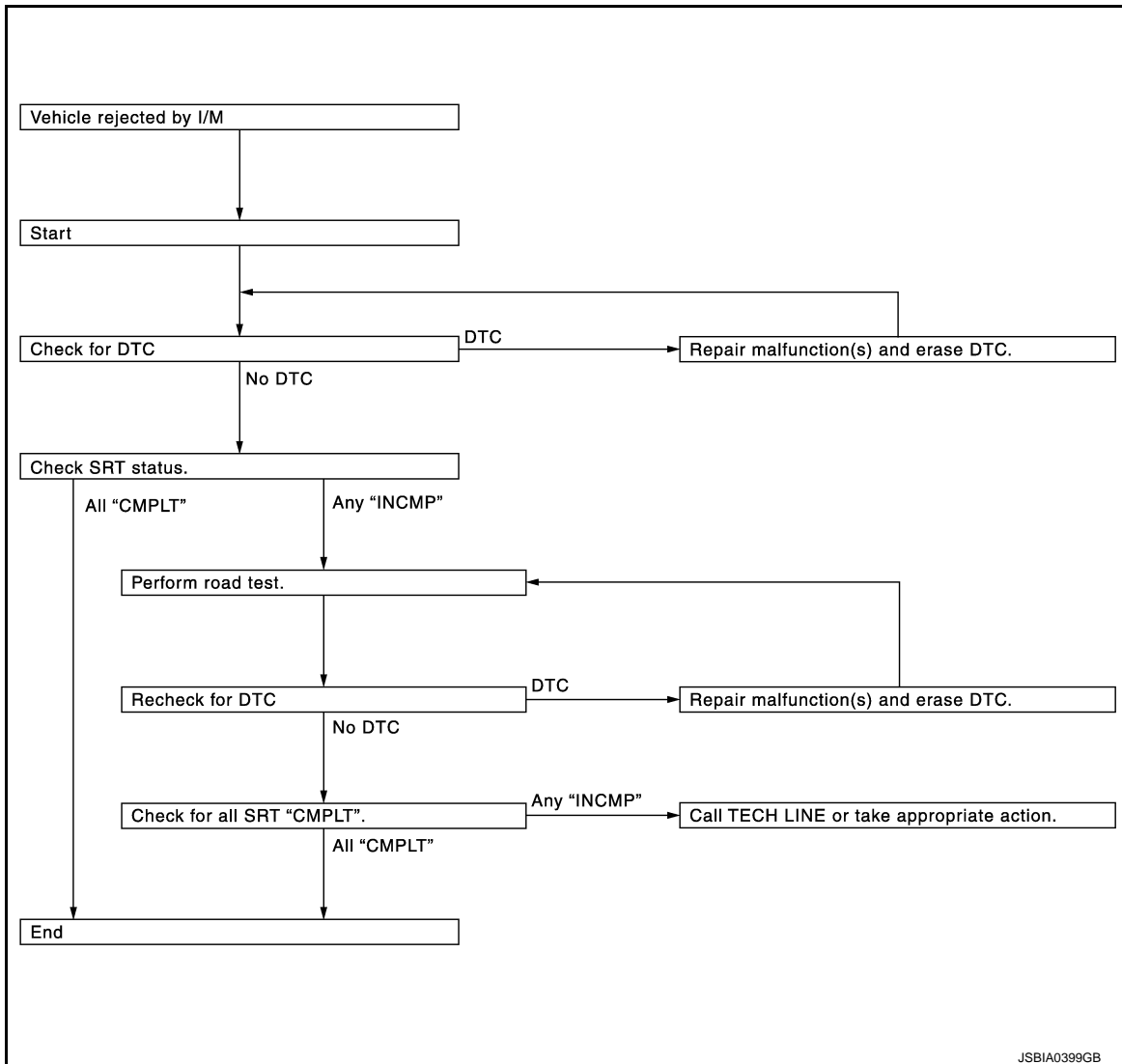
If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence, referring to the following flowchart.

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HOW TO SET SRT CODE

< BASIC INSPECTION >

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SRT Set Driving Pattern

INFOID:000000013844155

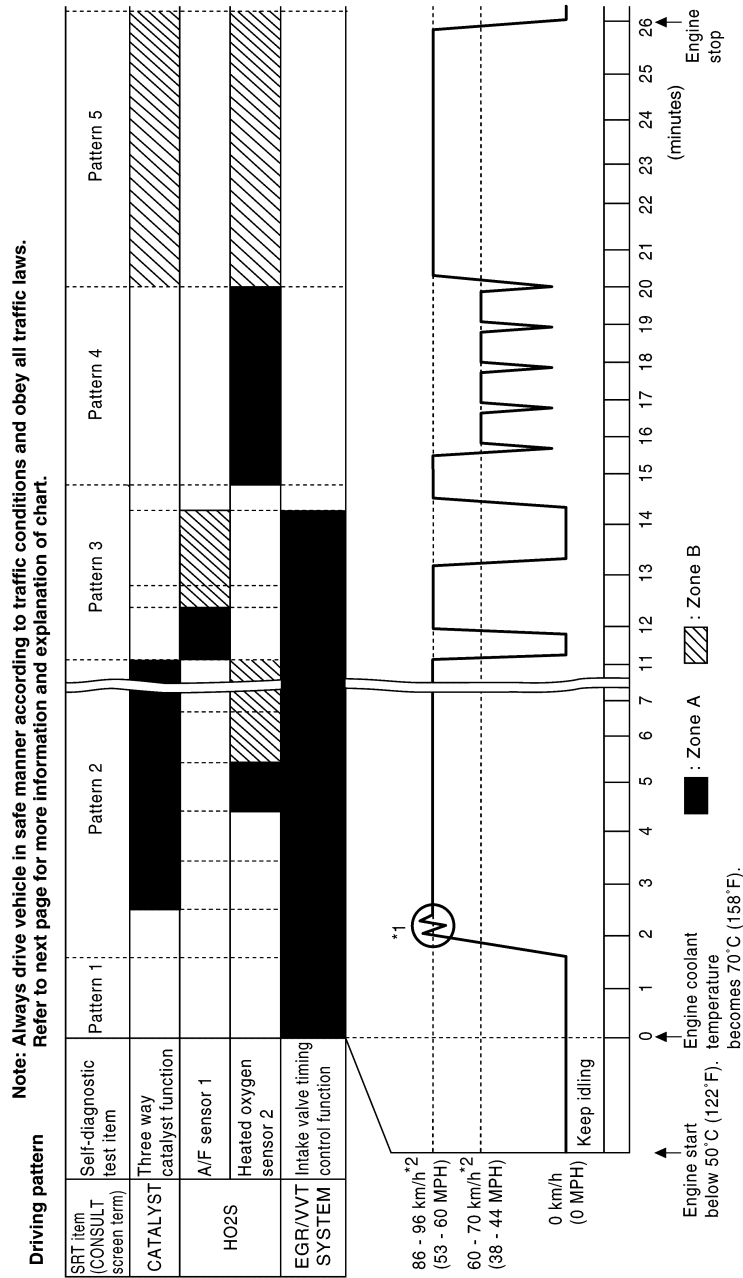
CAUTION:

HOW TO SET SRT CODE

< BASIC INSPECTION >

[VR30DDTT FOR MEXICO]

Always drive the vehicle in safe manner according to traffic conditions and obey all traffic laws.



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*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 refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.

HOW TO SET SRT CODE

[VR30DDTT FOR MEXICO]

< BASIC INSPECTION >

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
 - Flat road
 - Ambient air temperature: 20 - 30°C (68 - 86°F)
 - Diagnosis is performed as quickly as possible under normal conditions.
- Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Work Procedure

INFOID:000000013844156

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to [EC6-1139, "DTC Index"](#).

NO >> GO TO 2.

2. CHECK SRT STATUS

WITH CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

WITHOUT CONSULT

Perform "SRT status" mode with [EC6-1091, "On Board Diagnosis Function"](#).

WITH GST

Select Service \$01 with GST.

Is SRT code(s) set?

YES >> GO TO 10.

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 4.

3. DTC CONFIRMATION PROCEDURE

1. Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT.
2. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to [EC6-1215, "Description"](#).
3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to [EC6-1139, "DTC Index"](#).

NO >> GO TO 10.

4. PERFORM ROAD TEST

- Check the "Performance Priority" in the "SRT ITEM" table. Refer to [EC6-1215, "Description"](#).
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to [EC6-1216, "SRT Set Driving Pattern"](#).

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5. PATTERN 1

1. Check the vehicle condition;
 - Engine coolant temperature is -10 to 35°C (14 to 95°F).
 - Fuel tank temperature is more than 0°C (32°F).
2. Start the engine.
3. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:

ECM terminal voltage is follows;

- Engine coolant temperature
 - -10 to 35°C (14 to 95°F): 3.0 - 4.3 V
 - 70°C(158°F): Less than 1.4 V

HOW TO SET SRT CODE

[VR30DDTT FOR MEXICO]

< BASIC INSPECTION >

- Fuel tank temperature: Less than 4.1 V
Refer to [EC6-1107, "Reference Value"](#).

>> GO TO 6.

6.PATTERN 2

1. Drive the vehicle. And depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds.
2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:

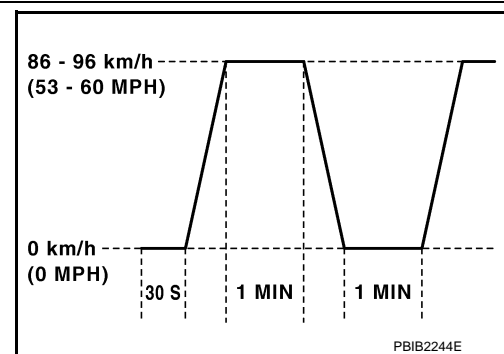
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7.PATTERN 3

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

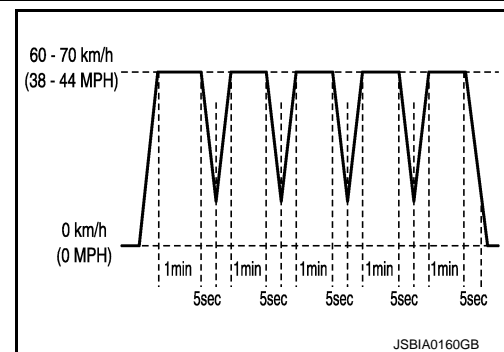
>> GO TO 8.



8.PATTERN 4

- Operate vehicle following the driving pattern shown in the figure.
- Drive the vehicle in a proper gear at 60 km/h (38 MPH) and maintain the speed.
- Release the accelerator pedal fully at least 5 seconds.
- Repeat the above two steps at least 5 times.

>> GO TO 9.



9.PATTERN 5

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 10.

10.CHECK SRT STATUS

WITH CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

WITHOUT CONSULT

Perform "SRT status" mode with [EC6-1091, "On Board Diagnosis Function"](#).

WITH GST

Select Service \$01 with GST.

Is SRT(s) set?

YES >> END

NO >> Call TECH LINE or take appropriate action.

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000013922552

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" in "DATA MONITOR" mode of CONSULT during normal operation of the Engine Control System. When the value in "SPEC" in "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" in "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not illuminate the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1/B2 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:0000000013922553

1. PRECONDITIONING

Make sure that all of the following conditions are satisfied.

TESTING CONDITION

- 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
- After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP 1" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- 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 IN DATA MONITOR MODE

Ⓜ With CONSULT

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

1. Perform [EC6-262. "Work Procedure"](#).
2. Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2", "MAS A/F SE-B1" and "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode with CONSULT.
3. Make sure that monitor items are within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
 NO >> Proceed to [EC6-1221. "Diagnosis Procedure"](#).

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

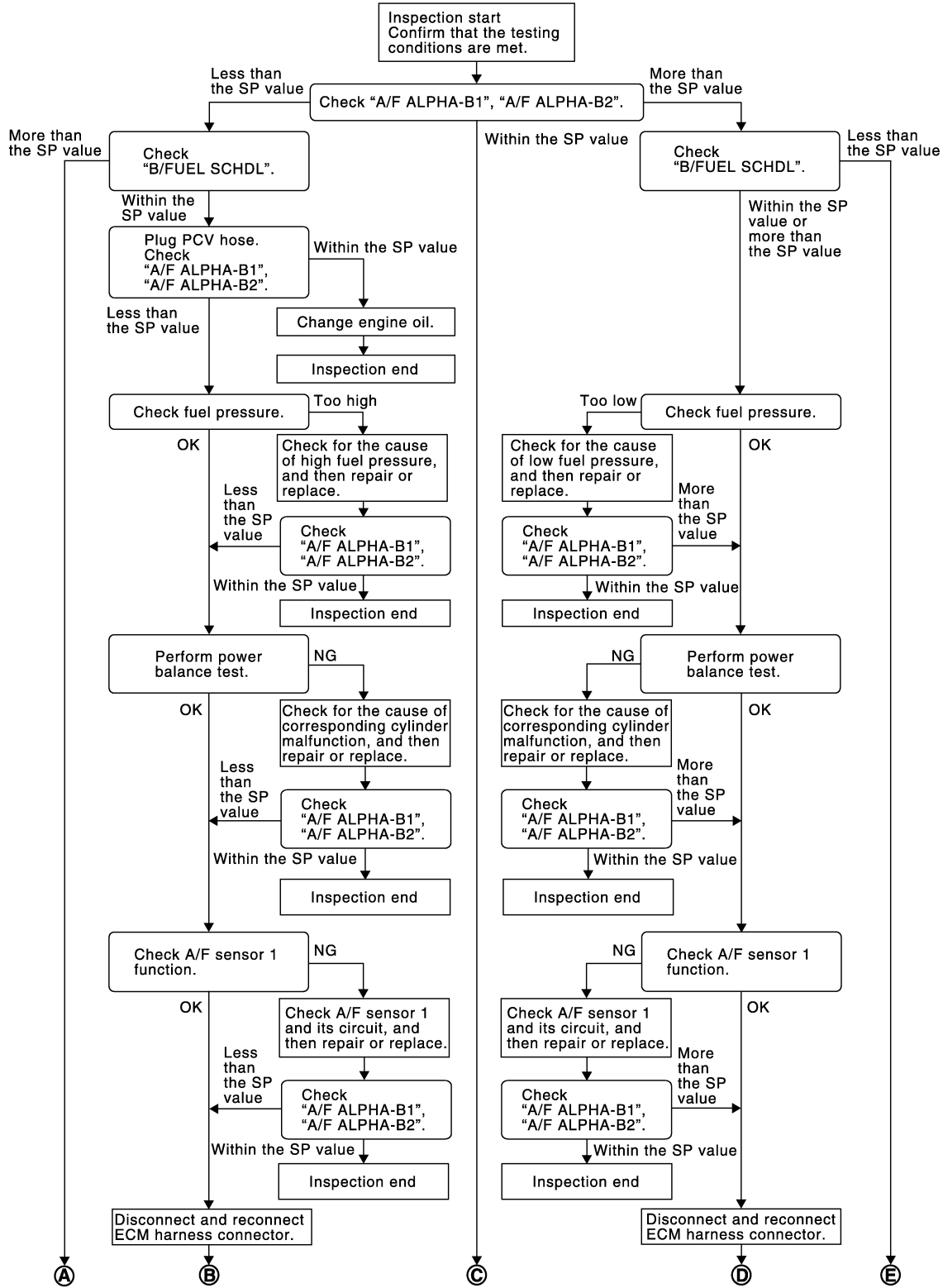
< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Diagnosis Procedure

INFOID:000000013922554

OVERALL SEQUENCE



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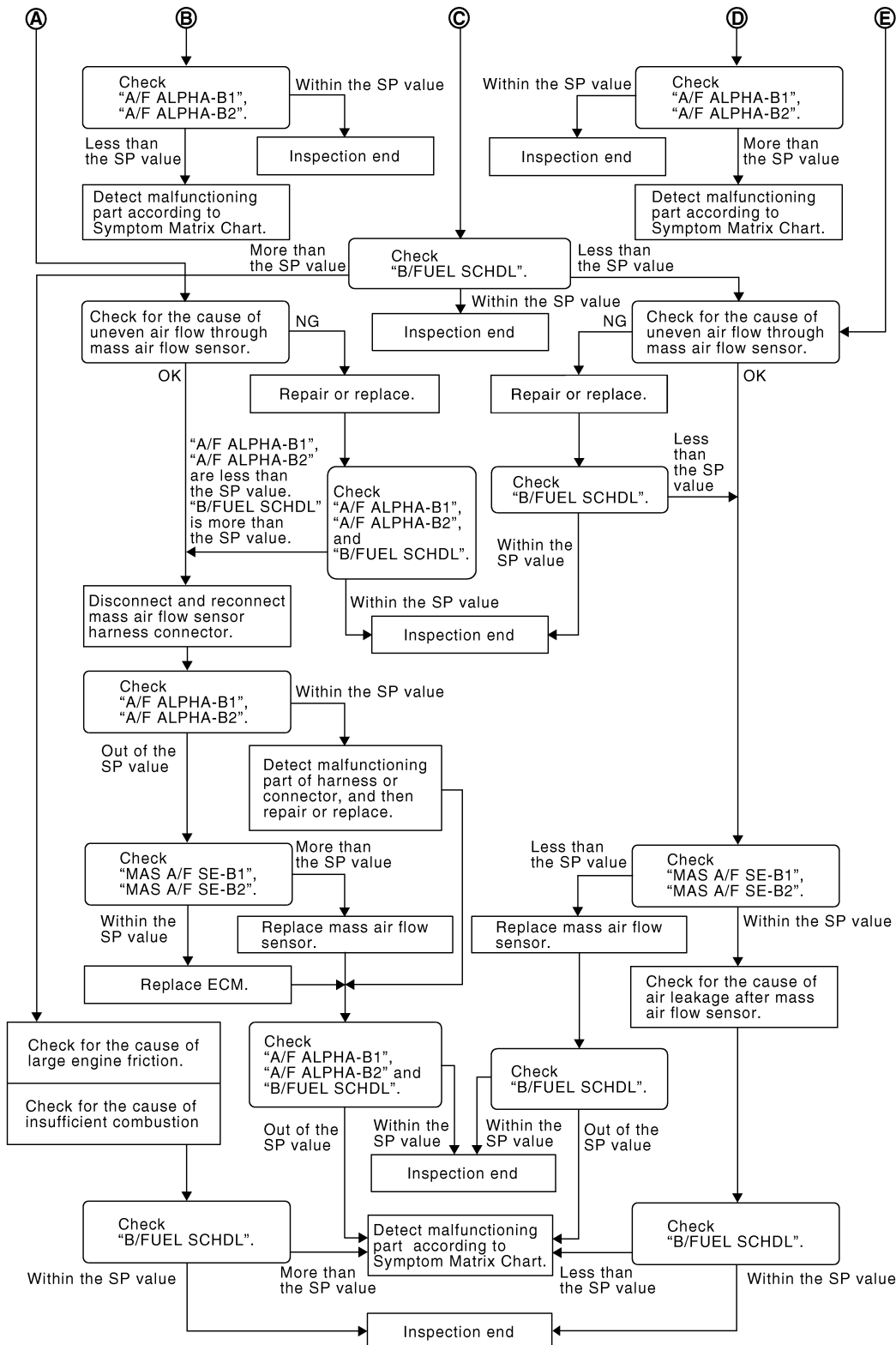
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TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]



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DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

ⓑ With CONSULT

1. Start engine.
2. Confirm that the testing conditions are met. Refer to [EC6-1220, "Component Function Check"](#).
3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NOTE:

Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

YES >> GO TO 17.

NO-1 >> Less than the SP value: GO TO 2.

NO-2 >> More than the SP value: GO TO 3.

2.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.

NO >> More than the SP value: GO TO 19.

3.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.

NO-1 >> More than the SP value: GO TO 6.

NO-2 >> Less than the SP value: GO TO 25.

4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Stop the engine.

2. Disconnect PCV hose, and then plug it.

3. Start engine.

4. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> GO TO 5.

NO >> GO TO 6.

5.CHANGE ENGINE OIL

1. Stop the engine.

2. Change engine oil. Refer to [LU-27, "Inspection"](#).

NOTE:

This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving conditions.

>> INSPECTION END

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to [EC6-279, "Work Procedure"](#).)

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO-2 >> Fuel pressure is too low: GO TO 7.

7.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO >> Repair or replace and then GO TO 8.

8.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> GO TO 9.

9.PERFORM POWER BALANCE TEST

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

- YES >> GO TO 12.
NO >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following bellow.

- Ignition coil and its circuit (Refer to [EC6-1736. "Component Function Check".](#))
- Fuel injector and its circuit (Refer to [EC6-1724. "Component Function Check".](#))
- Intake air leakage
- Low compression pressure (Refer to [EM-150. "Inspection".](#))

Is the inspection result normal?

- YES >> Replace fuel injector and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> GO TO 12.

12.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.

- For DTC P0130, P0150, refer to [EC6-1307. "DTC Description".](#)
- For DTC P0131, P0151, refer to [EC6-1311. "DTC Description".](#)
- For DTC P0132, P0152, refer to [EC6-1314. "DTC Description".](#)
- For DTC P014C, P014D, P014E, P014F, refer to [EC6-1331. "DTC Description".](#)

Are any DTCs detected?

- YES >> GO TO 13.
NO >> GO TO 15.

13.CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnosis Procedure according to corresponding DTC.

>> GO TO 14.

14.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> GO TO 15.

15.DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

>> GO TO 16.

16.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 [EC6-1002, "Symptom Table"](#).

17.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO-1 >> More than the SP value: GO TO 18.

NO-2 >> Less than the SP value: GO TO 25.

18.DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
 - Engine oil level is too high
 - Engine oil viscosity
 - Belt tension of power steering, alternator, A/C compressor, etc. is excessive
 - Noise from engine
 - Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
 - Valve clearance malfunction
 - Intake valve timing control function malfunction
 - Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.

NO >> Repair or replace malfunctioning part, and then GO TO 20.

20.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1", "A/F ALPHA-B2" are less than the SP value: GO TO 21.

21.DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

22.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" 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 >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to [EC6-1286, "Diagnosis Procedure"](#). Then GO TO 29.

NO >> GO TO 23.

23.CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"

Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace malfunctioning mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

1. Replace ECM.
2. Proceed to [EC6-267, "Work Procedure"](#).

>> GO TO 29.

25.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal in air cleaner element
- Uneven dirt in air cleaner element
- Improper specification in intake air system

Is the inspection result normal?

YES >> GO TO 27.

NO >> Repair or replace malfunctioning part, and then GO TO 26.

26.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Less than the SP value: GO TO 27.

27.CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"

Select "MAS A/F SE-B1", "MAS A/F SE-B2" 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 >> GO TO 28.

NO >> Less than the SP value: Replace malfunctioning mass air flow sensor, and then GO TO 30.

28.CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks in PCV valve
- Disconnection or cracks in EVAP purge hose, stuck open EVAP canister purge volume control solenoid valve
- Malfunctioning seal in rocker cover gasket
- Disconnection, looseness, or cracks in hoses, such as a vacuum hose, connecting to intake air system parts
- Malfunctioning seal in intake air system, etc.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

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>> GO TO 30.

29.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and 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 [EC6-1002. "Symptom Table"](#).

30.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to [EC6-1002. "Symptom Table"](#).

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

POWER SUPPLY AND GROUND CIRCUIT

ECM

ECM : Diagnosis Procedure

INFOID:0000000013922555

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
IPDM E/R	#46	10A
	#47	10A
	#49	15A
	#64	10A

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> GO TO 2.

2. CHECK GROUND CONNECTION

Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK ECM GROUND CIRCUIT

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

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 IGNITION SWITCH SIGNAL

Check the voltage between ECM harness connectors as follows.

POWER SUPPLY AND GROUND CIRCUIT

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[VR30DDTT FOR MEXICO]

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
E152	185	204	Ignition switch: ON	Battery voltage
			Ignition switch: OFF	0 V

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK IGNITION SWITCH SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connectors.
- Disconnect IPDM E/R harness connector.
- Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E123	55	E152	185	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

6. CHECK ECM POWER SUPPLY

- Reconnect ECM harness connectors.
- Check the voltage between ECM harness connector terminals as follows.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
E152	197	204	Ignition switch: ON	Battery voltage
			<ul style="list-style-type: none"> Ignition switch: OFF More than a few seconds after turning ignition switch OFF 	0 V

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F142	91	E152	204	Ignition switch: ON	Battery voltage
	145			<ul style="list-style-type: none"> Ignition switch: OFF More than a few seconds after turning ignition switch OFF 	0 V

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 7.

7. CHECK ECM POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connectors.
- Disconnect IPDM E/R harness connector.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E120	13	F142	91	Existed
			145	
E123	59	E152	197	

5. 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.

8. CHECK ECM RELAY CONTROL SIGNAL

1. Reconnect ECM harness connectors.
2. Reconnect IPDM E/R harness connectors.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Check the voltage between ECM harness connectors as follows.

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F142	125	E152	204	<ul style="list-style-type: none">• Ignition switch: OFF• A few seconds after turning ignition switch OFF	0 – 1.0 V
				<ul style="list-style-type: none">• Ignition switch: OFF• More than a few seconds after turning ignition switch OFF	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. CHECK ECM RELAY CONTROL SIGNAL CIRCUIT

1. Disconnect ECM harness connectors.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E124	72	F142	125	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace error-detected parts.

10. CHECK POWER SUPPLY CIRCUIT

Perform trouble diagnosis for power supply circuit.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

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11. CHECK ECM POWER SUPPLY (BACK-UP)

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connectors as follows.

ECM				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
F142	170	E152	204	Ignition switch: OFF	Battery voltage

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).
NO >> GO TO 12.

12. CHECK ECM POWER SUPPLY (BACK-UP) CIRCUIT

1. Disconnect ECM harness connectors.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E123	58	F142	170	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure

INFOID:000000013922556

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse (No. 49) from IPDM E/R.
3. Check that 15A fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> GO TO 2.

2. CHECK FUSIBLE LINK

1. Turn ignition switch OFF.
2. Check that the following fusible link is not blowing.

Location	Fuse No.	Capacity
Fuse and fusible link holder-1	#V	50A
	#W	50A

Is the fusible link blown (open)?

- YES >> Replace the fuse. [Check the power supply if fusible link is blown (open) again.]
NO >> GO TO 3.

3. CHECK GROUND CONNECTION

Check ground connection E138. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

POWER SUPPLY AND GROUND CIRCUIT

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC INTAKE VALVE TIMING CONTROL MODULE GROUND CIRCUIT

1. Disconnect electric intake valve timing control module harness connectors.
2. Check the continuity between electric intake valve timing control module harness connector and ground.

+		-	Continuity
Electric intake valve timing control module			
Connector	Terminal		
E154	41	Ground	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 ELECTRIC INTAKE VALVE TIMING CONTROL MODULE POWER SUPPLY

1. Reconnect electric intake valve timing control module harness connectors.
2. Check the voltage between electric intake valve timing control module harness connector terminals as follows.

Electric intake valve timing control module			Voltage
Connector	+	-	
	Terminal		
E154	39	41	Battery voltage
	40		

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Perform trouble diagnosis for power supply circuit.

6. CHECK IGNITION SWITCH SIGNAL

Check the voltage between electric intake valve timing control module harness connectors as follows.

Electric intake valve timing control module				Condition	Voltage
+		-			
Connector	Terminal	Connector	Terminal		
E153	28	E154	41	Ignition switch: ON	Battery voltage
				Ignition switch: OFF	0 V

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).
- NO >> GO TO 7.

7. CHECK IGNITION SWITCH SIGNAL

1. Turn ignition switch OFF.
2. Disconnect electric intake valve timing control module harness connectors.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and electric intake valve timing control module harness connector.

POWER SUPPLY AND GROUND CIRCUIT

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+		-		Continuity
IPDM E/R		Electric intake valve timing control module		
Connector	Terminal	Connector	Terminal	
E123	55	E153	28	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

FUEL PUMP CONTROL MODULE (FPCM)

FUEL PUMP CONTROL MODULE (FPCM) : Diagnosis Procedure

INFOID:000000013922557

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse (No. 52) from IPDM E/R.
3. Check that 15A fuse is not blowing.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> GO TO 2.

2. CHECK GROUND CONNECTION

Check ground connection B105. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3. CHECK FPCM GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect FPCM harness connectors.
2. Check the continuity between FPCM harness connector and ground.

+		-	Continuity
FPCM			
Connector	Terminal		
B11	3	Ground	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 FPCM POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between FPCM harness connector terminals.

Connector	FPCM		Voltage
	+	-	
	Terminal		
B11	6	3	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> GO TO 5.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

5. CHECK FPCM POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connectors.
3. Disconnect IPDM E/R harness connectors.
4. Check the continuity between IPDM E/R harness connector and FPCM harness connector.

+		-		Continuity
IPDM E/R		FPCM		
Connector	Terminal	Connector	Terminal	
E120	15	B11	6	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK FUEL PUMP RELAY SIGNAL

1. Reconnect IPDM E/R harness connectors.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connectors.

ECM				Voltage
+		-		
Connector	Terminal	Connector	Terminal	
F142	124	E152	204	0 – 1.0 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. CHECK FUEL PUMP RELAY SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Disconnect IPDM E/R harness connectors.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E124	69	F142	124	Existed

5. 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.

8. CHECK POWER SUPPLY CIRCUIT

Perform trouble diagnosis for power supply circuit.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44. "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

U0101 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

U0101 CAN COMM CIRCUIT

DTC Description

INFOID:000000013922558

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
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.

POSSIBLE CAUSE

CAN communication line between TCM and ECM (CAN communication line is open or shorted)

FAIL-SAFE

Not applicable

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 [EC6-1235, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922559

Proceed to [LAN-41, "Trouble Diagnosis Flow Chart"](#).

U012E ENGINE COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

U012E ENGINE COMMUNICATION

DTC Description

INFOID:000000013922560

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U012E	Communication error (lost) (Lost communication with camshaft position control module)	Internal error of the electric intake valve timing control module is detected.

POSSIBLE CAUSE

- Electric intake valve timing control module
- ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC U012E detected?

- YES >> Proceed to [EC6-1236, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922561

1. CHECK ENGINE COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and electric intake valve timing (IVT) control module harness connector.
3. Check the continuity between ECM harness connector and electric IVT control module harness connector.

U012E ENGINE COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ECM		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
E152	189	E153	19	Existed
	190		12	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.REPLACE ELECTRIC IVT CONTROL MODULE

1. Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

2. Perform DTC confirmation procedure. Refer to [EC6-1236, "DTC Description"](#).

Is DTC U012E detected again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

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U042F ENGINE COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

U042F ENGINE COMMUNICATION

DTC Description

INFOID:000000013922562

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U042F	Communication error (invalid) (Invalid data received from camshaft position control module)	ECM cannot receive a communication signal sent from the electric intake valve timing control module for 0.01 second or more.

POSSIBLE CAUSE

- Harness and connectors
(Engine communication circuit is open or shorted.)
- Electric intake valve timing control module

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC U042F is displayed with U1000, first perform the confirmation procedure (trouble diagnosis) for U1000.
Is DTC U1000 detected?

- YES >> Perform diagnosis for U1000. Refer to [EC6-1240, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 1 second.
2. Check DTC.

Is DTC U042F detected?

- YES >> Proceed to [EC6-1238, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922563

1.CHECK DTC PRIORITY

If DTC U042F is displayed with U1000, first perform the confirmation procedure (trouble diagnosis) for U1000.

U042F ENGINE COMMUNICATION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Is DTC U1000 detected?

YES >> Perform diagnosis for U1000. Refer to [EC6-1240, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK ENGINE COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and electric intake valve timing (IVT) control module harness connector.
3. Check the continuity between ECM harness connector and electric IVT control module harness connector.

ECM		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
E152	189	E153	19	Existed
	190		12	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

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U1000 CAN COMMUNICATION CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

U1000 CAN COMMUNICATION CIRCUIT

DTC Description

INFOID:000000013922564

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1000	CAN COMM CIRCUIT (CAN communication circuit)	Communication signal other than OBD (emission related diagnosis) is not received between electric intake valve timing control module and ECM for 2 seconds or more.

POSSIBLE CAUSE

- Harness or connectors (Engine communication line is open or shorted)
- ECM
- Electric intake valve timing control module

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC U1000 is displayed with DTC P0607, first perform the confirmation procedure (trouble diagnosis) for DTC P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1429, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1240, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922565

1.CHECK DTC PRIORITY

If DTC U1000 is displayed with DTC P0607, first perform the confirmation procedure (trouble diagnosis) for DTC P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1429, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK ENGINE COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect electric intake valve timing control module harness connector.
4. Check the continuity between ECM harness connector and electric intake valve timing control module harness connector.

U1000 CAN COMMUNICATION CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ECM		Electric intake valve timing control module		Continuity
Connector	Terminal	Connector	Terminal	
E152	189	E153	19	Existed
	190		12	

5. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTERMITTENT INCIDENT

Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.REPLACE ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

Replace electric intake valve timing control module. Refer to [EC6-1015, "Removal and Installation"](#).

>> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Erase DTC.
4. Perform DTC Confirmation Procedure.
See [EC6-1240, "DTC Description"](#).
5. Check DTC.

Is the DTC U1000 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.REPLACE ECM

Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

>> INSPECTION END

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U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

U1001 CAN COMM CIRCUIT

DTC Description

INFOID:000000013922566

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1001	CAN COMM CIRCUIT (CAN communication circuit)	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted)

FAIL-SAFE

Not applicable

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 [EC6-1242, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922567

Proceed to [LAN-41, "Trouble Diagnosis Flow Chart"](#).

P0010 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0010 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:0000000013922568

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0010	A camshaft position actuator B1 ["A" camshaft position actuator control circuit/open bank 1]	The electric intake valve timing control module detects internal power stage malfunction.

POSSIBLE CAUSE

- Electric intake valve timing (IVT) control module
- Electric intake valve timing (IVT) control module power supply

FAIL-SAFE

Fail safe mode	Vehicle behavior
Combustion control mode	Stratified charge combustion control at starting or Listed below: <ul style="list-style-type: none">• Idle speed control• Recovery speed control at decelerating
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)

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 when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P0010 detected?

- YES >> Proceed to [EC6-1243, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922569

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 2.

P0010 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> Repair or replace error-detected parts.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.

2. Perform DTC confirmation procedure. Refer to [EC6-1245, "DTC Description"](#).

Is DTC P0010 detected again?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P0011 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0011 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:000000013922570

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0011	INT/V TIM CONT-B1 [Intake valve timing control performance (bank 1)]	A	When the absolute difference between target angle and actual angle is more than 13 degree (camshaft angle) for 6 seconds under the following conditions. <ul style="list-style-type: none"> Ignition switch: ON Engine speed: 1,200 – 3,175 rpm Engine coolant temperature: 60 – 120°C (140 – 248°F) Battery voltage: 11 – 16 V
		B	When the absolute difference between valve timing control reference position and base angle is more than 13 degree (camshaft angle) for 3 seconds under the following conditions. <ul style="list-style-type: none"> Ignition switch: ON Engine speed: 500 – 2,000 rpm [when vehicle speed is less than 4 km/h (2.5 MPH)] Engine speed: 1,200 – 2,000 rpm [when vehicle speed is 4 km/h (2.5 MPH) or more] Engine coolant temperature: 60 – 120°C (140 – 248°F) Battery voltage: 11 – 16 V

POSSIBLE CAUSE

- A**
- Electric intake valve timing (IVT) control actuator (bank 1)
 - Harness and connectors (Electric IVT control actuator (bank 1) motor control circuit is open or shorted.)
 - Foreign matter caught at the electric IVT control actuator (bank 1)
- B**
- Timing chain installation
 - Intake camshaft sprocket (bank 1) wear

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle. When VTC mechanism sticks, camshaft position does not change from position of stuck angle.)

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

P0011 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ⓑ With CONSULT

1. On CONSULT screen, select "DATA MONITOR" mode.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 10 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

4. Let engine idle for 10 seconds.
5. Check DTC.

Is DTC P0011 detected?

- YES >> Proceed to [EC6-1252, "Diagnosis Procedure"](#)
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

ⓑ With CONSULT

1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

2. Check DTC.

Is DTC P0011 detected?

- YES >> Proceed to [EC6-1252, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:00000001392571

TYPE A

1. CHECK ELECTRIC IVT CONTROL ACTUATOR MOTOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control actuator (bank 1). Refer to [EM-238, "Exploded View"](#).
NO >> Repair or replace error-detected parts.

P0011 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

TYPE B

1. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to [EM-238, "Exploded View"](#).

NO >> GO TO 2.

2. CHECK CAMSHAFT SPROCKET AND TIMING CHAIN

Check the following.

1. Visually check for chipping camshaft sprocket (bank 1) gear tooth.
2. timing chain tension and elongation.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

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P0014, P0024 EVT CONTROL

DTC Description

INFOID:000000013922572

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0014	EXH/V TIM CONT-B1 ("B" camshaft position - timing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.
P0024	EXH/V TIM CONT-B2 ("B" camshaft position - timing over-advanced or system performance bank 2)	

POSSIBLE CAUSE

- Crankshaft position sensor
- 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

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle. When VTC mechanism sticks, camshaft position does not change from position of stuck angle.)

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0014 or P0024 is displayed with DTC P0078 or P0084, first perform the confirmation procedure (trouble diagnosis) for DTC P0078 or P0084.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0078: Refer to [EC6-1266, "DTC Description"](#).
 - DTC P0084: Refer to [EC6-1266, "DTC Description"](#).
- NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.


1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE - 1

 With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to the normal operating temperature.

P0014, P0024 EVT CONTROL

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

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

4. Let engine idle for 10 seconds.

5. Check 1st trip DTC.

 With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1249, "Diagnosis Procedure"](#)

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE - 2

 With CONSULT

1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,200 – 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

2. Check 1st trip DTC.

 With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1249, "Diagnosis Procedure"](#)

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922573

1.CHECK DTC PRIORITY

If DTC P0014 or P0024 is displayed with DTC P0078 or P0084, first perform the confirmation procedure (trouble diagnosis) for DTC P0078 or P0084.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC P0078: Refer to [EC6-1266, "DTC Description"](#).
- DTC P0084: Refer to [EC6-1266, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK OIL PRESSURE WARNING

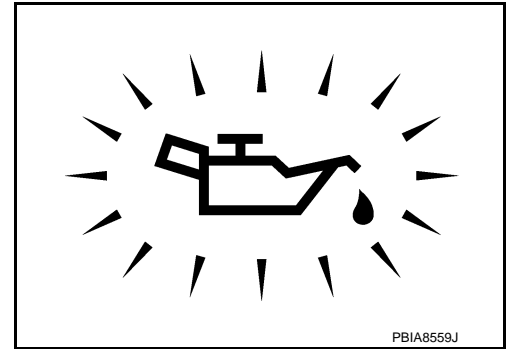
1. Start engine.

< DTC/CIRCUIT DIAGNOSIS >

2. Check oil pressure warning and confirm it is not displayed.

Is oil pressure warning displayed?

- YES >> Check the engine oil level. Refer to [LU-27. "Inspection"](#).
- NO >> GO TO 3.



3. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to [EC6-1267. "Component Inspection \(Exhaust Valve Timing Control Solenoid Valve\)"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View"](#).

4. CHECK CRANKSHAFT POSITION SENSOR

Check the crankshaft position sensor. Refer to [EC6-1382. "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace crankshaft position sensor. Refer to [EM-198. "Exploded View"](#).

5. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to [EC6-1391. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace malfunctioning exhaust valve timing control position sensor. Refer to [EM-250. "Exploded View"](#).

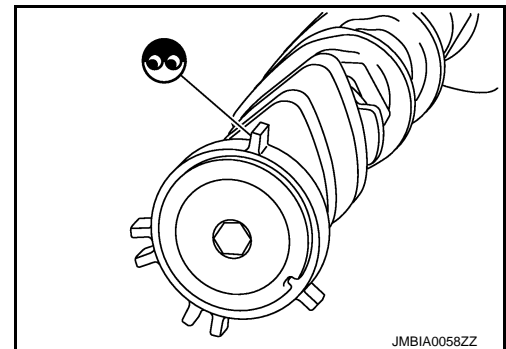
6. CHECK CAMSHAFT (EXH)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to [EM-250. "Exploded View"](#).



7. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

- YES >> Check timing chain installation. Refer to [EM-238. "Exploded View"](#).
- NO >> GO TO 8.

8. CHECK LUBRICATION CIRCUIT

Refer to [EM-255. "Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END.

NO >> Clean lubrication line.

Component Inspection (Exhaust Valve Timing Control Solenoid Valve)

INFOID:000000013922574

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE - 1

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control solenoid valve harness connector.
3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following.

Exhaust valve timing control solenoid valve		Condition		Resistance
+	-			
Terminal				
1	2			7.0 – 7.8 Ω
1	Ground	Temperature	20°C (68°F)	∞ (Continuity should not exist)
2				

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View"](#).

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE - 2

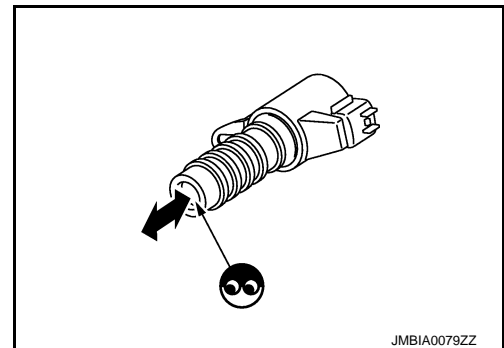
1. Remove exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View"](#).
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve.

NOTE:

Always replace O-ring when exhaust valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238. "Exploded View"](#).

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P0020 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0020 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:000000013922575

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0020	A camshaft position actuator B2 ["A" camshaft position actuator control circuit/open bank 2]	The electric intake valve timing control module detects internal power stage malfunction.

POSSIBLE CAUSE

- Electric intake valve timing (IVT) control module
- Electric intake valve timing (IVT) control module power supply

FAIL-SAFE

Fail safe mode	Vehicle behavior
Combustion control mode	Stratified charge combustion control at starting or Listed below: <ul style="list-style-type: none">• Idle speed control• Recovery speed control at decelerating
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.)

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 when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P0020 detected?

- YES >> Proceed to [EC6-1252, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922576

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 2.

P0020 INTAKE VALVE TIMING CONTROL

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.

2. Perform DTC confirmation procedure. Refer to [EC6-1252, "DTC Description"](#).

Is DTC P0020 detected again?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

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P0021 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0021 INTAKE VALVE TIMING CONTROL

DTC Description

INFOID:000000013922577

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0021	INT/V TIM CONT-B2 [Intake valve timing control performance (bank 2)]	A	When the absolute difference between target angle and actual angle is more than 13 degree (camshaft angle) for 6 seconds under the following conditions. <ul style="list-style-type: none"> Ignition switch: ON Engine speed: 1,200 – 3,175 rpm Engine coolant temperature: 60 – 120°C (140 – 248°F) Battery voltage: 11 – 16 V
		B	When the absolute difference between valve timing control reference position and base angle is more than 13 degree (camshaft angle) for 3 seconds under the following conditions. <ul style="list-style-type: none"> Ignition switch: ON Engine speed: 500 – 2,000 rpm [when vehicle speed is less than 4 km/h (2.5 MPH)] Engine speed: 1,200 – 2,000 rpm [when vehicle speed is 4 km/h (2.5 MPH) or more] Engine coolant temperature: 60 – 120°C (140 – 248°F) Battery voltage: 11 – 16 V

POSSIBLE CAUSE

- A
- Electric intake valve timing (IVT) control actuator (bank 2)
 - Harness and connectors [Electric IVT control actuator (bank 2) motor control circuit is open or shorted.]
 - Foreign matter caught at the electric IVT control actuator (bank 2)

- B
- Timing chain installation
 - Intake camshaft sprocket (bank 2) wear

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle. When VTC mechanism sticks, camshaft position does not change from position of stuck angle.)

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

P0021 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

With CONSULT

1. On CONSULT screen, select "DATA MONITOR" mode.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 10 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

4. Let engine idle for 10 seconds.
5. Check DTC.

Is DTC P0021 detected?

- YES >> Proceed to [EC6-1255, "Diagnosis Procedure"](#)
 NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

2. Check DTC.

Is DTC P0021 detected?

- YES >> Proceed to [EC6-1255, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922578

TYPE A

1.CHECK ELECTRIC IVT CONTROL ACTUATOR MOTOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F145	1	E153	4	Existed
	2		6	
	3		2	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control actuator (bank 2). Refer to [EM-238, "Exploded View"](#).
 NO >> Repair or replace error-detected parts.

P0021 INTAKE VALVE TIMING CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

TYPE B

1. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to [EM-238. "Exploded View"](#).

NO >> GO TO 2.

2. CHECK CAMSHAFT SPROCKET AND TIMING CHAIN

Check the following.

1. Visually check for chipping camshaft sprocket gear tooth.
2. timing chain tension and elongation.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

DTC Description

INFOID:000000013922582

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0031	A/F SEN1 HTR (B1) (HO2S heater control circuit low bank 1 sensor 1)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)
P0032	A/F SEN1 HTR (B1) (HO2S heater control circuit high bank 1 sensor 1)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)
P0051	A/F SEN1 HTR (B2) (HO2S heater control circuit low bank 2 sensor 1)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)
P0052	A/F SEN1 HTR (B2) (HO2S heater control circuit high bank 2 sensor 1)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)

POSSIBLE CAUSE

DTC P0031

- Harness or connectors [The A/F sensor 1 heater (bank 1) circuit is open or shorted.]
- A/F sensor 1 heater (bank 1)

DTC P0032

- Harness or connectors [The A/F sensor 1 heater (bank 1) circuit is shorted.]
- A/F sensor 1 heater (bank 1)

DTC P0051

- Harness or connectors [The A/F sensor 1 heater (bank 2) circuit is open or shorted.]
- A/F sensor 1 heater (bank 2)

DTC P0052

- Harness or connectors [The A/F sensor 1 heater (bank 2) circuit is shorted.]
- A/F sensor 1 heater (bank 2)

FAIL-SAFE

Not applicable

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 10.5 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1258, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922583

1. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT - 1

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.

DTC	+			-	Voltage
	A/F sensor 1				
	Bank	Connector	Terminal		
P0031, P0032	1	F133	1	Ground	Battery voltage
P0051, P0052	2	F134	1		

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 4.

2. CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	+			-		Continuity
	A/F sensor 1			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0031, P0032	1	F133	2	F142	94	Existed
P0051, P0052	2	F134	2		151	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK A/F SENSOR 1 HEATER

Check A/F sensor 1 heater. Refer to [EC6-1259, "Component Inspection \(A/F Sensor 1 Heater\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning A/F sensor 1. Refer to [EM-231, "Exploded View"](#).

4. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT - 2

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and A/F sensor 1 harness connector.

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0031, P0032	E123	52	F133	1	Existed
P0051, P0052			F134	1	

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

Component Inspection (A/F Sensor 1 Heater)

INFOID:000000013922584

1. CHECK A/F SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as follows.

A/F sensor 1		Condition		Resistance		
+	-					
Terminal		Temperature	25°C (77°F)	∞ (Continuity should not exist)		
1	2				1.80 – 2.44 Ω	
	3					
	4					
2	3					
	4					
3	4					

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning A/F sensor 1. Refer to [EM-231, "Exploded View"](#).

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P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0037, P0038, P0057, P0058 HO2S2 HEATER

DTC Description

INFOID:000000013922585

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0037	HO2S2 HTR (B1) (HO2S heater control circuit low bank 1 sensor 2)	<ul style="list-style-type: none">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.)ECM detects the heated oxygen sensor 2 heater circuit is short to ground.
P0038	HO2S2 HTR (B1) (HO2S heater control circuit high bank 1 sensor 2)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)
P0057	HO2S2 HTR (B2) (HO2S heater control circuit low bank 2 sensor 2)	<ul style="list-style-type: none">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.)ECM detects the heated oxygen sensor 2 heater circuit is short to ground.
P0058	HO2S2 HTR (B2) (HO2S heater control circuit high bank 2 sensor 2)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)

POSSIBLE CAUSE

DTC P0037

- Harness or connectors [The heated oxygen sensor 2 heater (bank 1) circuit is open or shorted.]
- Heated oxygen sensor 2 heater (bank 1)

DTC P0038

- Harness or connectors [The heated oxygen sensor 2 heater (bank 1) circuit is shorted.]
- Heated oxygen sensor 2 heater (bank 1)

DTC P0057

- Harness or connectors [The heated oxygen sensor 2 heater (bank 2) circuit is open or shorted.]
- Heated oxygen sensor 2 heater (bank 2)

DTC P0058

- Harness or connectors [The heated oxygen sensor 2 heater (bank 2) circuit is shorted.]
- Heated oxygen sensor 2 heater (bank 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at idle.

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1261, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922586

1. CHECK HEATED OXYGEN SENSOR 2 HEATER POWER SUPPLY CIRCUIT - 1

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between heated oxygen sensor 2 harness connector and ground.

DTC	+			-	Voltage
	Heated oxygen sensor 2				
	Bank	Connector	Terminal		
P0037, P0038	1	F125	1	Ground	Battery voltage
P0057, P0058	2	F126	1		

Is the inspection result normal?

- YES >> GO TO 2.
NO >> GO TO 4.

2. CHECK HEATED OXYGEN SENSOR 2 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between heated oxygen sensor 2 harness connector and ECM harness connector.

DTC	+			-		Continuity
	Heated oxygen sensor 2			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0037, P0038	1	F125	2	F142	166	Existed
P0057, P0058	2	F126	2		163	

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 HEATED OXYGEN SENSOR 2 HEATER

Check heated oxygen sensor 2 heater. Refer to [EC6-1262, "Component Inspection \(Heated Oxygen Sensor 2 Heater\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END.
NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226, "Exploded View"](#).

4. CHECK HEATED OXYGEN SENSOR 2 HEATER POWER SUPPLY CIRCUIT - 2

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and heated oxygen sensor 2 harness connector.

DTC	+		-		Continuity
	IPDM E/R		Heated oxygen sensor 2		
	Connector	Terminal	Connector	Terminal	
P0037, P0038	E123	52	F125	1	Existed
P0057, P0058			F126	1	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.

Component Inspection (Heated Oxygen Sensor 2 Heater)

INFOID:000000013922587

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check resistance between heated oxygen sensor 2 terminals as follows.

Heated oxygen sensor 2		Condition		Resistance	
+	-				
Terminal		Temperature	25°C (77°F)	∞ (Continuity should not exist)	
1	2				3.4 – 4.4 Ω
2	3				∞ (Continuity should not exist)
	4				
3	4				

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226, "Exploded View"](#).

P0046, P004B WASTEGATE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0046, P004B WASTEGATE CONTROL ACTUATOR

DTC Description

INFOID:000000013922588

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0046	TC/SC BOOST CONTROL A (Turbocharger/supercharger boost control "A" circuit range/performance)	When engine is running and the rpm is steady, the electric wastegate actuator drive duty is 100% or more.
P004B	TC/SC BOOST CONTROL B (Turbocharger/supercharger boost control "B" circuit range/performance)	<ul style="list-style-type: none">• Motor drive duty is 100% or more for 5 consecutive seconds• The difference between target stroke and actual stroke is 1.95 mm (0.0768 in) or more for 5 consecutive seconds

POSSIBLE CAUSE

DTC P0046

- Wastegate valve stuck
- Wastegate valve caught a foreign matter

DTC P004B

- Wastegate valve stuck
- Wastegate valve caught a foreign matter

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

- If DTC P0046 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.
- If DTC P0046 is displayed with DTC P2562 and/or P2566, first perform the confirmation procedure (trouble diagnosis) for DTC P2562 and/or P2566.
- If DTC P004B is displayed with DTC P2586 and/or P2590, first perform the confirmation procedure (trouble diagnosis) for DTC P2586 and/or P2590.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC P0643: Refer to [EC6-1439, "DTC Description"](#).
- DTC P2562: Refer to [EC6-1628, "DTC Description"](#).
- DTC P2566: Refer to [EC6-1628, "DTC Description"](#).
- DTC P2586: Refer to [EC6-1635, "DTC Description"](#).
- DTC P2590: Refer to [EC6-1635, "DTC Description"](#).

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.

P0046, P004B WASTEGATE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is between more than 11 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and warm it up to normal operating temperature.
3. Check 1st trip DTC. (If actuator motor is stuck on the valve closing side, 1st trip DTC is detected during the above procedure. If 1st trip DTC is not detected, actuator motor may be stuck on the valve opening side. In this case, follow the instruction below.)
4. Drive the vehicle and accelerate from 20km/h (13 MPH) to 80km/h (50 MPH) within 10 seconds.

CAUTION:

Always drive at safe speed.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1264, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922589

1.CHECK DTC PRIORITY

- If DTC P0046 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.
- If DTC P0046 is displayed with DTC P2562 and/or P2566, first perform the confirmation procedure (trouble diagnosis) for DTC P2562 and/or P2566.
- If DTC P004B is displayed with DTC P2586 and/or P2590, first perform the confirmation procedure (trouble diagnosis) for DTC P2586 and/or P2590.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC P0643: Refer to [EC6-1439, "DTC Description"](#).
- DTC P2562: Refer to [EC6-1628, "DTC Description"](#).
- DTC P2566: Refer to [EC6-1628, "DTC Description"](#).
- DTC P2586: Refer to [EC6-1635, "DTC Description"](#).
- DTC P2590: Refer to [EC6-1635, "DTC Description"](#).

NO >> GO TO 2.

2.COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
3. Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
4. Perform the test.
5. Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

P0046, P004B WASTEGATE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3. CHECK INSTALLATION CONDITION OF CONTROL ROD

1. Turn ignition switch OFF.
2. Visually check that the control rod is installed normally.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning turbocharger. Refer to [EM-233, "Removal and Installation"](#).

4. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

DTC P0046

Electric wastegate control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F139	1	F143	57	Existed
	2		45	
	3		39	
	4	F142	92	
	6	93		

DTC P004B

Electric wastegate control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F138	1	F143	61	Existed
	2		66	
	3		39	
	4	F142	89	
	6	90		

5. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK CARBON DEPOSIT

1. Remove turbocharger (malfunctioning bank side). Refer to [EM-233, "Removal and Installation"](#).
2. Check waste gate valve for carbon deposit and catching a foreign matter.

Is the inspection result normal?

YES >> Replace malfunctioning turbocharger. Refer to [EM-233, "Removal and Installation"](#).

NO >> Clean the wastegate valve.

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P0078, P0084 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0078, P0084 EVT CONTROL SOLENOID VALVE

DTC Description

INFOID:000000013922596

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve control solenoid circuit bank 1)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.
P0084	EX V/T ACT/CIRC-B2 (Exhaust valve control solenoid circuit bank 2)	

POSSIBLE CAUSE

- Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.)
- Exhaust valve timing control solenoid valve

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1266, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922597

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing 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.

DTC	+			-	Voltage
	Exhaust valve timing control solenoid valve				
	Bank	Connector	Terminal		
P0078	1	F84	1	Ground	Battery voltage
P0084	2	F94	1		

P0078, P0084 EVT CONTROL SOLENOID VALVE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between exhaust valve timing control solenoid valve harness connector and IPDM E/R harness connector.

DTC	+			-		Continuity
	Exhaust valve timing control solenoid valve			IPDM E/R		
	Bank	Connector	Terminal	Connector	Terminal	
P0078	1	F84	1	E123	59	Existed
P0084	2	F94	1			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust valve timing control solenoid valve harness connector and ECM harness connector.

DTC	+			-		Continuity
	Exhaust valve timing control solenoid valve			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0078	1	F84	2	F142	157	Existed
P0084	2	F94	2	F142	158	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check exhaust valve timing control solenoid valve control solenoid valve. Refer to [EC6-1267, "Component Inspection \(Exhaust Valve Timing Control Solenoid Valve\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238, "Exploded View"](#).

Component Inspection (Exhaust Valve Timing Control Solenoid Valve)

INFOID:000000013922598

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE - 1

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control solenoid valve harness connector.
3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following.

P0078, P0084 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Exhaust valve timing control solenoid valve		Condition		Resistance
+	-			
Terminal				
1	2	Temperature	20°C (68°F)	7.0 – 7.8 Ω
1	Ground			∞ (Continuity should not exist)
2				

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238, "Exploded View"](#).

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE - 2

1. Remove exhaust valve timing control solenoid valve. Refer to [EM-238, "Exploded View"](#).

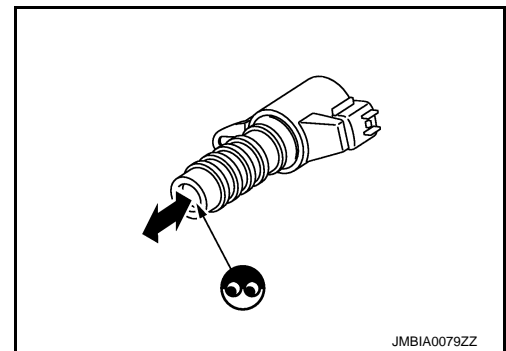
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve.

NOTE:

Always replace O-ring when exhaust valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control solenoid valve. Refer to [EM-238, "Exploded View"](#).

P0090 HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0090 HIGH PRESSURE FUEL PUMP

DTC Description

INFOID:000000013922605

DTC DETECTION LOGIC

NOTE:

DTC P0090 may be displayed when running out of gas.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0090	FUEL PUMP (High pressure fuel pump circuit)	<ul style="list-style-type: none"> Fuel rail pressure remains at 1.1 MPa (11.2 kg/ cm², 159.5 psi) or less for 5 seconds or more during engine rev. Fuel rail pressure remains at 27.0 MPa (275.4 kg/ cm², 3915.0 psi) or more for 0.3 seconds or more during engine rev.

POSSIBLE CAUSE

- Harness or connectors (The high pressure fuel pump circuit is open or shorted.)
- High pressure fuel pump

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0090 is displayed with DTC P1197, first perform the confirmation procedure (trouble diagnosis) for DTC P1197.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1454, "DTC Description"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.
- Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

 WITH CONSULT

1. Start engine.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode of "ENGNE" using CONSULT.
3. Maintain the following condition for 5 seconds or more at idle.

COOLAN TEMP/S : 70°C (158°F) or more

P0090 HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

4. Check 1st trip DTC.

 WITH GST

Follow the above steps for "WITH CONSULT".

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1270, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922606

1.CHECK DTC PRIORITY

If DTC P0090 is displayed with DTC P1197, first perform the confirmation procedure (trouble diagnosis) for DTC P1197.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1454, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

1. Turn ignition switch ON.
2. Disconnect ECM harness connector and high pressure fuel pump harness connector.
3. Check the continuity between ECM harness connector and high pressure fuel pump harness connector.

+		-		Continuity
ECM		High pressure fuel pump		
Connector	Terminal	Connector	Terminal	
F143	9	F120	2	Existed
	10		1	

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the error-detected parts.

3.CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to [EC6-1270, "Component Inspection \(High Pressure Fuel Pump\)"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Replace the error-detected parts.

Component Inspection (High Pressure Fuel Pump)

INFOID:000000013922607

1.CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

+	-	Condition		Resistance (Approx.)
High pressure fuel pump Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.47 – 0.53 Ω

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace high pressure fuel pump. Refer to [EM-178, "Removal and Installation"](#).

2.CHECK HIGH PRESSURE FUEL PUMP-2

P0090 HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

WITH CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check "FUEL PRES SEN V" in "DATA MONITOR" mode of "ECM" using CONSULT.

Monitor item	Condition	Value (Approx.)
FUEL PRES SEN V	Engine speed: idle	0.73 – 1.0 V
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F143	10	9	Engine speed: idle	0.73 – 1.0 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to [EM-178. "Removal and Installation"](#).

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P0097, P0098 IAT SENSOR 2

DTC Description

INFOID:0000000013922611

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0097	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit low input)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 0.085 V or less.
P0098	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit high input)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 4.84 V or more.

POSSIBLE CAUSE

- Harness or connectors (The intake air temperature sensor 2 circuit is open or shorted.)
- Intake air temperature sensor 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0097 or P0098 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).
- 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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1272. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922612

1.CHECK DTC PRIORITY

If DTC P0097 or P0098 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).
- NO >> GO TO 2.

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

2. CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPLY - 1

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost sensor harness connector terminals.

Turbocharger boost sensor (bank 1)			Voltage (Approx.)
Connector	+	-	
	Terminal		
F90	2	4	5 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

3. CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPLY - 2

Check the voltage between turbocharger boost sensor harness connector terminal and ground.

+		-	Voltage (Approx.)
Turbocharger boost sensor (bank 1)			
Connector	Terminal		
F90	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F90	2	F143	38	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

5. CHECK INTAKE AIR TEMPERATURE SENSOR 2 GROUND CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F90	4	F143	23	Existed

4. Also check harness for short to power.

P0097, P0098 IAT SENSOR 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ECM GROUND CIRCUIT FOR OPEN OR SHORT

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

7. CHECK INTAKE AIR TEMPERATURE SENSOR 2 SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		-		Continuity
Turbocharger boost sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F90	3	F143	62	Existed

4. 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.

8. CHECK INTAKE AIR TEMPERATURE SENSOR 2

Check intake air temperature sensor 2. Refer to [EC6-1274, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning turbocharger boost sensor (with intake air temperature sensor 2). Refer to [EM-167, "Exploded View"](#).

Component Inspection

INFOID:000000013922613

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.

P0097, P0098 IAT SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Turbocharger boost sensor (bank 1)		Condition		Resistance (kΩ)
+	-			
Terminals				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor (bank 1) (with intake air temperature sensor 2). Refer to [EM-167. "Exploded View"](#).

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P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

DTC Description

INFOID:000000013922614

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P00B3	RADIATOR COOLANT TEMP SEN (Radiator coolant temperature sensor circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the engine coolant temperature sensor 2 is 0.04 V or less.
P00B4	RADIATOR COOLANT TEMP SEN (Radiator coolant temperature sensor circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the engine coolant temperature sensor 2 is 4.84 V or more.

POSSIBLE CAUSE

- Harness or connectors (Engine coolant temperature sensor 2 circuit is open or shorted.)
- Engine coolant temperature sensor 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1276, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922615

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature (ECT) sensor 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECT sensor 2 harness connector and ground.

+		-	Voltage (Approx.)
ECT sensor 2			
Connector	Terminal		
F86	1	Ground	5 V

Is the inspection result normal?

P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
- NO >> GO TO 2.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor 2 harness connector and ECM harness connector.

+		-		Continuity
ECT sensor 2		ECM		
Connector	Terminal	Connector	Terminal	
F86	1	F143	56	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor 2 harness connector and ECM harness connector.

+		-		Continuity
ECT sensor 2		ECM		
Connector	Terminal	Connector	Terminal	
F86	2	F142	100	Existed

4. Also check harness for short to ground to power.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2

Check the engine coolant temperature sensor 2. Refer to [EC6-1277, "Component Inspection \(Engine Coolant Temperature Sensor 2\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor 2. Refer to [CO-39, "Exploded View"](#).

Component Inspection (Engine Coolant Temperature Sensor 2)

INFOID:000000013922616

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 2 harness connector.
3. Remove engine coolant temperature sensor 2. Refer to [CO-39, "Exploded View"](#).

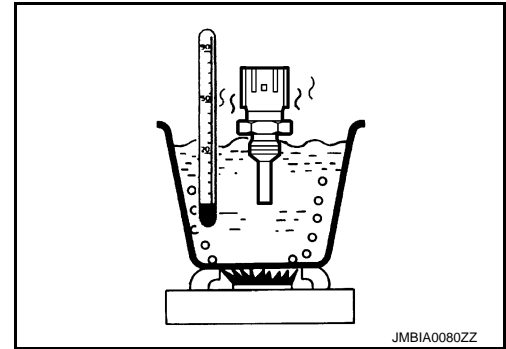
P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

4. Check resistance between engine coolant temperature sensor 2 terminals by heating with hot water as shown in the figure.

ECT sensor 2		Condition	Resistance
+	-		
Terminal			
1	2	20 (68)	2.10 – 2.90 kΩ
		50 (122)	0.68 – 1.00 kΩ
		90 (194)	0.236 – 0.260 kΩ



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor 2. Refer to [CO-39, "Exploded View"](#).

P00E0 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P00E0 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:000000013922617

DTC DETECTION LOGIC

EC6

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P00E0	Charge air cooler coolant temp sensor (Charge air cooler coolant temperature sensor circuit low)	A CAC coolant temperature sensor signal voltage is less than 0.04 V.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) coolant temperature sensor circuit is shorted.]
- CAC coolant temperature sensor

FAIL-SAFE

Not applicable

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 10 seconds.
2. Check DTC.

Is DTC P00E0 detected?

- YES >> Proceed to [EC6-1279, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922618

1. CHECK CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC coolant temperature sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC coolant temperature sensor harness connector terminals.

CAC coolant temperature sensor			Voltage (Approx.)
Connector	+	-	
	Terminal		
E160	1	2	5 V

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 2.

2. CHECK CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR POWER SUPPLY-2

Check the voltage between CAC coolant temperature sensor harness connector and ground.

P00E0 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage (Approx.)
Connector	Terminal		
E160	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

3. CHECK CAC COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CAC coolant temperature sensor harness connector and ECM harness connector.

CAC coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E160	1	F143	59	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

4. CHECK CAC COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CAC coolant temperature sensor harness connector and ECM harness connector.

CAC coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E160	2	F142	97	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

5. CHECK CAC COOLANT TEMPERATURE SENSOR

Check the CAC coolant temperature sensor. Refer to [EC6-1280, "Component Inspection \(Charge Air Cooler Temperature Sensor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC coolant temperature sensor. Refer to [EM-167, "Exploded View"](#).

Component Inspection (Charge Air Cooler Temperature Sensor)

INFOID:000000013922619

1. CHECK CHARGE AIR COOLER (CAC) TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove CAC coolant temperature sensor. Refer to [CO-49, "Exploded View"](#).
3. Check the resistance between CAC coolant temperature sensor terminals under the following conditions.

P00E0 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Terminal	Condition	Resistance
1 and 2	20°C (68°F)	2.37 – 2.63 kΩ
	50°C (122°F)	0.68 – 1.00 kΩ
	90°C (194°F)	0.236 – 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CAC coolant temperature sensor. Refer to [EM-167, "Exploded View"](#).

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P00E1 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P00E1 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:000000013922620

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P00E1	Charge air cooler coolant temp sensor (Charge air cooler coolant temperature sensor circuit high)	A CAC coolant temperature sensor signal voltage is more than 4.84 V.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) coolant temperature sensor circuit is open or shorted.]
- CAC coolant temperature sensor

FAIL-SAFE

Not applicable

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 10 seconds.
2. Check DTC.

Is DTC P00E1 detected?

YES >> Proceed to [EC6-1282, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922621

1.CHECK CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC coolant temperature sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC coolant temperature sensor harness connector terminals.

CAC coolant temperature sensor			Voltage (Approx.)
Connector	+	-	
E160	1	2	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2.CHECK CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR POWER SUPPLY-2

Check the voltage between CAC coolant temperature sensor harness connector and ground.

P00E1 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage (Approx.)
Connector	Terminal		
E160	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK CAC COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CAC coolant temperature sensor harness connector and ECM harness connector.

CAC coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E160	1	F143	59	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK CAC COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CAC coolant temperature sensor harness connector and ECM harness connector.

CAC coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E160	2	F142	97	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

5. CHECK CAC COOLANT TEMPERATURE SENSOR

Check the CAC coolant temperature sensor. Refer to [EC6-1280, "Component Inspection \(Charge Air Cooler Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CAC coolant temperature sensor. Refer to [EM-167, "Exploded View"](#).

Component Inspection (Charge Air Cooler Temperature Sensor)

INFOID:000000013922622

1. CHECK CHARGE AIR COOLER (CAC) TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove CAC coolant temperature sensor. Refer to [CO-49, "Exploded View"](#).
3. Check the resistance between CAC coolant temperature sensor terminals under the following conditions.

P00E1 CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Terminal	Condition	Resistance
1 and 2	20°C (68°F)	2.37 – 2.63 kΩ
	50°C (122°F)	0.68 – 1.00 kΩ
	90°C (194°F)	0.236 – 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CAC coolant temperature sensor. Refer to [EM-167, "Exploded View"](#).

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0102, P0103, P010C, P010D MAF SENSOR

DTC Description

INFOID:000000013922626

DTC DETECTION LOGIC

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0102	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit low input)	An excessively low frequency from the sensor is sent to ECM.
P0103	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit high input)	An excessively high frequency from the sensor is sent to ECM.
P010C	MAF SEN/CIRCUIT-B2 (Mass or volume air flow "B" circuit low input)	An excessively low frequency from the sensor is sent to ECM.
P010D	MAF SEN/CIRCUIT-B2 (Mass or volume air flow "B" circuit high input)	An excessively high frequency from the sensor is sent to ECM.

POSSIBLE CAUSE

DTC P0102

- Harness or connectors [The mass air flow sensor (bank 1) circuit is open or shorted.]
- Mass air flow sensor (bank 1)

DTC P0103

- Harness or connectors [The mass air flow sensor (bank 1) circuit is open or shorted.]
- Intake air leaks
- Mass air flow sensor (bank 1)

DTC P010C

- Harness or connectors [The mass air flow sensor (bank 2) circuit is open or shorted.]
- Mass air flow sensor (bank 2)

DTC P010D

- Harness or connectors [The mass air flow sensor (bank 2) circuit is open or shorted.]
- Intake air leaks
- Mass air flow sensor (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none"> • Partially controls ignition timing control. • Controls ignition timing delay control in the intermediate water temperature range.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0102 or P0103 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
- NO >> GO TO 2.

P0102, P0103, P010C, P010D MAF SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

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.

Which DTC is detected?

P0102, P010C>>GO TO 3.

P0103, P010D>>GO TO 4.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102 AND P010C

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1286. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

4. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1286. "Diagnosis Procedure"](#).

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-II

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1286. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922627

1. CHECK DTC PRIORITY

If DTC P0102 or P0103 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).

NO >> GO TO 2.

2. INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102, P010C>>GO TO 3.

P0103, P010D>>GO TO 4.

3. 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 4.

NO >> Reconnect the parts.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

4. CHECK MASS AIR FLOW SENSOR POWER SUPPLY

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

DTC	+			-	Voltage (Approx.)
	Mass air flow sensor				
	Bank	Connector	Terminal		
P0102, P0103	1	F99	2	Ground	5 V
P010C, P010D	2	F98			

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 5.

5. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0102, P0103	1	F99	2	F143	37	Existed
P010C, P010D	2	F98			76	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES-1 (P0102 or P0103 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
YES-2 (P010C or P010D is detected)>>GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
NO >> Repair or replace error-detected parts.

7. CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0102, P0103	1	F99	3	F143	42	Existed
P010C, P010D	2	F98	3		79	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

8. CHECK ECM GROUND CIRCUIT

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

DTC	Mass air flow sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0102, P0103	1	F99	1	F143	41	Existed
P010C, P010D	2	F98			46	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

10. CHECK MASS AIR FLOW SENSOR

Refer to [EC6-1288, "Component Inspection \(Mass Air Flow Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning mass air flow sensor. Refer to [EM-165, "Exploded View"](#).

Component Inspection (Mass Air Flow Sensor)

INFOID:000000013922628

1. CHECK MASS AIR FLOW SENSOR-I

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select "DATA MONITOR" mode.
5. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

⊗ Without CONSULT

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Start engine and warm it up to normal operating temperature.
- Check the frequency between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Frequency
	+	-		
	Terminal	Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

- Turn ignition switch OFF.
- Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Intake valve deposits
 - Improper specification of intake air system parts

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

Ⓜ With CONSULT

- Repair or replace malfunctioning part.
- Start engine and warm it up to normal operating temperature.
- Connect CONSULT and select "DATA MONITOR" mode.
- Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

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P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

⊗ Without CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the frequency between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Frequency
	+	-		
	Terminal	Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

Ⓟ With CONSULT

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
	Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

⊗ 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 frequency between ECM harness connector terminals under the following conditions.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ECM			Condition	Frequency
Connector	+	-		
	Terminal	Terminal		
F143	41 [MAF sensor (bank 1) signal]	42	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz
	46 [MAF sensor (bank 2) signal]	79	Ignition switch ON (Engine stopped.)	Approx. 3,300 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	2,800 – 3,100 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	2,100 – 2,400 Hz
			Idle to about 4,000 rpm	2,800 – 3,100 Hz to Approx. 1,900 Hz

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace malfunctioning mass air flow sensor.

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P0107, P0108 BAROMETRIC PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0107, P0108 BAROMETRIC PRESSURE SENSOR

DTC Description

INFOID:000000013924174

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0107	ABSL PRES SEN/CIRC (Atmospheric pressure sensor circuit low input)	An excessively low voltage from the atmospheric pressure sensor (built-into ECM) is sent to ECM.
P0108	ABSL PRES SEN/CIRC (Atmospheric pressure sensor circuit high input)	An excessively high voltage from the atmospheric pressure sensor (built-into ECM) is sent to ECM.

POSSIBLE CAUSE

Atmospheric pressure sensor (built-into ECM)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.

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.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1292, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013924175

1. DTC CONFIRMATION

- Turn ignition switch ON.
- Erase DTC.
- Perform DTC confirmation procedure. Refer to [EC6-1292, "DTC Description"](#).
- Check the DTC.

Is the DTC displayed again?

- YES >> Replace ECM. Refer to [EC6-1759, "Removal and Installation"](#).
NO >> INSPECTION END

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

DTC Description

INFOID:000000013922632

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms	DTC detecting condition
P010A	ABSL PRES SEN/CIRC	<ul style="list-style-type: none">An excessively low voltage from the sensor is sent to ECM.An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Manifold absolute pressure (MAP) sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
NO >> GO TO 2.

2.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.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 10 seconds.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1293, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922633

1.CHECK DTC PRIORITY

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK MAP SENSOR

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Check MAP sensor. Refer to [EC6-1295. "Component Inspection \(Manifold Absolute Pressure Sensor\)".](#)

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace MAP sensor. Refer to [EM-173. "Exploded View".](#)

4. CHECK MAP SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect MAP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between MAP sensor harness connector and ground.

+		-	Voltage (Approx.)
MAP sensor			
Connector	Terminal		
F102	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. CHECK MAP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and MAP sensor harness connector.

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F143	80	F102	1	Existed

Is the inspection result normal?

YES >> Check ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure".](#)

NO >> Repair or replace error-detected parts.

6. CHECK MAP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and MAP sensor harness connector.

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F142	114	F102	3	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 MAP SENSOR CIRCUIT

Check MAP sensor circuit for open and short.

ECM		MAP sensor		Continuity
Connector	Terminal	Connector	Terminal	
F142	113	F102	2	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Component Inspection (Manifold Absolute Pressure Sensor)

INFOID:000000013922634

1. CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR-1

1. Turn ignition switch OFF.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
4. Check the voltage between ECM harness connector terminals as follows.

Connector	ECM	
	+	-
	Terminal	
F142	113	114

NOTE:

- To avoid the influence of intake manifold vacuum, check the voltage 1 or more minutes past after engine is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.

5. Measure the atmospheric pressure.

NOTE:

As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the pressure with the following chart.

Altitude (m)	Compensated pressure (hPa)
0	0
200	-24
400	-47
600	-70
800	-92
1000	-114
1500	-168
2000	-218

6. Check the manifold absolute pressure sensor value corresponding to the atmospheric pressure.

Atmospheric pressure (hPa)	Voltage (V)
800	1.4 – 1.9
850	1.5 – 2.0
900	1.6 – 2.1
950	1.7 – 2.2
1000	1.75 – 2.3
1050	1.8 – 2.4

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace MAP sensor.

2. CHECK MAP SENSOR-2

1. Start engine and let it idle.
2. Check intake manifold vacuum.
3. Check the voltage between ECM harness connector terminals as follows.

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ECM		
Connector	+	-
	Terminal	
F142	113	114

4. Confirm the difference of the voltage when engine is stopped and at idling is within the values shown in the following chart.

Intake manifold vacuum [kPa (mmHg)]	Voltage difference (V)
-40 (-300)	0.8 – 1.3
-53.3 (-400)	1.0 – 1.5
-66.7 (-500)	1.2 – 1.7
-80 (-600)	1.4 – 1.9

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace MAP sensor. Refer to [EM-173. "Exploded View"](#).

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0112, P0113 IAT SENSOR

DTC Description

INFOID:000000013922638

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0112	IAT SEN/CIRCUIT-B1 (Intake air temperature sensor 1 circuit low bank 1)	An excessively low voltage from the sensor is sent to ECM.
P0113	IAT SEN/CIRCUIT-B1 (Intake air temperature sensor 1 circuit high bank 1)	An excessively high voltage from the sensor is sent to ECM.

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POSSIBLE CAUSE

DTC P0112

- Harness or connectors (The intake air temperature sensor 1 circuit is open or shorted.)
- Intake air temperature sensor 1

F

DTC P0113

- Harness or connectors (The intake air temperature sensor 1 circuit is open or shorted.)
- Intake air temperature sensor 1

G

FAIL-SAFE

Not applicable

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.

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>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

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Is 1st trip DTC detected?

M

YES >> Proceed to [EC6-1297, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

N

Diagnosis Procedure

INFOID:000000013922639

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect mass air flow (MAF) sensor (intake air temperature sensor 1 is built-into) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor (bank 1) harness connector and ground.

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MAF sensor (bank 1)		Ground	Voltage (Approx.)
Connector	Terminal		
F99	4	Ground	5 V

Is the inspection result normal?

P0112, P0113 IAT SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor (bank 1) harness connector and ECM harness connector.

MAF sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	4	F143	40	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor (bank 1) harness connector and ECM harness connector.

MAF sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	3	F143	42	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal	Ground	Existed
F143	2		
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 INTAKE AIR TEMPERATURE SENSOR 1

P0112, P0113 IAT SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Refer to [EC6-1299, "Component Inspection \(Intake Air Temperature Sensor 1\)"](#).

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor 1). Refer to [EM-165, "Exploded View"](#).

Component Inspection (Intake Air Temperature Sensor 1)

INFOID:000000013922640

1. CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow (MAF) sensor (intake air temperature sensor is built-into) harness connector and reconnect it.
3. Turn ignition switch ON.
4. Select "INT/A TEMP SEN" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
5. Check that the indicated value of "INT/A TEMP SEN" is almost the same as intake air temperature.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to [EM-165, "Exploded View"](#).

A
EC6
C
D
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P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

DTC Description

INFOID:000000013922644

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0117	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0118	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

DTC P0117

- Harness or connectors (The engine coolant temperature sensor 1 circuit is open or shorted.)
- Engine coolant temperature sensor 1

DTC P0118

- Harness or connectors (The engine coolant temperature sensor 1 circuit is open or shorted.)
- Engine coolant temperature sensor 1

FAIL-SAFE

Fail safe mode	Vehicle behavior
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 [EC6-1300. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922645

1. CHECK ECT SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature (ECT) sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECT sensor 1 harness connector and ground.

P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ECT sensor 1		Ground	Voltage (Approx.)
Connector	Terminal		
E142	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK ECT SENSOR 1 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor 1 harness connector and ECM harness connector.

ECT sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E142	1	F143	71	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

3. CHECK ECT SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor 1 harness connector and ECM harness connector.

ECT sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E142	2	F142	97	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK ECM GROUND CIRCUIT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

A

EC6

C

D

E

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P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Refer to [EC6-1302. "Component Inspection \(Engine Coolant Temperature Sensor 1\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor 1. Refer to [CO-63. "Exploded View"](#).

Component Inspection (Engine Coolant Temperature Sensor 1)

INFOID:000000013922646

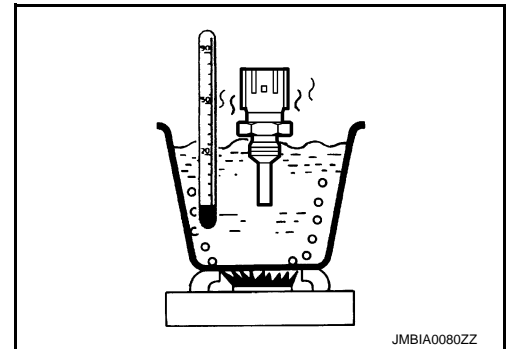
1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 1 harness connector.
3. Remove engine coolant temperature sensor 1. Refer to [CO-63. "Exploded View"](#).
4. Check resistance between engine coolant temperature sensor 1 terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90 kΩ
		50 (122)	0.68 – 1.00 kΩ
		90 (194)	0.236 – 0.260 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor 1. Refer to [CO-63. "Exploded View"](#).



P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0122, P0123, P0227, P0228 TP SENSOR

DTC Description

INFOID:000000013922651

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0122	TP SEN 2/CIRC-B1 (Throttle/Pedal position sensor/switch "A" circuit low)	An excessively low voltage from the TP sensor 2 is sent to ECM.
P0123	TP SEN 2/CIRC-B1 (Throttle/Pedal position sensor/switch "A" circuit high)	An excessively high voltage from the TP sensor 2 is sent to ECM.
P0227	TP SEN 2/CIRC-B2 (Throttle/Pedal position sensor/switch "C" circuit low)	An excessively low voltage from the TP sensor 2 is sent to ECM.
P0228	TP SEN 2/CIRC-B2 (Throttle/Pedal position sensor/switch "C" circuit high)	An excessively high voltage from the TP sensor 2 is sent to ECM.

C

D

E

F

POSSIBLE CAUSE

DTC P0122 and P0123

- Harness or connectors [TP sensor 2 (bank 1) circuit is open or shorted.]
- Electric throttle control actuator (TP sensor 2) (bank 1)

DTC P0227 and P0228

- Harness or connectors [TP sensor 2 (bank 2) circuit is open or shorted.]
- Electric throttle control actuator (TP sensor 2) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	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.

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DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).
- NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

M

N

O

P

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1304, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-1 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922652

1.CHECK DTC PRIORITY

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

DTC	+			-	Voltage (Approx.)
	Electric throttle control actuator				
	Bank	Connector	Terminal		
P0122, P0123	1	F118	5	Ground	5 V
P0227, P0228	2	F119	5		

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0122, P0123	1	F118	5	F143	35	Existed
P0227, P0228	2	F119	5	F142	105	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES-1 (P0122 or P0123 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
YES-2 (P0227 or P0228 is detected)>>GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0122, P0123	1	F118	4	F143	44	Existed
P0227, P0228	2	F119	4	F142	104	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0122, P0123	1	F118	3	F143	48	Existed
P0227, P0228	2	F119	3	F142	112	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 8.

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> Repair or replace error-detected parts.

8. CHECK THROTTLE POSITION SENSOR

Refer to [EC6-1306, "Component Inspection \(Throttle Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection (Throttle Position Sensor)

INFOID:000000013922653

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC6-272, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
F143	43 [TP sensor 1 (bank 1)]	44	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F142	106 [TP sensor 1 (bank 2)]	104	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F143	48 [TP sensor 2 (bank 1)]	44	Fully released	Less than 4.75
			Fully depressed	More than 0.36
F142	112 [TP sensor 2 (bank 2)]	104	Fully released	Less than 4.75
			Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Proceed to [EC6-272, "Description"](#).

>> INSPECTION END

P0130, P0150 A/F SENSOR 1

DTC Description

INFOID:000000013922661

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0130	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit]	A	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.
		B	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.
P0150	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit]	A	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.
		B	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.

POSSIBLE CAUSE

DTC P0130 - A

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0130 - B

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0150 - A

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0150 - B

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

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

1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for 2 minutes.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1309, "Diagnosis Procedure"](#).
- NO-1 >> With CONSULT: GO TO 3.

P0130, P0150 A/F SENSOR 1

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< DTC/CIRCUIT DIAGNOSIS >

NO-2 >> Without CONSULT: GO TO 7.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Does the indication fluctuate around 2.2 V?

YES >> GO TO 4.

NO >> Proceed to [EC6-1309. "Diagnosis Procedure"](#).

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

1. Select "A/F SEN1 (B1) P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT.
2. Touch "START".
3. When the following conditions are met, "TESTING" will be displayed on the CONSULT screen.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position

If "TESTING" is not displayed after 20 seconds, retry from step 2.

CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake when releasing the accelerator pedal.

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

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to [EC6-1309. "Diagnosis Procedure"](#).

7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

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.

 **With GST**

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Shift the selector lever to D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

Never apply brake when releasing the accelerator pedal.

4. Repeat steps 2 and 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Turn ignition switch ON.

P0130, P0150 A/F SENSOR 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

7. Turn ignition switch OFF and wait at least 10 seconds.
8. Restart engine.
9. Repeat steps 2 and 3 for five times.
10. Stop the vehicle and connect GST to the vehicle.
11. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1309, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922662

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0130	1	F133	1	Ground	Battery voltage
P0150	2	F134	1		

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

3.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 IPDM E/R harness connector and A/F sensor 1 harness connector.

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0130	E123	52	F133	1	Existed
P0150			F134	1	

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 A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

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DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0130	1	F133	3	F142	102	Existed
			4		101	
P0150	2	F134	3		111	
			4			

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0130	1	F133	3	Ground	Not existed
			4		
P0150	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0130	1	F142	102	Ground	Not existed
			101		
P0150	2		111		
			107		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

P0131, P0151 A/F SENSOR 1

DTC Description

INFOID:0000000013922663

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0131	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit low voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.
P0151	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit low voltage]	

POSSIBLE CAUSE

DTC P0131

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0151

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Is the indication constantly approx. 0 V?

YES >> Proceed to [EC6-1312, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

CAUTION:

Always drive vehicle at a safe speed.

6. Maintain the following conditions for about 20 consecutive seconds.

P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 1.

7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1312, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922664

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0131	1	F133	1	Ground	Battery voltage
P0151	2	F134	1		

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.

3. 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 IPDM E/R harness connector and A/F sensor 1 harness connector.

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0131	E123	52	F133	1	Existed
P0151			F134	1	

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 A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

P0131, P0151 A/F SENSOR 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0131	1	F133	3	F142	102	Existed
			4		101	
P0151	2	F134	3		111	
			4		107	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0131	1	F133	3	Ground	Not existed
			4		
P0151	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0131	1	F142	102	Ground	Not existed
			101		
P0151	2		111		
			107		

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

A
EC6
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P0132, P0152 A/F SENSOR 1

DTC Description

INFOID:000000013922665

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0132	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 (bank 1) circuit high voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.
P0152	A/F SENSOR1 (B2) [Air fuel ratio (A/F) sensor 1 (bank 2) circuit high voltage]	

POSSIBLE CAUSE

DTC P0132

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P0152

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Is the indication constantly approx. 5V?

- YES >> Proceed to [EC6-1315, "Diagnosis Procedure"](#).
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

CAUTION:

Always drive vehicle at a safe speed.

6. Maintain the following conditions for about 20 consecutive seconds.

P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

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

A

EC6

NOTE:

- Keep the accelerator pedal as steady as possible during cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 1.

C

7. Check 1st trip DTC.

D

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1315, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

E

Diagnosis Procedure

INFOID:000000013922666

1.CHECK GROUND CONNECTION

F

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

G

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair or replace ground connection.

H

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

I

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0132	1	F133	1	Ground	Battery voltage
P0152	2	F134	1		

J

K

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.

L

3.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

M

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and A/F sensor 1 harness connector.

N

DTC	+		-		Continuity
	IPDM E/R		A/F sensor 1		
	Connector	Terminal	Connector	Terminal	
P0132	E123	52	F133	1	Existed
P0152			F134	1	

O

P

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 A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

P0132, P0152 A/F SENSOR 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0132	1	F133	3	F142	102	Existed
			4		101	
P0152	2	F134	3		111	
			4		107	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0132	1	F133	3	Ground	Not existed
			4		
P0152	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0132	1	F142	102	Ground	Not existed
			101		
P0152	2		111		
			107		

5. Also check harness for short to power.

Is the inspection result normal?

- YES >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

P0137, P0157 HO2S2

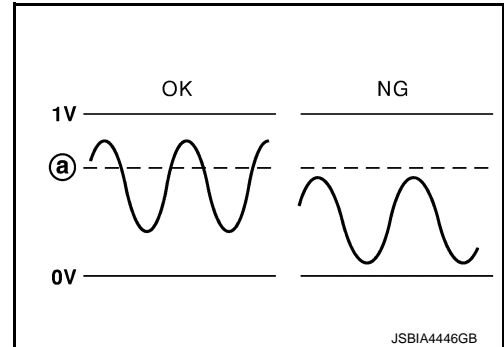
DTC Description

INFOID:000000013922667

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 malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

Ⓐ : 0.74 V



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0137	HO2S2 (B1) (O2 sensor circuit low voltage bank 1 sensor 2)	<ul style="list-style-type: none"> The maximum voltage from the sensor does not reach the specified voltage. ECM detects the heated oxygen sensor 2 circuit is short to ground.
P0157	HO2S2 (B2) (O2 sensor circuit low voltage bank 2 sensor 2)	

POSSIBLE CAUSE

DTC P0137

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector
- Intake air leaks

DTC P0157

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector
- Intake air leaks

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2.PRECONDITIONING

If DTC confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

A
EC6
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P

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 with 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).
If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches 70°C (158°F).
9. Open engine hood.
10. Select “HO2S2 (B1) P1147” (for DTC P0137) or “HO2S2 (B2) P1167” (for DTC P0157) of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT.
11. Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until “COMPLETED” is displayed.

12. Touch “SELF-DIAG RESULTS”.

Which is displayed on CONSULT screen?

- OK >> INSPECTION END
- NG >> Proceed to [EC6-1319. "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-1

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.

Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0137	F142	110	99	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure.
P0157		98			

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> GO TO 6.

6. PERFORM COMPONENT FUNCTION CHECK-2

Check the voltage between ECM harness connector terminals under the following condition.

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0137	F142	110	99	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure.
P0157		98			

A

EC6

Is the inspection result normal?

C

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 7.

D

7.PERFORM COMPONENT FUNCTION CHECK-3

Check the voltage between ECM harness connector terminals under the following condition.

E

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0137	F142	110	99	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.74 V at least once during this procedure.
P0157		98			

F

G

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-1319, "Diagnosis Procedure"](#).

H

Diagnosis Procedure

INFOID:000000013922668

I

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

J

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

K

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC6-275, "Work Procedure"](#).
2. Run engine for at least 10 minutes at idle speed.

L

Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to [EC6-1337, "DTC Description"](#).

NO >> GO TO 3.

M

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

N

O

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0137	1	F125	4	F142	99	Existed
P0157	2	F126	4			

P

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 4.
 NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0137	1	F125	3	F142	110	Existed
P0157	2	F126	3		98	

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC	HO2S2			Ground	Continuity
	Bank	Connector	Terminal		
P0137	1	F125	3	Ground	Not existed
P0157	2	F126	3		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0137	1	F142	110	Ground	Not existed
P0157	2		98		

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC6-1320, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226, "Exploded View"](#).

Component Inspection

INFOID:000000013922669

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

- YES >> GO TO 2.
 NO >> GO TO 3.

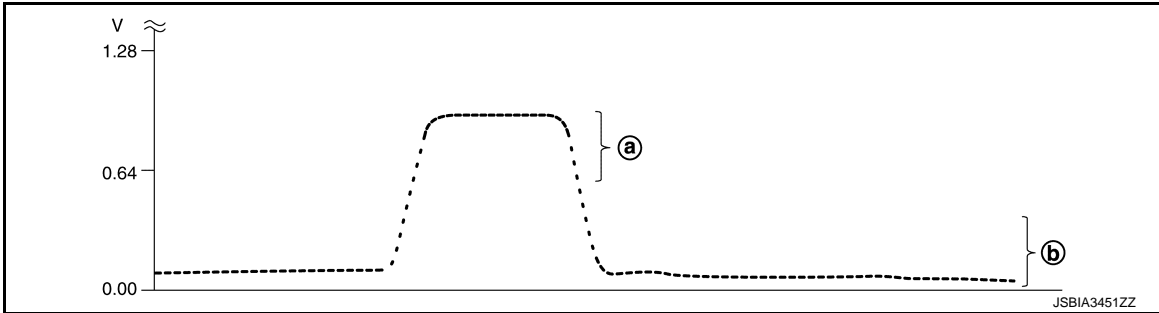
2.CHECK HEATED OXYGEN SENSOR 2

Ⓢ With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.

< DTC/CIRCUIT DIAGNOSIS >

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above ① 0.74 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)/(B2)" should be below ② 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Reving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

A
EC6
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I
J
K
L
M
N
O
P

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
F142	110 [HO2S2 (bank 1)]	99	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]			

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0138, P0158 HO2S2

DTC Description

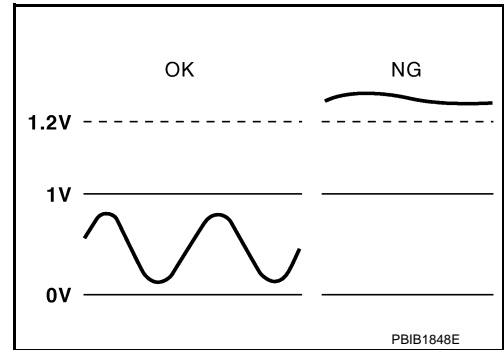
INFOID:000000013922670

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time.

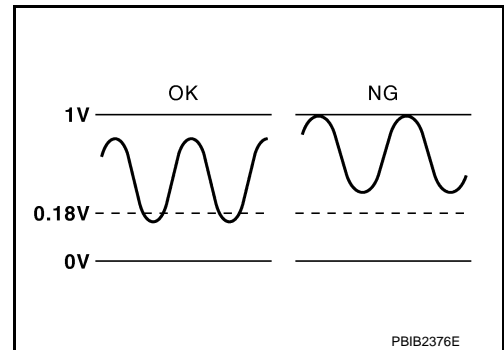
MALFUNCTION A

To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during various driving conditions such as fuel cut.



MALFUNCTION B

To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during various driving conditions such as fuel cut.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P0138	HO2S2 (B1) (O2 sensor circuit high voltage bank 1 sensor 2)	A	An excessively high voltage from the sensor is sent to ECM.
		B	The minimum voltage from the sensor is not reached to the specified voltage.
P0158	HO2S2 (B2) (O2 sensor circuit high voltage bank 2 sensor2)	A	An excessively high voltage from the sensor is sent to ECM.
		B	The minimum voltage from the sensor is not reached to the specified voltage.

POSSIBLE CAUSE

DTC P0138 - A

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2

DTC P0138 - B

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector

DTC P0158 - A

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2

A

EC6

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< DTC/CIRCUIT DIAGNOSIS >

DTC P0158 - B

- Harness or connectors (The sensor circuit is open or shorted)
- Heated oxygen sensor 2
- Fuel pressure
- Fuel injector

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 2 minutes.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1325. "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. Select "DATA MONITOR" mode with 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).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
9. Open engine hood.
10. Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
11. Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to [EC6-1325. "Diagnosis Procedure"](#).

CON NOT BE DIAGNOSED>>GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC confirmation procedure again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION-1

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.

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0138	F142	110	99	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be below 0.18 V at least once during this procedure.
P0158		98			

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION-2

Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0138	F142	110	99	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at least once during this procedure.
P0158		98			

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> GO TO 7.

7.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION-3

Check the voltage between ECM harness connector terminals under the following condition.

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0138	F142	110	99	Coasting from 80 km/h (50 MPH) in D position	The voltage should be below 0.18 V at least once during this procedure.
P0158		98			

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-1325, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013922671

1.INSPECTION START

< DTC/CIRCUIT DIAGNOSIS >

Confirm the detected malfunction (A or B). Refer to [EC6-1323. "DTC Description"](#).

Which malfunction is detected?

- A >> GO TO 2
- B >> GO TO 9.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48. "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace ground connection.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F125	4	F142	99	Existed
P0158	2	F126	4			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F125	3	F142	110	Existed
P0158	2	F126	3		98	

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC	HO2S2			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F125	3	Ground	Not existed
P0158	2	F126	3		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F142	110	Ground	Not existed
P0158	2		98		

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC6-1328. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to [GI-45. "Intermittent Incident"](#).

>> INSPECTION END

9.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48. "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace ground connection.

10.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC6-275. "Work Procedure"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0172, P0175. Refer to [EC6-1342. "DTC Description"](#).
- NO >> GO TO 11.

11.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F125	4	F142	99	Existed
P0158	2	F126	4			

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 12.

A
EC6

C
D
E
F
G
H
I
J
K
L
M
N
O
P

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

12.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F125	3	F142	110	Existed
P0158	2	F126	3		98	

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC	HO2S2			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F125	3	Ground	Not existed
P0158	2	F126	3		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F142	110	Ground	Not existed
P0158	2		98		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

13.CHECK HEATED OXYGEN SENSOR 2

Refer to [EC6-1328, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning heated oxygen sensor 2. Refer to [EM-226, "Exploded View"](#).

Component Inspection

INFOID:0000000013922672

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

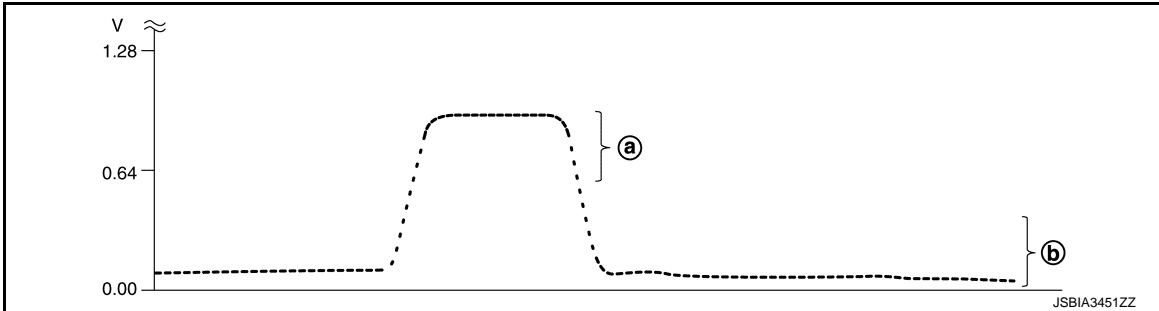
2.CHECK HEATED OXYGEN SENSOR 2

ⓅWith CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode with 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. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.

< DTC/CIRCUIT DIAGNOSIS >

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"HO2S2 (B1)/(B2)" should be above ① 0.74 V at least once when the "FUEL INJECTION" is +25%.
 "HO2S2 (B1)/(B2)" should be below ② 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

⊗ Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Reving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

ECM		Condition	Voltage
Connector	Terminal		
F142	110 [HO2S2 (bank 1)]	Keeping engine at idle for 10 minutes	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

A
EC6
C
D
E
F
G
H
I
J
K
L
M
N
O
P

ECM		Condition	Voltage
Connector	+ Terminal		
F142	110 [HO2S2 (bank 1)]	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.74 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	98 [HO2S2 (bank 2)]		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P014C, P014D, P014E, P014F A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P014C, P014D, P014E, P014F A/F SENSOR 1

DTC Description

INFOID:000000013924176

DTC DETECTION LOGIC

To judge malfunctions, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P014C	A/F SENSOR1 (B1) (O2 sensor slow response - rich to lean bank 1 sensor 1)	The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.
P014D	A/F SENSOR1 (B1) (O2 sensor slow response - lean to rich bank 1 sensor 1)	
P014E	A/F SENSOR1 (B2) (O2 sensor slow response - rich to lean bank 2 sensor 1)	
P014F	A/F SENSOR1 (B2) (O2 sensor slow response - lean to rich bank 2 sensor 1)	

POSSIBLE CAUSE

DTC P014C

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P014D

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P014E

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

DTC P014F

- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
- A/F sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

Do you have CONSULT?

- YES >> GO TO 2.
- NO >> GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

P014C, P014D, P014E, P014F A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

④ With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle at least 10 minutes.

CAUTION:

Never turn ignition switch to OFF during this step.

6. On CONSULT screen, select the following items in “DATA MONITOR” of “ENGINE”.
 - ENG SPEED
 - VHCL SPEED SE
 - COOLAN TEMP/S
 - B/FUEL SCHDL
 - A/F SEN1 DIAG3 (B1)
 - A/F SEN1 DIAG3 (B2)
7. Drive the vehicle under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

Item	Condition
ENG SPEED	1,000 – 1,400 rpm
VHCL SPEED SE	More than 58 km/h (37 MPH) constant speed
COOLAN TEMP/S	More than 80°C (176°F)
B/FUEL SCHDL	3 – 8 msec
Gear position	D position

8. Keep the driving condition and check the items status of “DATA MONITOR” as follows.

CAUTION:

This procedure must be performed by two or more persons.

NOTE:

If “PRCNT” changed to “ABSN”, proceed to [EC6-1220, "Component Function Check"](#).

DTC	Data monitor item	Status
<ul style="list-style-type: none">• P014C• P014D	A/F SEN1 DIAG3 (B1)	PRCNT
<ul style="list-style-type: none">• P014E• P014F	A/F SEN1 DIAG3 (B2)	

Is “PRCNT” displayed on CONSULT screen?

YES >> GO TO 3.

NO >> Refer to [EC6-1220, "Component Function Check"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE-2

④ With CONSULT

1. Keep the driving for 10 seconds or more.
2. Check the items status of “DATA MONITOR” as follows.

NOTE:

If “CMPLT” changed to “INCM”, proceed to [EC6-1220, "Component Function Check"](#).

DTC	Data monitor item	Status
<ul style="list-style-type: none">• P014C• P014D	A/F SEN1 DIAG2 (B1)	CMPLT
<ul style="list-style-type: none">• P014E• P014F	A/F SEN1 DIAG2 (B2)	

Is “CMPLT” displayed on CONSULT screen?

YES >> GO TO 4.

P014C, P014D, P014E, P014F A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> Proceed to [EC6-1334, "Diagnosis Procedure"](#).

4.PERFORM SELF-DIAGNOSIS

With CONSULT

Check the "SELF-DIAG RESULT".

Is any DTC detected?

YES >> Proceed to [EC6-1334, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

5.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

1. Start engine and warm it up to normal operating temperature.

2. Select Service \$01 with GST.

3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Is the total percentage within $\pm 15\%$?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

7.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

4. Start engine and let it idle at least 10 minutes.

CAUTION:

Never turn ignition switch to OFF during this step.

5. Check that the engine coolant temperature reaches normal operating temperature.

6. Drive the vehicle for 10 seconds or more under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

Item	Condition
Engine speed	1,000 – 1,400 rpm
Vehicle speed	More than 58 km/h (37 MPH) constant speed
Gear position	D position

7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1334, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P014C, P014D, P014E, P014F A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

INFOID:000000013924177

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E194. Refer to Ground Inspection in [GI-48. "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

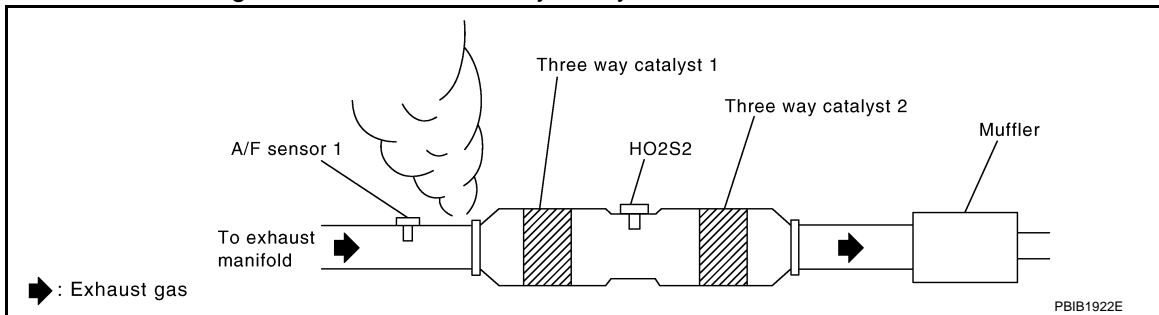
2. RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to [EM-231. "Exploded View"](#).

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

- YES >> Repair or replace.
NO >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Repair or replace.
NO >> GO TO 5.

5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to [EC6-1208. "Description"](#).
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC6-1337. "DTC Description"](#) or [EC6-1342. "DTC Description"](#).
NO >> GO TO 6.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
• P014C • P014D	1	F133	1	Ground	Battery voltage
• P014E • P014F	2	F134	1		

P014C, P014D, P014E, P014F A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F12
- IPDM E/R harness connector E123
- 15 A fuse (No. 48)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
• P014C • P014D	1	F133	3	F142	102	Existed
			4		101	
• P014E • P014F	2	F134	3		111	
			4		107	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
• P014C • P014D	1	F133	3	Ground	Not existed
			4		
• P014E • P014F	2	F134	3		
			4		

DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal		
• P014C • P014D	1	F142	102	Ground	Not existed
			101		
• P014E • P014F	2		111		
			107		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC6-1259, "Component Inspection \(A/F Sensor 1 Heater\)"](#).

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).

10. CHECK MASS AIR FLOW SENSOR

P014C, P014D, P014E, P014F A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Check both mass air flow sensor (bank 1 and bank 2).

Refer to [EC6-1259, "Component Inspection \(A/F Sensor 1 Heater\)"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning mass air flow sensor. Refer to [EM-165, "Exploded View"](#).

11. CHECK PCV VALVE

Refer to [EC6-1758, "Inspection"](#).

Is the inspection result normal?

YES >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to [EM-231, "Exploded View"](#).

NO >> Repair or replace PCV valve. Refer to [EM-193, "Exploded View"](#).

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Description

INFOID:000000013922678

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too lean), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0171	FUEL SYS-LEAN-B1 (System too lean bank 1)	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)
P0174	FUEL SYS-LEAN-B2 (System too lean bank 2)	

POSSIBLE CAUSE

DTC P0171

- 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 P0174

- 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

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	<ul style="list-style-type: none"> • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition 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 [EC6-275, "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 [EC6-1338, "Diagnosis Procedure"](#).
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 5 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1338, "Diagnosis Procedure"](#).
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)
---------------	-----------------------------

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1338, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922679

1.CHECK EXHAUST GAS LEAK

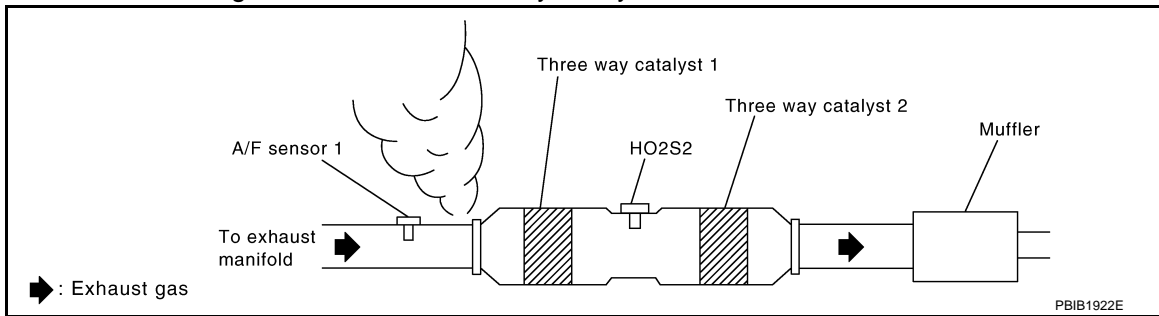
1. Start engine and run it at idle.

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

- Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

- YES >> Repair or replace error-detected parts.
 NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

- Listen for an intake air leak after the mass air flow sensor.
- Check PCV hose connection.

Is intake air leak detected?

- YES >> Repair or replace error-detected parts.
 NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect corresponding A/F sensor 1 harness connector.
- Disconnect ECM harness connector.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	+			-		Continuity
	A/F sensor 1			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0171	1	F133	3	F142	102	Existed
			4		101	
P0174	2	F134	3		111	
			4		107	

- Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	+			-	Continuity
	A/F sensor 1				
	Bank	Connector	Terminal		
P0171	1	F133	3	Ground	Not existed
			4		
P0174	2	F134	3		
			4		

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

DTC	+			-	Continuity
	ECM				
	Bank	Connector	Terminal		
P0171	1	F142	101	Ground	Not existed
			102		
P0174	2		107		
			111		

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

1. Release fuel pressure to zero. Refer to [EC6-279, "Work Procedure"](#).

2. Install fuel pressure gauge and check fuel pressure. Refer to [EC6-279, "Work Procedure"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to [FL-10, "Removal and Installation"](#).

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 SENSOR (Hz)" in "DATA MONITOR" mode with CONSULT.

For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

With GST

1. Install all removed parts.

2. Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

Is the measurement value within the specification?

YES >> GO TO 7.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC6-1286, "Diagnosis Procedure"](#).

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

1. Start engine.

2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Start engine and let it idle.

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

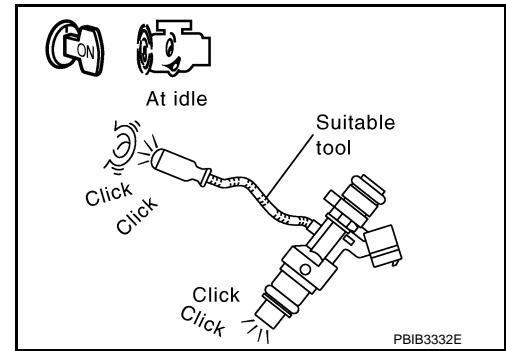
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC6-1724. "Diagnosis Procedure"](#).



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P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Description

INFOID:000000013922680

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too rich), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0172	FUEL SYS-RICH-B1 (System too rich bank 1)	<ul style="list-style-type: none">Fuel injection system does not operate properly.The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)
P0175	FUEL SYS-RICH-B2 (System too rich bank 2)	

POSSIBLE CAUSE

DTC P0172

- A/F sensor 1
- Fuel injector
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

DTC P0175

- A/F sensor 1
- Fuel injector
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	Stops feedback control of idle speed and controls with specified speed.
	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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.

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to [EC6-275. "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 [EC6-1343. "Diagnosis Procedure"](#).
NO >> Remove spark plugs and check for fouling, etc.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 10 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1343. "Diagnosis Procedure"](#).
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)
---------------	-----------------------------

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

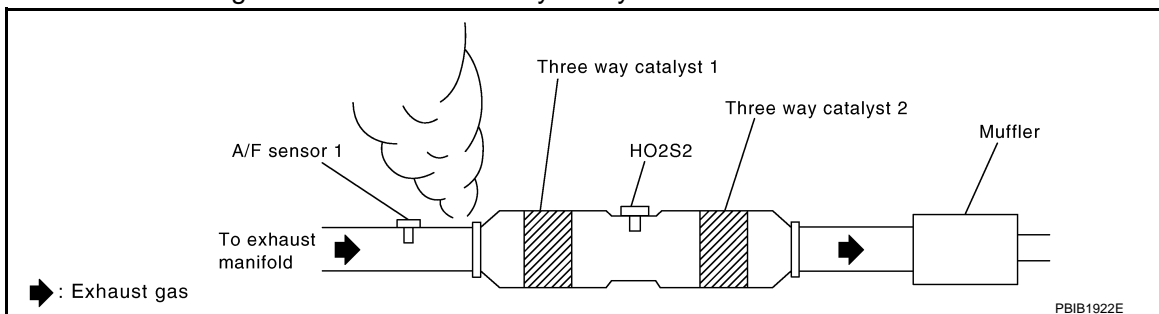
- YES >> Proceed to [EC6-1343. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922681

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

- YES >> Repair or replace.

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	+			-		Continuity
	A/F sensor 1			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0171	1	F133	3	F142	102	Existed
			4		101	
P0174	2	F134	3		111	
			4		107	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	+			-	Continuity
	A/F sensor 1				
	Bank	Connector	Terminal		
P0171	1	F133	3	Ground	Not existed
			4		
P0174	2	F134	3		
			4		

DTC	+			-	Continuity
	ECM				
	Bank	Connector	Terminal		
P0171	1	F142	101	Ground	Not existed
			102		
P0174	2		107		
			111		

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

1. Release fuel pressure to zero. Refer to [EC6-279. "Work Procedure"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC6-279. "Work Procedure"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace "fuel filter and fuel pump assembly". Refer to [FL-10. "Removal and Installation"](#).

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

5. CHECK MASS AIR FLOW SENSOR

With CONSULT

1. Install all removed parts.
2. Check "MASS AIR FLOW SENSOR (Hz)" in "DATA MONITOR" mode with CONSULT.
For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in "Service \$01" with GST.
For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

Is the measurement value within the specification?

YES >> GO TO 6.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC6-1286, "Diagnosis Procedure"](#).

6. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

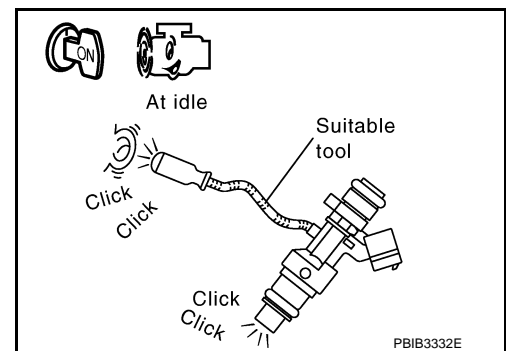
1. Start engine and let it idle.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC6-1724, "Diagnosis Procedure"](#).



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P0190 FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0190 FUEL RAIL PRESSURE SENSOR

DTC Description

INFOID:000000013924178

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0190	FUEL PRES SEN/CIRC (Fuel rail pressure sensor "A" circuit)	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.

POSSIBLE CAUSE

- Harness or connectors
 - The fuel rail pressure sensor circuit is open or shorted.
 - Sensor power supply 2 is shorted.
- Fuel rail pressure sensor
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine ON and wait at least 60 seconds.
2. Check DTC or 1st trip DTC.

Is DTC or 1st trip DTC detected?

- YES >> Proceed to [EC6-1346, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013924179

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-1

1. Turn ignition switch OFF.

P0190 FUEL RAIL PRESSURE SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect FRP sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage (Approx.)
Connector	+	-	
terminal			
F137	3	1	5 V

Inspection result normal?

YES >> GO TO 7.

NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and the ground.

+		-	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F137	3	Ground	5 V

Is inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.CHECK FRP SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	3	F143	80	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC6-1742, "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

5.CHECK FRP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

P0190 FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	1	F143	83	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 FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

7. CHECK FRP SENSOR SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		-		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F137	2	F143	53	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 FRP SENSOR

Check the FRP sensor. Refer to [EC6-1349, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P0190 FUEL RAIL PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Component Inspection (Fuel Rail Pressure Sensor)

INFOID:000000013924180

1. CHECK FRP SENSOR

WITH CONSULT

1. Turn ignition switch OFF.
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
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	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			Condition	Value (Approx.)
Connector	+	-		
	Terminal			
F143	53	83	[Engine is running] • Warm-up condition • Idle speed	1.14 – 1.46 V
			[Engine is running] • Warm-up condition • Revving 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-182. "Exploded View"](#).

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P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0197, P0198 EOT SENSOR

DTC Description

INFOID:000000013922697

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low)	An excessively low voltage from the sensor is sent to ECM.
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The engine oil temperature sensor circuit is open or shorted.)
- Engine oil temperature sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Others	Exhaust valve timing control does not function.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1350, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922698

1.CHECK EOT SENSOR POWER SUPPLY

1. Disconnect engine oil temperature (EOT) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EOT sensor harness connector and ground.

+		-	Voltage (V)
EOT sensor			
Connector	Terminal		
F87	1	Ground	Approx. 5

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 2.

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

2. CHECK EOT SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EOT sensor harness connector and ECM harness connector.

+		-		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F87	1	F143	50	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

3. CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EOT sensor harness connector and ECM harness connector.

+		-		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F87	2	F142	100	Existed

4. Also check harness for short to ground and 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

Refer to [EC6-1351, "Component Inspection \(Engine Oil Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to [EM-238, "Exploded View"](#).

Component Inspection (Engine Oil Temperature Sensor)

INFOID:000000013922699

1. CHECK ENGINE OIL TEMPERATURE SENSOR

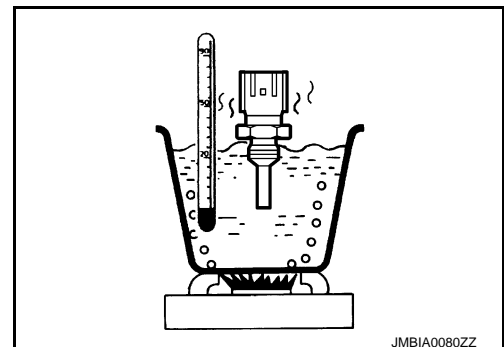
1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor. Refer to [EM-238, "Exploded View"](#).
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 – 2.90
		50 (122)	0.68 – 1.00
		90 (194)	0.236 – 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to [EM-238, "Exploded View"](#).



P0201, P0202, P0203, P0204, P0205, P0206 FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0201, P0202, P0203, P0204, P0205, P0206 FUEL INJECTOR

DTC Description

INFOID:000000013922700

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0201	INJECTOR CIRC-CYL1 (Injector circuit/open - cylinder 1)	ECM detects No. 1 injector circuit is open or shorted.
P0202	INJECTOR CIRC-CYL2 (Injector circuit/open - cylinder 2)	ECM detects No. 2 injector circuit is open or shorted.
P0203	INJECTOR CIRC-CYL3 (Injector circuit/open - cylinder 3)	ECM detects No. 3 injector circuit is open or shorted.
P0204	INJECTOR CIRC-CYL4 (Injector circuit/open - cylinder 4)	ECM detects No. 4 injector circuit is open or shorted.
P0205	INJECTOR CIRC-CYL5 (Injector circuit/open - cylinder 5)	ECM detects No. 5 injector circuit is open or shorted.
P0206	INJECTOR CIRC-CYL6 (Injector circuit/open - cylinder 6)	ECM detects No. 6 injector circuit is open or shorted.

POSSIBLE CAUSE

- Harness or connectors (The fuel injector circuit is open or shorted.)
- Fuel injector
- ECM

FAIL-SAFE

Not applicable

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, conform that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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 [EC6-1352, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922701

1.CHECK FUEL INJECTOR

Refer to [EC6-1724, "Component Function Check"](#).

Is inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0222, P0223, P2132, P2133 TP SENSOR

DTC Description

INFOID:000000013922702

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0222	TP SEN 1/CIRC-B1 (Throttle/Pedal position sensor/switch "B" circuit low)	An excessively low voltage from the TP sensor 1 is sent to ECM.
P0223	TP SEN 1/CIRC-B1 (Throttle/Pedal position sensor/switch "B" circuit high)	An excessively high voltage from the TP sensor 1 is sent to ECM.
P2132	TP SEN 1/CIRC-B2 (Throttle/Pedal position sensor/switch "F" circuit low)	An excessively low voltage from the TP sensor 1 is sent to ECM.
P2133	TP SEN 1/CIRC-B2 (Throttle/Pedal position sensor/switch "F" circuit high)	An excessively high voltage from the TP sensor 1 is sent to ECM.

C

D

E

F

POSSIBLE CAUSE

DTC P0222 and P0223

- Harness or connectors [TP sensor 1 (bank 1) circuit is open or shorted.]
- Electric throttle control actuator (TP sensor 1) (bank 1)

G

DTC P2132 and P2133

- Harness or connectors [TP sensor 1 (bank 2) circuit is open or shorted.]
- Electric throttle control actuator (TP sensor 1) (bank 2)

H

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	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.

I

J

K

L

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0222, P0223, P2132 or P2133 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).

NO >> GO TO 2.

M

N

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.

O

P

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1354, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922703

1.CHECK DTC PRIORITY

If DTC P0222, P0223, P2132 or P2133 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

DTC	+			-	Voltage (Approx.)
	Electric throttle control actuator				
	Bank	Connector	Terminal		
P0222, P0223	1	F118	5	Ground	5 V
P2132, P2133	2	F119	5		

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0222, P0223	1	F118	5	F143	35	Existed
P2132, P2133	2	F119	5	F142	105	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES-1 (P0222 or P0223 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
YES-2 (P2132 or P2133 is detected)>>GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0222, P0223	1	F118	4	F143	44	Existed
P2132, P2133	2	F119	4	F142	104	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P0222, P0223	1	F118	6	F143	43	Existed
P2132, P2133	2	F119	6	F142	106	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 8.

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> Repair or replace error-detected parts.

8. CHECK THROTTLE POSITION SENSOR

Refer to [EC6-1306, "Component Inspection \(Throttle Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection (Throttle Position Sensor)

INFOID:0000000013922704

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC6-272, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
F143	43 [TP sensor 1 (bank 1)]	44	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F142	106 [TP sensor 1 (bank 2)]	104	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F143	48 [TP sensor 2 (bank 1)]	44	Fully released	Less than 4.75
			Fully depressed	More than 0.36
F142	112 [TP sensor 2 (bank 2)]	104	Fully released	Less than 4.75
			Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Proceed to [EC6-272, "Description"](#).

>> INSPECTION END

P0234 TC SYSTEM

DTC Description

INFOID:000000013922705

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0234	TC SYSTEM-B1 (Turbocharger/supercharger "A" overboost condition)	Turbocharger boost is excessively high.

POSSIBLE CAUSE

- Harness or connectors
[Electric wastegate control actuator (bank 1) circuit.]
[Turbocharger boost sensor (bank 1) circuit]
- Electric wastegate control actuator (bank 1)
- Turbocharger boost sensor (bank 1)
- Turbocharger (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of turbocharger system circuit.

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "WASTEGATE ACTUATOR".
3. Operate "Up" or "Down", set "W/G ACTUATOR POSITION B1" to 0.002 m, and make a quick short note of value "V1" of "W/G ACTUATOR POSI SEN B1".
4. Operate "Up" or "Down", set "W/G ACTUATOR POSITION B1" to 0.006 m, and make a quick short note of value "V2" of "W/G ACTUATOR POSI SEN B1".

Do the values of "V1" and "V2" change (visually, ACTUATOR SHAFT operates) and "V2" minus "V1" becomes equal to or more than 1.3 V?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-1357, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013922706

1.CHECK TURBOCHARGER BOOST SENSOR

Perform diagnosis procedure for turbocharger boost sensor. Refer to [EC6-1357, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Perform trouble diagnosis for electric wastegate control actuator. Refer to [EC6-1264, "Diagnosis Procedure"](#).

P0234 TC SYSTEM

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.PERFORM ELECTRIC WASTEGATE CONTROL ACTUATOR INITIALIZATION

1. Perform electric wastegate control actuator initialization. Refer to [EC6-277, "Description"](#).
2. Perform drive test.
3. Check DTC.

Is DTC P0234 detected again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

P0235, P0239 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0235, P0239 TC BOOST SENSOR

DTC Description

INFOID:000000013922707

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0235	TURBO BOOST SENSOR (Turbocharger/supercharger boost sensor "A" circuit)	An excessively low voltage from the turbocharger boost sensor is sent to ECM.
P0239	TC/SC boost sensor B (Turbocharger/supercharger boost sensor "B" circuit)	

POSSIBLE CAUSE

- Harness or connectors (Turbocharger boost sensor circuit is open or shorted.)
- Turbocharger boost sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0235 or P0239 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).

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

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1360, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P0235, P0239 TC BOOST SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

INFOID:000000013922708

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P0235 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).

NO >> GO TO 2.

2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

+			-	Voltage (Approx.)
Turbocharger boost sensor				
DTC	Connector	Terminal		
P0235	F90	2	Ground	5 V
P0239	F91			

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform [EC6-1742. "Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4. 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.

+			-		Continuity
Turbocharger boost sensor			ECM		
DTC	Connector	Terminal	Connector	Terminal	
P0235	F90	4	F143	23	Existed
P0239	F91	4		68	

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 TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+			-		Continuity
Turbocharger boost sensor			ECM		
DTC	Connector	Terminal	Connector	Terminal	
P0235	F90	1	F143	58	Existed
P0239	F91	1		63	

2. Also check harness for short to ground and to power.

P0235, P0239 TC BOOST SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6. CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to [EC6-1361, "Component Inspection \(Turbocharger Boost Sensor\)"](#).

Is the inspection result normal?

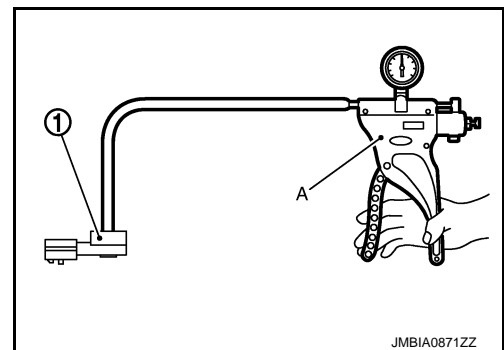
- YES >> INSPECTION END
- NO >> Replace malfunctioning turbocharger boost sensor. Refer to [EM-167, "Exploded View"](#).

Component Inspection (Turbocharger Boost Sensor)

INFOID:000000013922709

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)].

Bank	Connector	ECM		Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
		+	-		
		Terminal			
1	F143	58	23	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
2		63	68		
1		58	23	40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V
2		63	68		

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning turbocharger boost sensor. Refer to [EM-167, "Exploded View"](#).

P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922716

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P023B	Charged air cooler coolant pump (Charge air cooler coolant pump control circuit low)	A signal duty of the CAC coolant pump operation command sent from ECM is less than 2% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P023B is detected?

- YES >> Proceed to [EC6-1362, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922717

1.COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	Existed

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check CAC cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4	Ground	Existed

Is the inspection result normal?

P023B CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922718

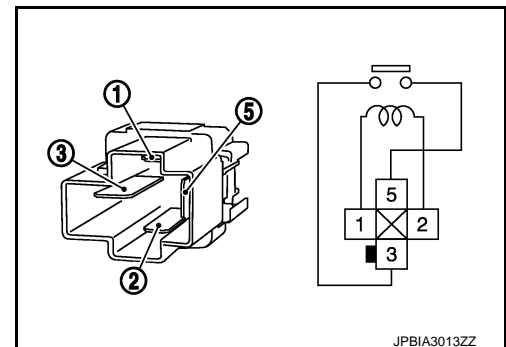
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922719

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P023C	Charged air cooler coolant pump (Charge air cooler coolant pump control circuit high)	A signal duty of the CAC coolant pump operation command sent from ECM is more than 98% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P023C is detected?

YES >> Proceed to [EC6-1366, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922720

1.COMPONENT FUNCTION CHECK

④ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

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P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7. CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8. CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9. CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	Existed

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10. CHECK CAC COOLING RELAY

Check CAC cooling relay. Refer to [EC6-1369. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11. CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4	Ground	Existed

Is the inspection result normal?

P023C CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922721

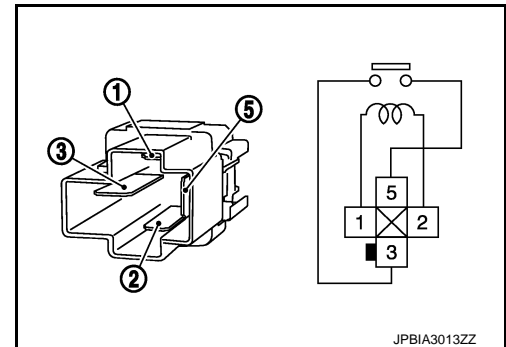
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

DTC Description

INFOID:00000001392722

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

- 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 illuminating.
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 illuminate when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
A misfire malfunction can be detected in any one cylinder or in multiple cylinders.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0300	MULTI CYL MISFIRE (Random/Multiple cylinder misfire detected)	Multiple cylinders misfire.
P0301	CYL 1 MISFIRE (Cylinder 1 misfire detected)	No. 1 cylinder misfires.
P0302	CYL 2 MISFIRE (Cylinder 2 misfire detected)	No. 2 cylinder misfires.
P0303	CYL 3 MISFIRE (Cylinder 3 misfire detected)	No. 3 cylinder misfires.
P0304	CYL 4 MISFIRE (Cylinder 4 misfire detected)	No. 4 cylinder misfires.
P0305	CYL 5 MISFIRE (Cylinder 5 misfire detected)	No. 5 cylinder misfires.
P0306	CYL 6 MISFIRE (Cylinder 6 misfire detected)	No. 6 cylinder misfires.

POSSIBLE CAUSE

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The fuel injector circuit is open or shorted
- Fuel injector
- Intake air leak
- The ignition signal circuit is open or shorted
- Lack of fuel
- Signal plate
- A/F sensor 1
- Incorrect PCV hose connection

FAIL-SAFE

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	<ul style="list-style-type: none"> Stops feedback control of idle speed and controls with specified speed. Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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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.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and let it idle for about 15 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1372, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and drive the vehicle under similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

Similar conditions to (1st trip) Freeze Frame Data mean that the following conditions should be satisfied at the same time.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data \pm 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)
Base fuel schedule	Base fuel schedule in the freeze frame data \times (1 \pm 0.1)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

Driving time varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes

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P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Engine speed	Time
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1372, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922723

1.CHECK GROUND CONNECTION

Check the following.

- Connection condition of the ground F52
- Connection condition of the ground harness between engine assembly and vehicle body (If equipped)

Is the inspection result normal?

YES >> GO TO 2

NO >> Repair or replace error-detected parts.

2.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 3.

3.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 4.

YES-2 >> Without CONSULT: GO TO 5.

NO >> Repair or replace it.

4.PERFORM POWER BALANCE TEST

 **With CONSULT**

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 5.

5.CHECK FUNCTION OF FUEL INJECTOR-I

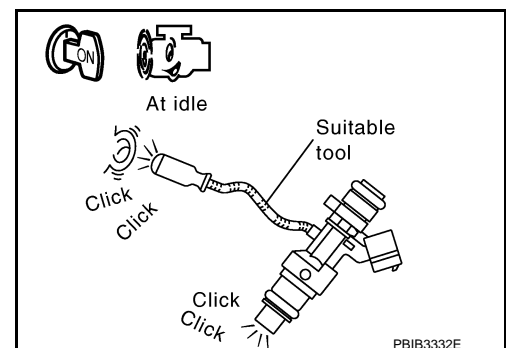
1. Start engine and let it idle.
2. Listen to each fuel injector operation sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC6-1724, "Diagnosis Procedure"](#).



6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

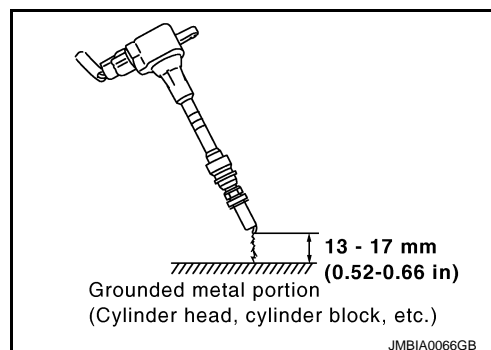
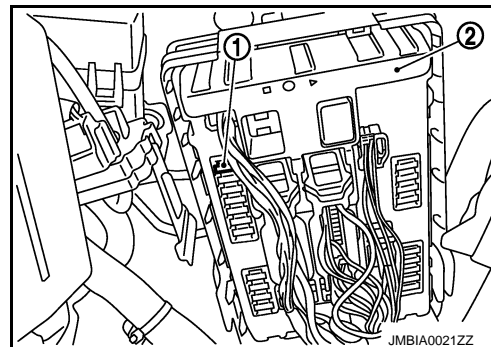
Perform the following procedure in a place where with no combustibles objects and good ventilation.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse ① in IPDM E/R ② 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:

- Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.

NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a non-malfunctioning spark plug.
3. Crank engine for 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 [EC6-1736. "Diagnosis Procedure"](#).

8. CHECK SPARK PLUG

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P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

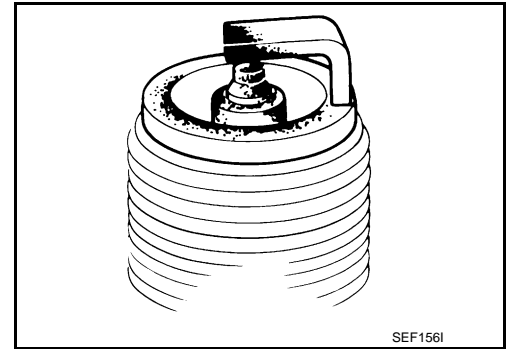
< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160. "Removal and Installation"](#).
- NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160. "Removal and Installation"](#).

10. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-150. "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

11. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to [EC6-279. "Work Procedure"](#).
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC6-279. "Work Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 13.
- NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly".
- NO >> Repair or replace.

13. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to [EC6-262. "Work Procedure"](#).

For specification, refer to [EC6-1017. "Idle Speed"](#) and [EC6-1017. "Ignition Timing"](#).

Is the inspection result normal?

- YES >> GO TO 14.
- NO >> Follow the [EC6-262. "Work Procedure"](#).

14. 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.

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Bank	+		-		Continuity
	A/F sensor 1		ECM		
	Connector	Terminal	Connector	Terminal	
1	F133	3	F142	102	Existed
		4		101	
2	F134	3		111	
		4		107	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

Bank	+		-	Continuity
	A/F sensor 1			
	Connector	Terminal		
1	F133	3	Ground	Not existed
		4		
2	F134	3		
		4		

Bank	+		-	Continuity
	ECM			
	Connector	Terminal		
1	F142	101	Ground	Not existed
		102		
		107		
2	111			

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

15.CHECK A/F SENSOR 1 HEATER

Refer to [EC6-1259, "Component Inspection \(A/F Sensor 1 Heater\)"](#).

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace (malfunctioning) A/F sensor 1. Refer to [EM-231, "Exploded View"](#).

16.CHECK MASS AIR FLOW SENSOR

With CONSULT

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.

For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

With GST

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to [EC6-1017, "Mass Air Flow Sensor"](#).

Is the measurement value within the specification?

YES >> GO TO 17.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC6-1286, "Diagnosis Procedure"](#).

17.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in [EC6-1002, "Symptom Table"](#).

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace.

18.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 [EC6-114, "On Board Diagnosis Function"](#) (Without CONSULT) or [EC6-115, "CONSULT Function"](#) (With CONSULT).

>> INSPECTION END

P0327, P0328, P0332, P0333 KS

DTC Description

INFOID:000000013922724

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0327	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit low bank 1)	An excessively low voltage from the sensor is sent to ECM.
P0328	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit high bank 1)	An excessively high voltage from the sensor is sent to ECM.
P0332	KNOCK SEN/CIRC-B2 (Knock sensor 2 circuit low bank 2)	An excessively low voltage from the sensor is sent to ECM.
P0333	KNOCK SEN/CIRC-B2 (Knock sensor 2 circuit high bank 2)	An excessively high voltage from the sensor is sent to ECM.

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POSSIBLE CAUSE

DTC P0327 and P0328

- Harness or connectors [The knock sensor (bank 1) circuit is open or shorted.]
- Knock sensor (bank 1)

DTC P0332 and P0333

- Harness or connectors [The knock sensor (bank 2) circuit is open or shorted.]
- Knock sensor (bank 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1377. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922725

1. CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector and ECM harness connector.
3. Check the continuity between knock sensor harness connector and ECM harness connector.

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DTC	Knock sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0327, P0328	1	F201	2	F143	84	Existed
P0332, P0333	2	F202	2			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

DTC	Knock sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0327, P0328	1	F201	1	F143	8	Existed
P0332, P0333	2	F202	1		86	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK KNOCK SENSOR

Refer to [EC6-1378, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor. Refer to [EM-270, "Exploded View"](#).

Component Inspection

INFOID:000000013922726

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.

P0327, P0328, P0332, P0333 KS

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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 MΩ.

Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature	20°C (68°F)	532 – 588

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor. Refer to [EM-270. "Exploded View"](#).

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P0335 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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P0335 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:00000001392727

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor "A" circuit)	Crankshaft position sensor signal is not input to ECM for approximately 1 consecutive second or more while all of the following conditions are satisfied: <ul style="list-style-type: none"> • Engine is running or at the start of engine. • Camshaft position sensor signal is inputted.
		Crankshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second or more while all of the following conditions are satisfied: <ul style="list-style-type: none"> • Engine is running or at the start of engine. • Camshaft position sensor signal is inputted.

POSSIBLE CAUSE

- Harness or connectors
(Crankshaft position sensor circuit is open or shorted.)
- Crankshaft position sensor
- Signal plate

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none"> • No stratified charge combustion at starting (cold start). • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none"> • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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:

Before performing the following procedure, check that battery voltage as the following.

- Ignition switch ON: More than 11 V

P0335 CRANKSHAFT POSITION SENSOR

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- Engine cranking: More than 7 V

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Shift the selector lever in N range.
3. Start the engine and let it idle at least 5 seconds.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1381. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922728

1.CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector and ground.

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F88	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F143	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F143	28	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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P0335 CRANKSHAFT POSITION SENSOR

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- YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	F143	31	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK CKP SENSOR

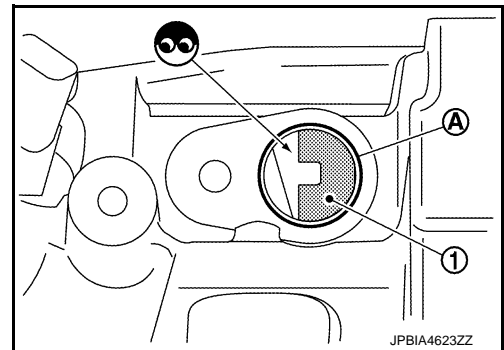
Check CKP sensor. Refer to [EC6-1382, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

6.CHECK GEAR TOOTH

1. Remove CKP sensor. Refer to [EM-198, "Exploded View"](#).
2. Look into the mounting hole (A) of the CKP sensor to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace the signal plate. Refer to [EM-198, "Exploded View"](#).

Component Inspection (Crankshaft Position Sensor)

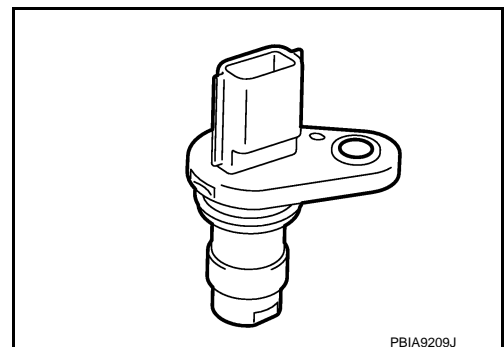
INFOID:000000013922729

1.CHECK CRANKSHAFT POSITION (CKP) SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect CKP sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).



P0335 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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2.CHECK CKP SENSOR-2

Check the resistance between CKP sensor terminals as per the following.

CKP sensor		Resistance [at 25°C (77°F)]
+	-	
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

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P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0340, P0345 CMP SENSOR (PHASE)

DTC Description

INFOID:000000013922730

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0340	CMP SEN/CIRC-B1 (Camshaft position sensor "A" circuit bank 1)	<ul style="list-style-type: none">The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.
P0345	CMP SEN/CIRC-B2 (Camshaft position sensor "A" circuit bank 2)	<ul style="list-style-type: none">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.

POSSIBLE CAUSE

DTC P0340

- Harness or connectors [CMP sensor (PHASE) (bank 1) circuit is open or shorted.]
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft (INT)
- Starter motor
- Starting system circuit
- Dead (Weak) battery

DTC P0345

- Harness or connectors
 - CMP sensor (PHASE) (bank 2) circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Camshaft position sensor (PHASE) (bank 2)
- Camshaft (INT)
- Starter motor
- Starting system circuit
- Dead (Weak) battery
- Each sensor, connector with sensor power supply 2 circuit

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P0340 or P0345 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).
- NO >> GO TO 2.

2. PRECONDITIONING

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

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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 3.

3.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 [EC6-1385, "Diagnosis Procedure"](#).
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1385, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922731

1.CHECK DTC PRIORITY

If DTC P0340 or P0345 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
NO >> GO TO 2.

2.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

- YES >> GO TO 3.
NO >> Check starting system. (Refer to [STR-12, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-15, "Work Flow \(Without GR8-1200 NI\)"](#). For details, Refer to [STR-5, "Special Service Tools"](#).)

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY

1. Disconnect intake camshaft position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between intake camshaft position sensor harness connector and ground.

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

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DTC	Intake camshaft position sensor			Ground	Voltage (V)
	Bank	Connector	Terminal		
P0340	1	F135	1	Ground	Approx. 5
P0345	2	F97	1		

Is the inspection result normal?

YES >> GO TO 6.

NO-1 >> P0340: Repair open circuit, short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 5.

5. CHECK INTAKE CAMSHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake camshaft position sensor harness connector and ECM harness connector.

Intake camshaft position sensor			ECM		Continuity
Bank	Connector	Terminal	Connector	Terminal	
2	F97	1	F143	85	Existed

Is the inspection result normal?

YES >> Check sensor power supply 2 circuit. Refer to [EC6-1742, "Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

6. CHECK INTAKE CAMSHAFT POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake camshaft position sensor harness connector and ECM harness connector.

DTC	Intake camshaft position sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0340	1	F135	2	F143	29	Existed
P0345	2	F97	2		82	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

7. CHECK INTAKE CAMSHAFT POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between intake camshaft position sensor harness connector and ECM harness connector.

DTC	Intake camshaft position sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0340	1	F135	3	F143	26	Existed
P0345	2	F97	3		77	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

P0340, P0345 CMP SENSOR (PHASE)

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC6-1387, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

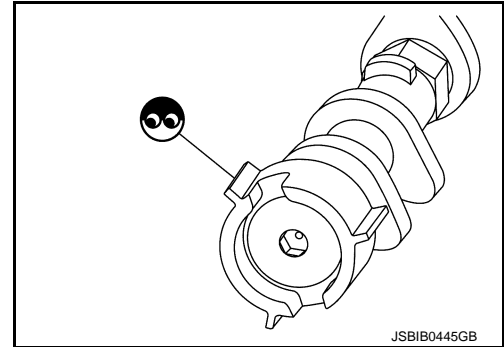
NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to [EM-250, "Exploded View"](#).

9. CHECK CAMSHAFT (INTAKE)

Check the following.

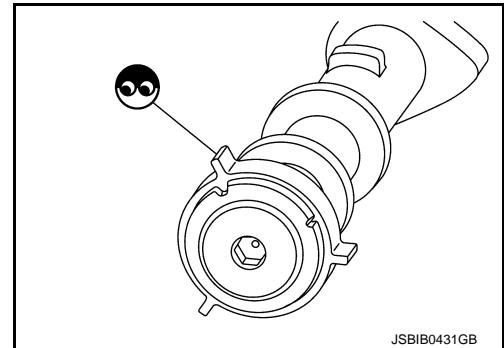
BANK 1

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end



BANK 2

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

Component Inspection

INFOID:0000000013922732

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. Refer to [EM-250, "Exploded View"](#).

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

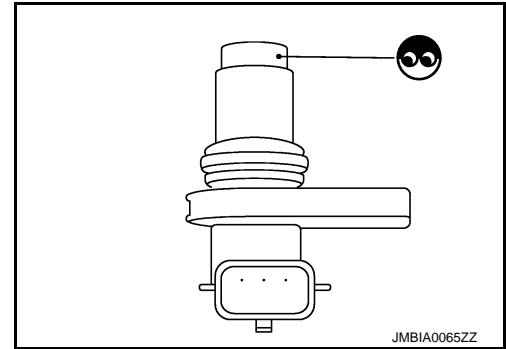
[VR30DDTT FOR MEXICO]

5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to [EM-250, "Exploded View"](#).



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

Terminals (Polarity)	Resistance (Ω)
1 (+) - 2 (-)	Except 0 or ∞ [at 25°C (77°F)]
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to [EM-250, "Exploded View"](#).

P0365 EXHAUST CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0365 EXHAUST CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013922733

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0365	CAMSHAFT POSITION SENSOR B B1 (Camshaft position sensor "B" circuit bank 1)	Exhaust camshaft position sensor signal is not inputted to ECM for approximately 1 consecutive second or more during engine run (600 rpm or more) or at an engine start.
		Exhaust camshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second or more during engine run (400 rpm or more) or at an engine start.

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POSSIBLE CAUSE

- Harness or connectors
(Exhaust camshaft position sensor (bank 1) circuit is open or shorted.)
- Exhaust camshaft position sensor (bank 1)
- Exhaust camshaft (bank 1) (sensor rotor)

F

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

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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:

Before performing the following procedure, check that battery voltage as the following.

- Ignition switch ON: More than 11 V
- Engine cranking: More than 7 V

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Shift the selector lever in N range.
3. Start the engine and let it idle at least 5 seconds.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1389, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

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Diagnosis Procedure

INFOID:000000013922734

1. CHECK CAMSHAFT POSITION (EXHAUST CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect camshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust CMP sensor harness connector and ground.

P0365 EXHAUST CAMSHAFT POSITION SENSOR

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+		-	Voltage (Approx.)
Exhaust CMP sensor			
Connector	Terminal		
F101	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 2.

2. CHECK EXHAUST CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust CMP sensor harness connector and ECM harness connector.

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F101	1	F143	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

3. CHECK EXHAUST CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust CMP sensor harness connector and ECM harness connector.

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F101	2	F143	29	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 EXHAUST CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between exhaust CMP sensor harness connector and ECM harness connector.

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F101	3	F143	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace error-detected parts.

5. CHECK EXHAUST CMP SENSOR

Check exhaust CMP sensor. Refer to [EC6-1382, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace exhaust CMP sensor. Refer to [EM-250, "Exploded View"](#).

P0365 EXHAUST CAMSHAFT POSITION SENSOR

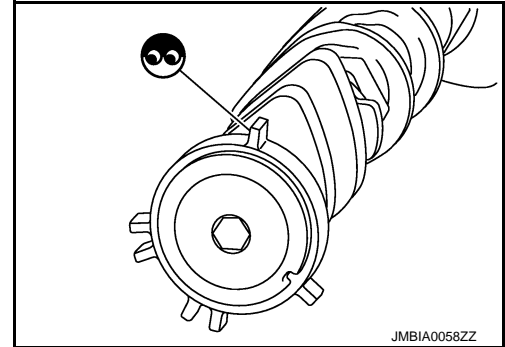
< DTC/CIRCUIT DIAGNOSIS >

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6.CHECK EXHAUST CAMSHAFT (BANK 1)

Check the following items:

- Accumulation of debris to the signal plate exhaust camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection

INFOID:0000000013922735

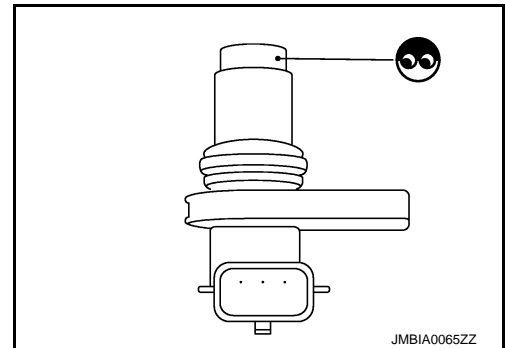
1.CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2.CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P0390 EXHAUST CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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P0390 EXHAUST CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013922736

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0390	Camshaft position sensor B bank 2 (Camshaft position sensor "B" circuit bank 2)	Exhaust camshaft position sensor signal is not inputted to ECM for approximately 1 consecutive second or more during engine run (600 rpm or more) or at an engine start.
		Exhaust camshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second or more during engine run (400 rpm or more) or at an engine start.

POSSIBLE CAUSE

- Harness or connectors
(Exhaust camshaft position sensor (bank 2) circuit is open or shorted.)
- Exhaust camshaft position sensor (bank 2)
- Exhaust camshaft (bank 2) (sensor rotor)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

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:

Before performing the following procedure, check that battery voltage as the following.

- Ignition switch ON: More than 11 V
- Engine cranking: More than 7 V

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Shift the selector lever in N range.
3. Start the engine and let it idle at least 5 seconds.
4. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1392, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922737

1. CHECK EXHAUST CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect camshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust CMP sensor harness connector and ground.

P0390 EXHAUST CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage (Approx.)
Exhaust CMP sensor			
Connector	Terminal		
F104	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 2.

2. CHECK EXHAUST CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust CMP sensor harness connector and ECM harness connector.

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F104	1	F143	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

3. CHECK EXHAUST CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust CMP sensor harness connector and ECM harness connector.

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F104	2	F143	82	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 EXHAUST CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between exhaust CMP sensor harness connector and ECM harness connector.

Exhaust CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F104	3	F143	75	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace error-detected parts.

5. CHECK EXHAUST CMP SENSOR

Check exhaust CMP sensor . Refer to [EC6-1382, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace exhaust CMP sensor . Refer to [EM-250, "Exploded View"](#).

P0390 EXHAUST CAMSHAFT POSITION SENSOR

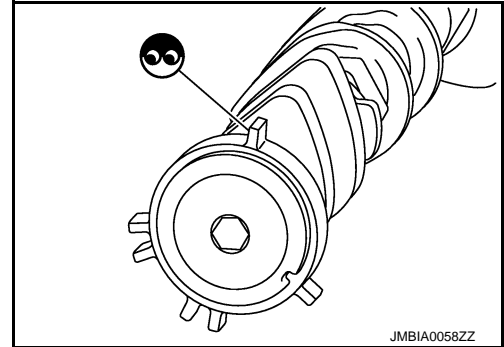
< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

6. CHECK EXHAUST CAMSHAFT (BANK 2)

Check the following items:

- Accumulation of debris to the signal plate exhaust camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection

INFOID:0000000013922738

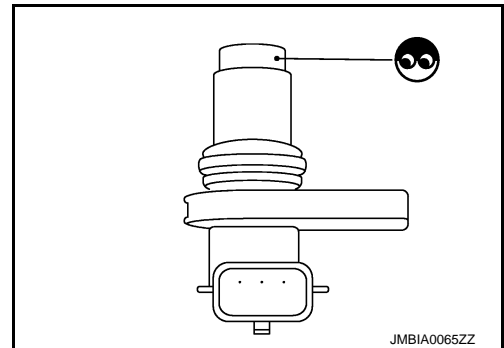
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0420, P0430 THREE WAY CATALYST FUNCTION

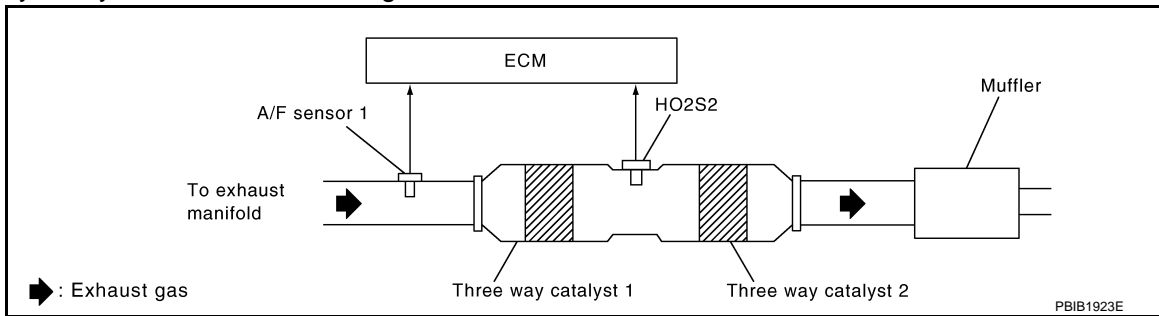
DTC Description

INFOID:000000013922739

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 1 with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst 1 malfunction is diagnosed.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold bank 1)	<ul style="list-style-type: none"> • Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.
P0430	TW CATALYST SYS-B2 (Catalyst system efficiency below threshold bank 2)	

POSSIBLE CAUSE

- Three way catalyst (manifold)
- Exhaust tube
- Intake air leaks
- Fuel injector
- Fuel injector leaks
- Spark plug
- Improper ignition timing

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 7.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. 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).
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
9. Open engine hood.
10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT.
11. Rev engine up to about 2,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
12. Check the indication of "CATALYST".

Which is displayed on CONSULT screen?

CMPLT >> GO TO 6.

INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to about 2,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 6.

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1397, "Diagnosis Procedure"](#).

NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Check the voltage between ECM harness connector terminals under the following condition.

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

DTC	ECM			Condition	Voltage
	Connector	+	-		
		Terminal	Terminal		
P0420	F142	110 [HO2S2 (bank 1)]	99	Keeping engine speed at 2,500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. • 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0
P0430		98 [HO2S2 (bank 2)]			

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-1397, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013922740

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dents.

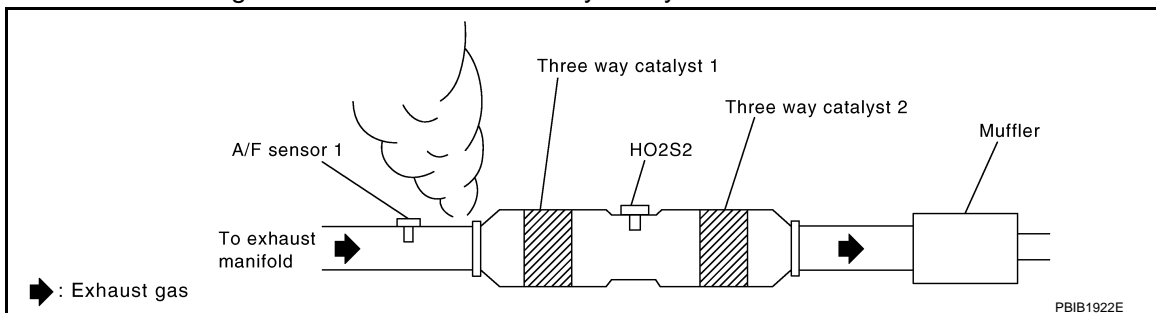
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to [EC6-262, "Work Procedure"](#).

For specification, refer to [EC6-1017, "Idle Speed"](#) and [EC6-1017, "Ignition Timing"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the [EC6-262, "Work Procedure"](#).

5. CHECK FUEL INJECTORS

Check the fuel injector. Refer to [EC6-1724, "Component Function Check"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform [EC6-1724, "Diagnosis Procedure"](#).

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

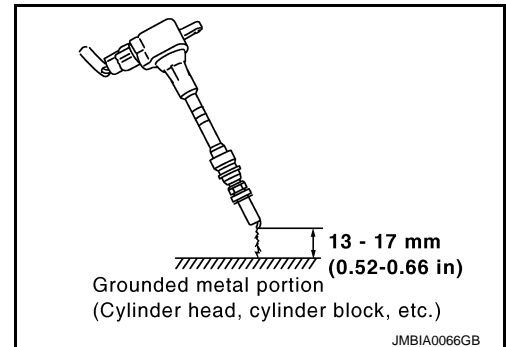
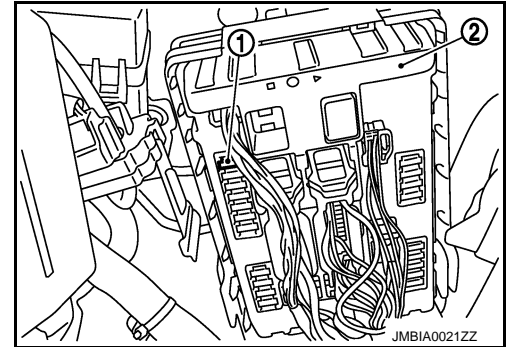
Perform the following procedure in a place where with no combustible objects and good ventilation.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse ① in IPDM E/R ② 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:

- Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.

NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a non-malfunctioning spark plug.
3. Crank engine for 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 [EC6-1736. "Diagnosis Procedure"](#).

8. CHECK SPARK PLUG

P0420, P0430 THREE WAY CATALYST FUNCTION

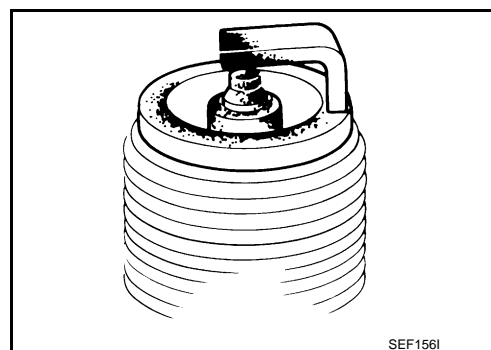
[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160. "Exploded View"](#).
- NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [EM-160. "Exploded View"](#).

10. PERFORM DTC CONFIRMATION PROCEDURE

1. Replace three way catalyst. Refer to [EM-227. "Removal and Installation"](#).
2. Perform DTC confirmation procedure. Refer to [EC6-1395. "DTC Description"](#).

Is DTC "P0420" or "P0430" detected?

- YES >> Replace all fuel injector. Refer to [EM-182. "Removal and Installation"](#)
- NO >> INSPECTION END

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Description

INFOID:000000013924189

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0444	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit open)	An excessively low voltage signal is sent to ECM through the valve

POSSIBLE CAUSE

- Harness or connectors (The solenoid valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1400. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013924190

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F136	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

EVAP canister purge volume control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F136	1	E123	59	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F136	2	F142	155	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓜ With CONSULT

1. Reconnect all harness connectors disconnected.
2. Start the engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

- YES >> INSPECTION END
NO >> GO TO 5.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC6-1401, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [FL-19, "Hydraulic Layout"](#).

Component Inspection

INFOID:0000000013924191

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. Start the engine.

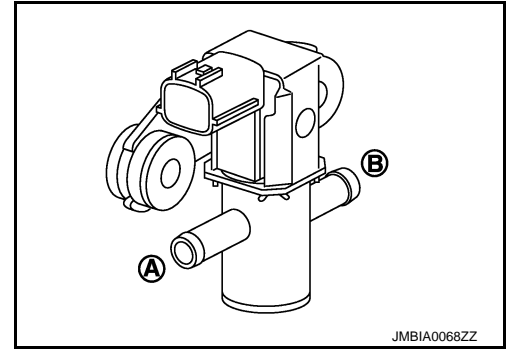
P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
6. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

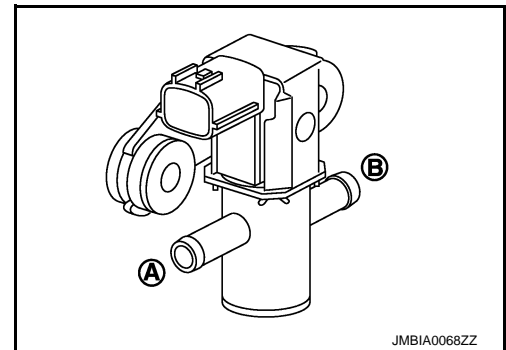
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



⊗ Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to [FL-19, "Hydraulic Layout"](#).

P0500 VSS

Description

INFOID:0000000013922773

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.

EC6

DTC Description

INFOID:0000000013922774

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0500	VEHICLE SPEED SEN A (Vehicle speed sensor "A")	At 20 km/h (13 MPH), ECM detects the following 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 communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).

POSSIBLE CAUSE

- 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

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	<ul style="list-style-type: none"> • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Shift the selector lever to D range and wait at least for 2 seconds.
3. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-1404. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922775

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-111. "VR30DDTT : DTC Index"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to [BRC-72. "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 [MWI-87. "DTC Index"](#).

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 [TM-184. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace or replace error-detected parts.

5.CHECK WHEEL SENSOR

Check wheel sensor. Refer to [BRC-116. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace or replace error-detected parts.

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0520 EOP SENSOR

DTC Description

INFOID:000000013922785

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0520	EOP SENSOR/SWITCH [Engine oil pressure (EOP) sensor circuit]	ECM detects the following status continuously for 5 seconds or more: <ul style="list-style-type: none"> A voltage signal transmitted from the engine oil pressure sensor is lower than 0.3 V. A voltage signal transmitted from the engine oil pressure sensor is higher than 5.02 V.

C

D

POSSIBLE CAUSE

- Harness or connectors (Engine oil pressure sensor circuit is open or shorted.)
- Engine oil level abnormality
- Engine oil pressure sensor
- Sensor power supply 2 circuit

E

F

FAIL-SAFE

Not applicable

G

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

J

K

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1405, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

L

Diagnosis Procedure

INFOID:000000013922786

M

1. CHECK EOP SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect EOP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EOP sensor harness connector terminals.

N

O

Connector	EOP sensor		Voltage (Approx.)
	+	-	
	terminal		
F42	3	1	5 V

P

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> GO TO 4.

P0520 EOP SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

2. CHECK EOP SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

+		-		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	2	F143	51	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK EOP SENSOR

Check EOP sensor. Refer to [EC6-1407, "Component Inspection"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Repair or replace error-detected parts.

4. CHECK EOP SENSOR POWER SUPPLY-II

Check the voltage between EOP sensor harness connector terminal and ground.

+		-	Voltage (Approx.)
EOP sensor			
Connector	Terminal		
F42	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. CHECK EOP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

+		-		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	3	F143	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check sensor power supply 2 circuit. Refer to [EC6-1742, "Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

6. CHECK EOP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F42	1	F143	24	Existed

A

EC6

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

C

7.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

D

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

E

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H

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

I

J

Component Inspection

INFOID:0000000013922787

1.CHECK EOP SENSOR

K

1. Turn ignition switch OFF.
2. Disconnect EOP sensor harness connector.
3. Check resistance between EOP sensor connector terminals.

L

EOP sensor		Condition	Resistance (kΩ)
+	-		
Terminal			
1	2	None	4 kΩ – 10 kΩ
	3		2 kΩ – 8 kΩ
2	1		4 kΩ – 10 kΩ
	3		1 kΩ – 3 kΩ
3	1		2 kΩ – 8 kΩ
	2		1 kΩ – 3 kΩ

M

N

O

P

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace EOP sensor. Refer to [EM-238. "Exploded View"](#).

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0524 ENGINE OIL PRESSURE

DTC Description

INFOID:000000013922788

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
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.

POSSIBLE CAUSE

- Decrease in engine oil pressure
- Decrease in engine oil level
- Engine oil condition
- EOP sensor
- Engine body

FAIL-SAFE

Fail safe mode	Vehicle behavior
Others	<ul style="list-style-type: none">• ECM illuminates engine oil pressure warning lamp on the combination meter.• Engine speed will not rise more than 4,000rpm due to the fuel cut.• Fail-safe is canceled when ignition switch OFF → ON.

DTC CONFIRMATION PROCEDURE

CAUTION:

If "[EC6-1409, "Diagnosis Procedure"](#)" 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.

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 DTC.

Is DTC detected?

P0524 ENGINE OIL PRESSURE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-1409, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

4.CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to [LU-27, "Inspection"](#).

Is the inspection result normal?


- YES >> GO TO 5.
NO >> Proceed to [EC6-1409, "Diagnosis Procedure"](#).

5.CHECK ENGINE OIL PRESSURE

 With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition	Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position • Air conditioner switch: OFF • No load	Engine speed: Idle 1,000 - 1,500 mV (50 - 150 kPa)
		Engine speed: 2,000 rpm 1,750 - 2,150 mV (200 - 300 kPa)

 Without CONSULT

Check engine oil pressure. Refer to [LU-27, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Proceed to [EC6-1409, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013922789

1.CHECK ENGINE OIL LEVEL

1. Turn ignition switch OFF.
2. Check engine oil level. Refer to [LU-27, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ENGINE OIL PRESSURE

 With CONSULT

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition	Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position • Air conditioner switch: OFF • No load	Engine speed: Idle 1,000 - 1,500 mV (50 - 150 kPa)
		Engine speed: 2,000 rpm 1,750 - 2,150 mV (200 - 300 kPa)

 Without CONSULT

Check engine oil pressure. Refer to [LU-27, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Check oil pump. Refer to [LU-40, "Inspection"](#).

3.CHECK EOP SENSOR

P0524 ENGINE OIL PRESSURE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Check EOP sensor. Refer to [EC6-1410. "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to [LU-24. "Engine Lubrication System"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace error-detected parts.

5.CHECK CAUSE OF ENGINE OIL CONSUMPTION

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC6-1013. "Inspection"		
2	Turbocharger	EM-236. "Inspection"		
3	Exhaust front tube	Visual	<ul style="list-style-type: none"> • No blocking • No abnormal sounds 	—
4	Oil pump	Visual	<ul style="list-style-type: none"> • No blocking • No abnormal sounds 	—
4	Oil pump	LU-40. "Inspection"		
5	<ul style="list-style-type: none"> • Piston • Piston pin • Piston ring 	<ul style="list-style-type: none"> • Piston to piston pin oil clearance • Piston ring side clearance • Piston ring end gap 		EM-289
6	Cylinder block	<ul style="list-style-type: none"> • Cylinder block top surface distortion • Piston to cylinder bore clearance 		EM-279

>> Repair or replace error-detected parts.

Component Inspection

INFOID:000000013922790

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 (kΩ)						
+	-								
Terminal		None							
1	2			None					
	3								
2	1					None			
	3								
3	1							None	
	2								

Is the inspection result normal?

- YES >> INSPECTION END.
- NO >> Replace EOP sensor. Refer to [EM-238. "Exploded View"](#).

P0544 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0544 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013922791

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0544	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit bank 1 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 1) is less than 0.025 V for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (bank 1) circuit is shorted.]
- Exhaust gas temperature sensor (bank 1)

FAIL-SAFE

Not applicable

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.

>> 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 [EC6-1411. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922792

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1)

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B1" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B1	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 2.53250 V
	2,000 rpm	1.29500 V

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

P0544 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	67	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	2.0 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 1). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 1) harness connector terminal and ground.

+		-	Voltage (Approx.)
Exhaust gas temperature sensor (bank 1)			
Connector	Terminal		
F95	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

P0544 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Continuity
Exhaust gas temperature sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	1	F143	67	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

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P0545, P0546 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0545, P0546 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013922793

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0545	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit low bank 1 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 1) is less than Approx. 0.2 V for 5 consecutive seconds.
P0546	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit high bank 1 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 1) is more than Approx. 4.8 V for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (bank 1) circuit is shorted.]
- Exhaust gas temperature sensor (bank 1)

FAIL-SAFE

Not applicable

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.

>> 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 [EC6-1414. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922794

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1)

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B1" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B1	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 2.53250 V
	2,000 rpm	1.29500 V

P0545, P0546 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	67	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	2.0 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 1). Refer to [EM-231. "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 1) harness connector terminal and ground.

+		-	Voltage (Approx.)
Exhaust gas temperature sensor (bank 1)			
Connector	Terminal		
F95	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

P0545, P0546 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Continuity
Exhaust gas temperature sensor (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	Existed
F95	1	F143	67	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

P0547 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0547 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013922795

DTC DETECTION LOGIC

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DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0547	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit bank 2 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 2) is less than 0.025 V for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (bank 2) circuit is shorted.]
- Exhaust gas temperature sensor (bank 2)

FAIL-SAFE

Not applicable

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.

>> 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 [EC6-1417, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922796

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2)

☐ With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B2" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B2" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B2	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 2.45625 V
		2,000 rpm 1.33125 V

☒ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

P0547 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	47	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	1.8 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 2). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 2) harness connector terminal and ground.

+		-	Voltage (Approx.)
Exhaust gas temperature sensor (bank 2)			
Connector	Terminal		
F96	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

P0547 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Continuity
Exhaust gas temperature sensor (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	1	F143	47	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

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P0548, P0549 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0548, P0549 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013922797

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0548	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit low bank 2 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 2) is less than Approx. 0.2 V for 5 consecutive seconds.
P0549	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit high bank 2 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 2) is more than Approx. 4.8 V for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (bank 2) circuit is shorted.]
- Exhaust gas temperature sensor (bank 2)

FAIL-SAFE

Not applicable

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.

>> 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 [EC6-1420, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922798

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2)

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B2" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B2" indication as follows.

Monitor item	Condition	Value (Approx.)	
EXHAUST GAS TEMP SEN 1 B2	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	2.45625 V
	2,000 rpm	1.33125 V	

P0548, P0549 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	47	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] • Warm-up condition • Idle speed	1.8 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 2). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 2) harness connector terminal and ground.

+		-	Voltage (Approx.)
Exhaust gas temperature sensor (bank 2)			
Connector	Terminal		
F96	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

P0548, P0549 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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+		-		Continuity
Exhaust gas temperature sensor (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	Existed
F96	1	F143	47	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

P0603 ECM

DTC Description

INFOID:0000000013922799

DTC DETECTION LOGIC

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0603	ECM BACK UP/CIRCUIT [Internal control module keep alive memory (KAM) error]	<ul style="list-style-type: none"> Malfunction in the internal back up RAM of ECM. Malfunction in the internal EEPROM system of ECM.

POSSIBLE CAUSE

- ECM power supply
- ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Others	ASCD operation may be deactivated.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 1 second.
- Turn ignition switch OFF and wait at least 10 seconds.
- Repeat step 1 and 2 for 10 times.
- Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1423, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922800

1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Perform trouble diagnosis for ECM power supply and ground circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace error-detected parts.

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

P0603 ECM

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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC6-1423, "DTC Description"](#).

Is the 1st trip DTC P0603 displayed again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

P0604 ECM

DTC Description

INFOID:000000013922801

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0604	ECM [Internal control module random access memory (RAM) error]	Malfunction in the internal RAM of ECM.

C
D

POSSIBLE CAUSE

ECM

FAIL-SAFE

E
F

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

G

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

H

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

I

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

J

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

K

- Turn ignition switch ON (engine stopped) and wait least 20 minutes.
CAUTION:
Never start engine during this procedure.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Check 1st trip DTC.

L

M

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1425, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [G1-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

N

Diagnosis Procedure

INFOID:000000013922802

O

1. PERFORM DTC CONFIRMATION PROCEDURE

P

- Turn ignition switch ON.
- Erase DTC.
- Perform DTC confirmation procedure. Refer to [EC6-1425, "DTC Description"](#).

Is the 1st trip DTC P0604 displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
- NO >> INSPECTION END

P0605 ECM

DTC Description

INFOID:000000013922803

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0605	ECM [Internal control module read only memory (ROM) error]	Malfunction in the internal ROM of ECM.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON (engine stopped) and wait least 20 minutes.

CAUTION:

Never start engine during this procedure.

- 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 [EC6-1426, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922804

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Erase DTC.
- Perform DTC confirmation procedure. Refer to [EC6-1426, "DTC Description"](#).

Is the 1st trip DTC P0605 displayed again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

P0606 ECM

DTC Description

INFOID:000000013922805

DTC DETECTION LOGIC

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0606	CONTROL MODULE (Control module processor)	Malfunction in ECM processor.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON (engine stopped) and wait at least 10 seconds.

CAUTION:

Never start engine during this procedure.

- 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 [EC6-1428, "Diagnosis Procedure"](#).

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- Start engine.
- Rev up the engine quickly to approximately 3,000 rpm under unloaded condition and completely release the accelerator pedal.
- Let the engine idle and wait at least 10 seconds.
- 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 [EC6-1428, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922806

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure for 3 times. Refer to [EC6-1427, "DTC Description"](#).

Is the 1st trip DTC P0606 displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
NO >> INSPECTION END

P0607 ECM

DTC Description

INFOID:000000013922807

DTC DETECTION LOGIC

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0607	ECM (Control module performance)	ECM internal communication system is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Others	ASCD operation may be deactivated.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1429, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922808

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to [EC6-1429, "DTC Description"](#).

Is the 1st trip DTC P0607 displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
- NO >> INSPECTION END

P060A ECM

DTC Description

INFOID:000000013922809

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P060A	CONTROL MODULE (Internal control module monitoring processor performance)	ECM internal monitoring processor is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	<ul style="list-style-type: none"> ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ASCD operation may be deactivated.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait at least 10 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.
- Repeat step 1 and 2 for 5 times.
- Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1431, "Diagnosis Procedure"](#).

P060A ECM

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< DTC/CIRCUIT DIAGNOSIS >

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

A

Diagnosis Procedure

INFOID:0000000013922810

1. PERFORM DTC CONFIRMATION PROCEDURE

EC6

1. Turn ignition switch ON.

2. Erase DTC.

3. Perform DTC confirmation procedure. Refer to [EC6-1430, "DTC Description"](#).

C

Is the 1st trip DTC P060A displayed again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

D

NO >> INSPECTION END

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P060B ECM

DTC Description

INFOID:0000000013922811

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P060B	CONTROL MODULE (Internal control module A/D processing performance)	ECM internal analog/digital conversion processing system is malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> Fixes electric intake valve timing control motor in the reference position. Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON (engine stopped) and wait least 10 seconds.
- 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 [EC6-1432, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922812

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Erase DTC.
- Perform DTC confirmation procedure. Refer to [EC6-1432, "DTC Description"](#).

Is the 1st trip DTC P060B displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
- NO >> INSPECTION END

P0611 ECM PROTECTION

Description

INFOID:000000013922813

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 Description

INFOID:000000013922814

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0611	FIC MODULE (ECM protection)	ECM overheat protection control is activated.

POSSIBLE CAUSE

ECM overheated

FAIL-SAFE

Not applicable

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 [EC6-1433, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013922815

1. INSPECTION START

1. Perform DTC confirmation procedure. Refer to [EC6-1426, "DTC Description"](#).
2. Check 1st trip DTC.

Is DTC P0605 detected?

- YES >> Proceed to [EC6-1426, "Diagnosis Procedure"](#).
- NO >> Explain the customer about the activation of the protection function.

P062B ECM

Description

INFOID:000000013922816

This DTC is detected when the ECM-integrated injector driver unit has a malfunction. For injector driver unit, refer to [EC6-42, "ECM \(With Barometric Pressure Sensor\)"](#).

DTC Description

INFOID:000000013922817

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P062B	ECM (Internal control module fuel injector control performance)	Injector driver unit is malfunctioning.

POSSIBLE CAUSE

- Harness and connectors (Injector circuit is open or shorted)
- Battery power supply
- ECM (injector driver unit)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Traveling control mode	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and keep the engine speed at idle for 30 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1434, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922818

1. CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC6-1724, "Component Function Check"](#).

Is inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace error-detected parts.

2. PERFORM DTC CONFIRMATION PROCEDURE

P062B ECM

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< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to [EC6-1434, "DTC Description"](#).
4. Check 1st trip DTC.

Is the DTC P062B displayed again?

- YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
NO >> INSPECTION END

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P062F CONTROL MODULE

DTC Description

INFOID:000000013922819

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P062F	CONTROL MODULE (Internal control module EEPROM error)	ECM calculation is function malfunctioning.

POSSIBLE CAUSE

ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Check the DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-1436, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922820

1. INSPECTION START

1. Perform DTC Confirmation Procedure. Refer to [EC6-1434, "DTC Description"](#).
2. Erase DTC.

Is DTC erased?

- YES >> INSPECTION END
- NO >> GO TO 2.

2. REPLACE ECM

1. Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).
2. Perform [EC6-267, "Description"](#).

>> INSPECTION END

P0641 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0641 SENSOR POWER SUPPLY

DTC Description

INFOID:000000013922821

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0641	Sensor reference voltage A (Sensor reference voltage "A" circuit open)	When an input voltage of sensor reference is not 3.3 V.

POSSIBLE CAUSE

- Electric IVT control module

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC P0641 detected?

YES >> Proceed to [EC6-1437, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922822

1. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

P0641 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

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Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P0643 SENSOR POWER SUPPLY

Description

INFOID:000000013922823

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor (bank 2)
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

Sensor power supply 3

- Turbocharger speed sensor (bank 1)
- Turbocharger speed sensor (bank 2)

DTC Description

INFOID:000000013922824

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0643	SENSOR POWER/CIRC (Sensor power supply 1 circuit short)	ECM detects a voltage of power source for sensor is excessively low or high.

POSSIBLE CAUSE

Sensor power supply 1 circuit

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

P0643 SENSOR POWER SUPPLY

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

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 [EC6-1440, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922825

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.

+		-	Voltage (Approx.)
APP sensor			
Connector	Terminal	Ground	5 V
M124*1	4		
M126*2	5		

*1: With ICC

*2: Without ICC

Is the inspection result normal?

- YES >> INSPECTION END
- 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.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	Existed
M124*1	4	E152	198	
M126*2	5			

*1: With ICC

*2: Without ICC

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair open circuit.

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3.CHECK SENSOR POWER SUPPLY 1 CIRCUIT

1. Disconnect following sensors harness connector.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E152	198	APP sensor 1	M124*1	4
			M126*2	5
F143	34	Crankshaft position sensor	F88	1
	35	Throttle position sensor (bank 1)	F118	5
	36	Intake camshaft position sensor (bank 1)	F135	1
	37	Mass air flow sensor (bank 1)	F99	2
	38	Turbocharger boost sensor (bank 1)	F90	2
		Turbocharger boost sensor (bank 2)	F91	2
		Multi-way control valve	F117	5
	39	Electric wastegate control actuator (bank 1)	F139	3
Electric wastegate control actuator (bank 2)		F138	3	

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.

- APP sensor 1 (Refer to [EC6-1612, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).)
- Crankshaft position sensor (bank 1) (Refer to [EC6-1382, "Component Inspection \(Crankshaft Position Sensor\)"](#).)
- Throttle position sensor (bank 1) (Refer to [EC6-1306, "Component Inspection \(Throttle Position Sensor\)"](#).)
- Turbocharger boost sensor (bank 1) (Refer to [EC6-1361, "Component Inspection \(Turbocharger Boost Sensor\)"](#).)
- Turbocharger boost sensor (bank 2) (Refer to [EC6-1361, "Component Inspection \(Turbocharger Boost Sensor\)"](#).)
- Mass air flow sensor (bank 1) (Refer to [EC6-1288, "Component Inspection \(Mass Air Flow Sensor\)"](#).)
- Multi-way control valve (Refer to [EC6-1665, "Component Inspection \(Multi-way Control Valve\)"](#).)
- Electric wastegate control actuator (bank 1), or Electric wastegate control actuator (bank 2) (Refer to [EC6-1630, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 1\)\]"](#) or [EC6-1637, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 2\)\]"](#).)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning component.

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

DTC Description

INFOID:000000013922826

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P06DA	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit/open)	ECM detects the following status continuously for 5 seconds or more: A voltage signal from engine oil pressure control solenoid valve is around 0V or more and less than normal operating voltage
P06DB	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal from engine oil pressure control solenoid valve is around 0V

POSSIBLE CAUSE

- Harness or connectors (Engine oil pressure control solenoid valve circuit is open or shorted.)
- Engine oil pressure control solenoid valve

FAIL-SAFE

Not applicable

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 the engine.
2. Maintain engine speed at 4,500 rpm or more for at least 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1442, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922827

1. CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil pressure control solenoid valve harness connector and ground.

+		-	Voltage
Connector	Terminal		
F89	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine oil pressure control solenoid valve harness connector and ECM harness connector.

+		-		Continuity
Engine oil pressure control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F89	2	F142	142	Existed

4. 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 ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

Check the engine oil pressure control solenoid valve. Refer to [EC6-1443, "Component Inspection \(Engine Oil Pressure Control Solenoid Valve\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil pressure control solenoid valve. Refer to [LU-39, "Exploded View"](#).

Component Inspection (Engine Oil Pressure Control Solenoid Valve)

INFOID:000000013922828

1.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE-1

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure control solenoid valve harness connector.
3. Check resistance between engine oil pressure control solenoid valve terminals as follows.

Engine oil pressure control solenoid valve		Condition		Resistance
+	-			
Terminal				
1	2	Temperature	20°C (68°F)	19.8 - 24.2 Ω
1	Ground			∞ Ω (Continuity should not exist)
2				

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine oil pressure control solenoid valve. Refer to [LU-39, "Exploded View"](#).

2.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE-2

1. Remove engine oil pressure control solenoid valve. Refer to [LU-39, "Exploded View"](#).
2. Provide 12 V DC between engine oil pressure 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 engine oil pressure control solenoid valve.

NOTE:

Always replace O-ring when engine oil pressure control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> Replace engine oil pressure control solenoid valve. Refer to [LU-39, "Exploded View"](#).

P0850 PNP SWITCH

DTC Description

INFOID:000000013922829

When the selector lever position is P or N, park/neutral position (PNP) signal from the TCM is sent to ECM. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0850	P-N POS SW/CIRCUIT (Park/Neutral switch input circuit)	The signal of the park/neutral position (PNP) signal does not change during driving after the engine is started.

POSSIBLE CAUSE

- Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.]
- TCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

- YES >> GO TO 2.
- NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.CHECK PNP SIGNAL

 With CONSULT

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
N or P position	ON
Except above position	OFF

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Proceed to [EC6-1446. "Diagnosis Procedure"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select "DATA MONITOR" mode with CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

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P0850 PNP SWITCH

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED	1,195 – 6,375 rpm
COOLAN TEMP/S	More than 66°C (151°F)
B/FUEL SCHDL	1.5 – 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1446, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage (V)	
Connector	+	-			
	Terminal				
F142	121	95	Selector lever	P or N	Battery voltage
				Except above	Approx. 0

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-1446, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013922830

1. CHECK DTC WITH TCM

Refer to [TM-85, "Diagnosis Description"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

YES >> GO TO 3.

NO >> Check DTC with BCM. Refer to [BCS-17, "COMMON ITEM : CONSULT Function \(BCM - COMMON ITEM\)"](#).

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/T assembly harness connector and ECM harness connector.

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Continuity
A/T assembly		ECM		
Connector	Terminal	Connector	Terminal	
F2	9	F142	121	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

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P1140 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1140 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013922831

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1140	INTK TIM S/CIRC-B1 (Intake timing sensor circuit bank 1)	Intake camshaft position sensor signal is not inputted to ECM for approximately 1 consecutive second during engine run.
		Intake camshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second during engine run.

POSSIBLE CAUSE

- Harness or connectors
[Intake camshaft position sensor (bank 1) circuit is open or shorted.]
- Intake camshaft position sensor (bank 1)
- Intake camshaft (bank 1) (sensor rotor)

FAIL-SAFE

Not applicable

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 the engine and let it idle at least 10 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1448. "DTC Description"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922832

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect CMP sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F135	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> GO TO 2.

P1140 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

2. CHECK INTAKE CMP SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor (bank 1) harness connector and ECM harness connector.

Intake CMP sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	1	F143	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE CMP SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor (bank 1) harness connector and ECM harness connector.

Intake CMP sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	2	F143	29	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 INTAKE CMP SENSOR (BANK 1) INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor (bank 1) harness connector and ECM harness connector.

Intake CMP sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	3	F143	26	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK INTAKE CMP SENSOR (BANK 1)

Check intake CMP sensor (bank 1). Refer to [EC6-1382, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace intake CMP sensor (bank 1). Refer to [EM-250, "Exploded View"](#).

6. CHECK INTAKE CAMSHAFT (BANK 1)

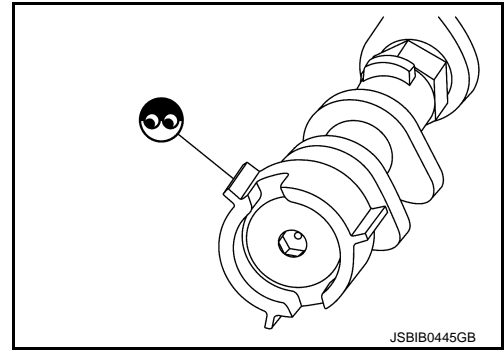
Check the following items:

P1140 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate intake camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection

INFOID:0000000013922833

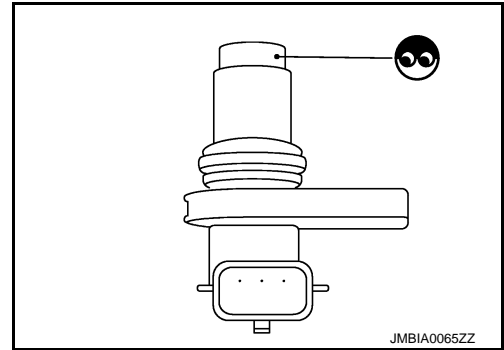
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P1145 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1145 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013922834

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1145	INTK TIM S/CIRC-B2 (Intake timing sensor circuit bank 2)	Intake camshaft position sensor signal is not inputted to ECM for approximately 1 consecutive second during engine run.
		Intake camshaft position sensor signal is inappropriate or partly missing for approximately 1 consecutive second during engine run.

POSSIBLE CAUSE

- Harness or connectors
(Intake camshaft position sensor (bank 2) circuit is open or shorted.)
- Intake camshaft position sensor (bank 2)
- Intake camshaft (bank 2) (sensor rotor)

FAIL-SAFE

Not applicable

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 the engine and let it idle at least 10 seconds.
2. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-1451, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922835

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect CMP sensor (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor (bank 2)	Connector		
	Terminal		
F97	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

P1145 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

2. CHECK INTAKE CMP SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor (bank 2) harness connector and ECM harness connector.

Intake CMP sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	1	F143	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE CMP SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor (bank 2) harness connector and ECM harness connector.

Intake CMP sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	2	F143	82	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 INTAKE CMP SENSOR (BANK 2) INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor (bank 2) harness connector and ECM harness connector.

Intake CMP sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	3	F143	77	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK INTAKE CMP SENSOR (BANK 2)

Check intake CMP sensor (bank 2). Refer to [EC6-1382, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace intake CMP sensor (bank 2). Refer to [EM-250, "Exploded View"](#).

6. CHECK INTAKE CAMSHAFT (BANK 2)

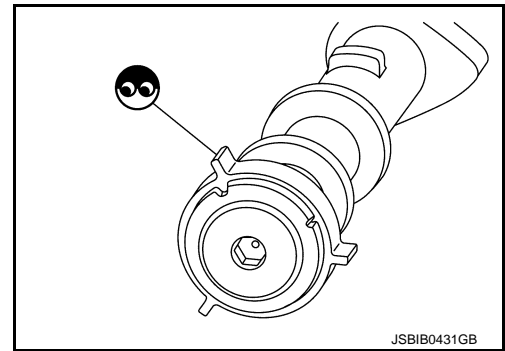
Check the following items:

P1145 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate intake camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection

INFOID:0000000013922836

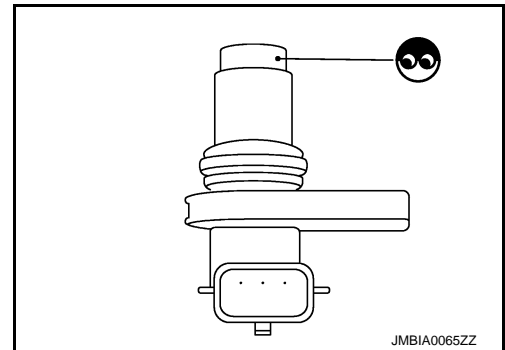
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

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P1197 OUT OF GAS

DTC Description

INFOID:000000013922839

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1197	FUEL RUN OUT (Out of gas)	<ul style="list-style-type: none"> Fuel rail pressure remains at 1.1 MPa (11.2 kg/cm², 159.5 psi) or less for 5 seconds or more with the fuel level too low. Fuel rail pressure remains 2.7 MPa (27.5 kg/cm², 392 psi) lower than a target fuel pressure for 5 seconds or more with the fuel level too low.

POSSIBLE CAUSE

- Out of gas
- Harness or connectors (Low pressure fuel pump circuit is open or shorted.)
- Low pressure fuel pump
- Harness or connectors (High pressure fuel pump circuit is shorted.)
- Fuel pressure regulator
- Low pressure fuel system
- High pressure fuel pump
- High pressure fuel pump power supply circuit
- High pressure fuel system
- Fuel rail pressure sensor
- Disconnection of the fuel hose

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

Start the engine.

Does the engine start?

YES >> GO TO 3.

NO >> Proceed to [EC6-1455, "Diagnosis Procedure"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Warm up the engine to the normal operating temperature.

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).

2. Keep the engine speed at 3,500 rpm for 5 seconds and let it idle at least 60 seconds.

P1197 OUT OF GAS

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

3. Check the 1st trip DTC.

NOTE:

If the fuel tank has sufficient fuel, this diagnosis result may not be detected.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1455, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922840

1. REFUEL THE VEHICLE

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 DTC confirmation procedure again. Refer to [EC6-1454, "DTC Description"](#).

Is 1st trip DTC detected?

YES >> GO TO 2.

NO >> INSPECTION END

2. CHECK LOW PRESSURE FUEL PUMP

Check low pressure fuel pump. Refer to [EC6-1729, "Component Function Check"](#).

Is inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK HIGH PRESSURE FUEL PUMP CONTROL CIRCUIT

Check high pressure fuel pump control circuit. Refer to [EC6-1732, "Component Function Check"](#).

Is inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK ECM POWER SUPPLY CIRCUIT

Check ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

Is inspection result normal?

YES >> Check the fuel hose for disconnection and looseness.

NO >> Repair or replace error-detected parts.

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P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1212 TCS COMMUNICATION LINE

DTC Description

INFOID:000000013922847

- This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.
- **Freeze frame data is not stored in the ECM for this self-diagnosis.**

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1212	TCS/CIRC (TCS control unit circuit)	ECM cannot receive the information from “ABS actuator and electric unit (control unit)” continuously.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- ABS actuator and electric unit (control unit)
- Dead (Weak) battery

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1212 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
 - DTC P0607: Refer to [EC6-1429, "DTC Description"](#).
- NO >> GO TO 2.

2.PRECONDITIONING

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1456, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922848

1.CHECK DTC PRIORITY

If DTC P1212 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
 - DTC P0607: Refer to [EC6-1429, "DTC Description"](#).

P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> GO TO 2.

2.CHECK DTC WITH BRC

Perform the trouble diagnosis for BRC.

>> Proceed to [BRC-87, "Work Flow"](#).

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P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1217 ENGINE OVER TEMPERATURE

DTC Description

INFOID:000000013922849

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1217	ENG OVER TEMP [Engine over temperature (Overheat)]	<ul style="list-style-type: none">• 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.

CAUTION:

When a malfunction is indicated, always replace the coolant. Refer to [CO-33, "Draining"](#) and [CO-34, "Refilling"](#). Also, replace the engine oil. Refer to [LU-29, "Draining"](#) and [LU-29, "Refilling"](#).

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Always use coolant with the proper mixture ratio. Refer to [MA-20, "Recommended Fluids and Lubricants"](#).
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

- Harness or connectors (The cooling fan circuit is open or shorted.)
- IPDM E/R
- Cooling fan control module
- Cooling fan motor
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Multi-way control valve
- Engine coolant temperature sensor 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
 - DTC P0607: Refer to [EC6-1429, "DTC Description"](#).
- NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK 1

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

P1217 ENGINE OVER TEMPERATURE

[VR30DDTT FOR MEXICO]

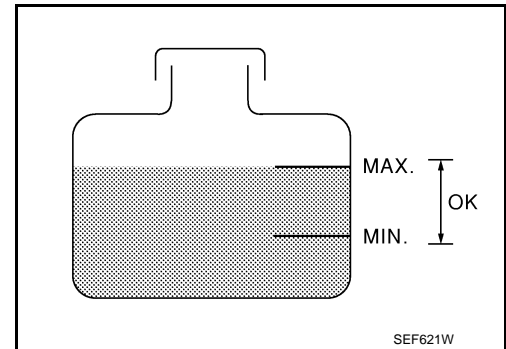
< DTC/CIRCUIT DIAGNOSIS >

Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

- YES >> Proceed to [EC6-1459, "Diagnosis Procedure"](#).
NO >> GO TO 3.



3.PERFORM COMPONENT FUNCTION CHECK 2

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Proceed to [EC6-1459, "Diagnosis Procedure"](#).
NO >> GO TO 4.

4.PERFORM COMPONENT FUNCTION CHECK 3

With CONSULT

1. Turn ignition switch ON.
2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to [PCS-12, "Diagnosis Description"](#).

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to [EC6-1459, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013922850

1.CHECK DTC PRIORITY

If DTC P1217 is displayed with DTC UXXXX or P0607, first perform the confirmation procedure for DTC UXXXX or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
 - DTC P0607: Refer to [EC6-1429, "DTC Description"](#).
- NO >> GO TO 2.

2.CHECK COOLING FAN OPERATION

With CONSULT

1. Turn ignition switch ON.
2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to [PCS-12, "Diagnosis Description"](#).
2. Make sure that cooling fan operates.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Proceed to [EC6-1715, "Diagnosis Procedure \(Cooling Fan Motor 1\)"](#).

3.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to [CO-33, "Inspection"](#).

P1217 ENGINE OVER TEMPERATURE

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is leakage detected?

YES >> GO TO 4.

NO >> GO TO 5.

4.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

5.CHECK RADIATOR CAP

Check radiator cap. Refer to [CO-37, "RESERVOIR TANK CAP : Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace radiator cap. Refer to [CO-39, "Exploded View"](#).

6.CHECK MULTI-WAY CONTROL VALVE

Check multi-way control valve. Refer to [EC6-1664, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace multi-way control valve. Refer to [CO-63, "Removal and Installation"](#).

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Check engine coolant temperature sensor 1. Refer to [EC6-1302, "Component Inspection \(Engine Coolant Temperature Sensor 1\)"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor 1. Refer to [CO-63, "Exploded View"](#).

8.OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the [CO-31, "Troubleshooting Chart"](#).

>> INSPECTION END

P1220 FUEL PUMP CONTROL MODULE (FPCM)

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

P1220 FUEL PUMP CONTROL MODULE (FPCM)

DTC Description

INFOID:000000013922851

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1220	FPCM/CIRCUIT (Fuel pump control module circuit)	During engine cranking, the signal voltage of the FPCM to the ECM is too low.

POSSIBLE CAUSE

- Harness or connectors
- FPCM circuit is open or shorted
- Fuel pump circuit is open or shorted
- FPCM

FAIL-SAFE

Noapplicable

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 12 - 15 V at idle.
- Before performing the following procedure, check that the engine coolant temperature is -10°C (14°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
If engine does not start, crank engine for at least 5 seconds.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1461, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922852

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 52) from IPDM E/R.
3. Check 15 A fuse for blown.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
- NO >> GO TO 2.

2. CHECK FPCM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect FPCM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between FPCM harness connector and ground.

P1220 FUEL PUMP CONTROL MODULE (FPCM)

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

+		-	Voltage
FPCM			
Connector	Terminal		
B11	6	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK FPCM POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between FPCM harness connector and IPDM E/R harness connector.

FPCM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
B11	6	E120	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4. CHECK FPCM GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between FPCM harness connector and ground.

+		-	Continuity
FPCM			
Connector	Terminal		
B11	3	Ground	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 FPCM INPUT AND OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between FPCM harness connector and ECM harness connector.

+		-		Continuity
FPCM		ECM		
Connector	Terminal	Connector	Terminal	
B11	4	E152	182	Existed
	5		188	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK FUEL PUMP CONTROL CIRCUIT FOR OPEN AND SHORT

1. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.

P1220 FUEL PUMP CONTROL MODULE (FPCM)

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

2. Check the continuity between FPCM harness connector and “fuel level sensor unit and fuel pump (main)” harness connector.

+		-		Continuity
FPCM		Fuel level sensor unit and fuel pump (main)		
Connector	Terminal	Connector	Terminal	
B11	1	B101	5	Existed
	2		6	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK FPCM

Refer to [EC6-1463. "Component Inspection \(FPCM\)".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace FPCM. Refer to [EC6-1016. "Removal and Installation".](#)

Component Inspection (FPCM)

INFOID:0000000013922853

1.CHECK FUEL PUMP CONTROL MODULE (FPCM)

1. Check the voltage between FPCM terminals under the following conditions.

FPCM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
B11	1	2	For 1 second after turning ignition switch ON	Approx. 9.9 V
			More than 1 second after turning ignition switch ON	Approx. 0 V
			Idle speed	Approx. 9.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace FPCM. Refer to [EC6-1016. "Removal and Installation".](#)

P1225, P1234 TP SENSOR

DTC Description

INFOID:000000013922854

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1225	CTP LEARNING-B1 (Closed throttle position learning bank 1)	Closed throttle position learning value is excessively low.
P1234	CTP LEARNING-B2 (Closed throttle position learning bank 2)	

POSSIBLE CAUSE

DTC P1225

- Electric throttle control actuator (bank 1) (TP sensor 1 and 2)

DTC P1234

- Electric throttle control actuator (bank 2) (TP sensor 1 and 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1464, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922855

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

P1225, P1234 TP SENSOR

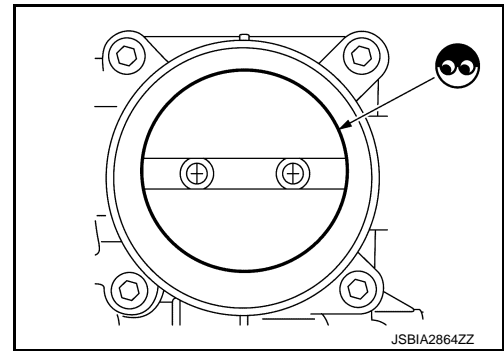
[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).
- NO >> 1. Remove the foreign matter and clean the electric throttle control actuator inside.
2. Perform throttle valve closed position leaning. Refer to [EC6-272, "Description"](#).



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P1226, P1235 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1226, P1235 TP SENSOR

DTC Description

INFOID:000000013922856

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1226	CTP LEARNING-B1 (Closed throttle position learning bank 1)	Closed throttle position learning is not performed successfully, repeatedly.
P1235	CTP LEARNING-B2 (Closed throttle position learning bank 2)	

POSSIBLE CAUSE

DTC P1226

- Electric throttle control actuator (bank 1) (TP sensor 1 and 2)

DTC P1235

- Electric throttle control actuator (bank 2) (TP sensor 1 and 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1466. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922857

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

P1226, P1235 TP SENSOR

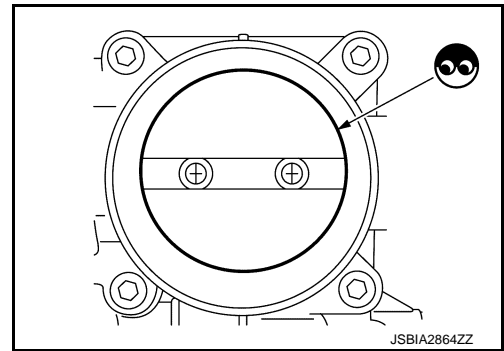
[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).
- NO >> 1. Remove the foreign matter and clean the electric throttle control actuator inside
2. Perform throttle valve closed position leaning. Refer to [EC6-272, "Work Procedure"](#).



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P1233 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1233 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Description

INFOID:000000013922858

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1233	ETC_FNCTN/CIRC-B2 (ETC Function Circuit Bank 2)	Electric throttle control function does not operate properly.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is open or shorted)
- Electric throttle control actuator (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1233 is displayed with DTC P1238 or P1290, first perform the confirmation procedure for DTC P1238 or P1290.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P1238: Refer to [EC6-1473, "DTC Description"](#).
 - DTC P1290: Refer to [EC6-1479, "DTC Description"](#).
- NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 3.

3.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 [EC6-1468, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922859

1.CHECK DTC PRIORITY

P1233 ELECTRIC THROTTLE CONTROL FUNCTION

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P1233 or P2101 is displayed with DTC P1238 or P1290, first perform the confirmation procedure for DTC P1238 or P1290.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P1238: Refer to [EC6-1473, "DTC Description"](#).
 - DTC P1290: Refer to [EC6-1479, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 63) from IPDM E/R.
3. Check 15 A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector terminals as per the following.

ECM				Condition	Voltage (V)	
+		-				
Connector	Terminal	Connector	Terminal			
F142	96	E152	204	Ignition switch	OFF	Approx. 0
				ON	Battery voltage	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 4.

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E124	65	F142	123	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E123	57	F142	96	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

P1233 ELECTRIC THROTTLE CONTROL FUNCTION

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace error-detected parts.

6. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F119	1	F142	147	Existed
			148	Not existed
	2		147	Not existed
			148	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

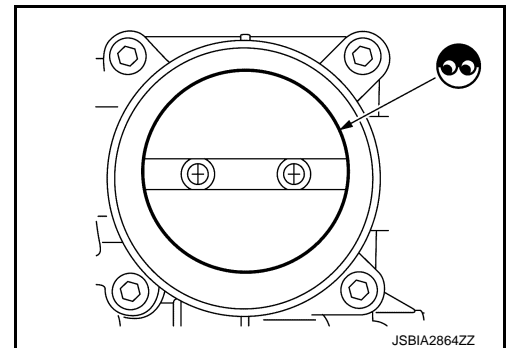
1. Remove the intake air duct. Refer to [EM-167, "Exploded View"](#).
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.

NO >> 1. Remove the foreign matter and clean the electric throttle control actuator inside.

2. Perform throttle valve closed position leaning. Refer to [EC6-272, "Work Procedure"](#).



8. CHECK THROTTLE CONTROL MOTOR

Refer to [EC6-1472, "Component Inspection \(Throttle Control Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunction electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection (Throttle Control Motor)

INFOID:000000013922860

1. CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Condition		Resistance (Ω)
Bank	Terminals			
1	1 and 2	Temperature	25°C (77°F)	1 – 15
2	1 and 2			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

P1236 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1236 THROTTLE CONTROL MOTOR

DTC Description

INFOID:000000013922861

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1236	ETC_MOT-B2 (ETC Motor Bank 2)	ECM detects short in both circuits between ECM and throttle control motor.

POSSIBLE CAUSE

- Harness or connectors [Throttle control motor circuit is shorted.]
- Electric throttle control actuator (bank 2) (Throttle control motor)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

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 [EC6-1471, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922862

1. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

P1236 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F119	1	F142	147	Existed
			148	Not existed
	2		147	Not existed
			148	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK THROTTLE CONTROL MOTOR

Refer to [EC6-1472, "Component Inspection \(Throttle Control Motor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection (Throttle Control Motor)

INFOID:000000013922863

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Condition		Resistance (Ω)
Bank	Terminals			
1	1 and 2	Temperature	25°C (77°F)	1 – 15
2	1 and 2			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

P1238 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1238 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:000000013922864

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P1238	ETC ACTR-B2 (ETC Actuator Bank 2)	A	Electric throttle control actuator does not function properly due to the return spring malfunction.
		B	Throttle valve opening angle in fail-safe mode is not in specified range.
		C	ECM detect the throttle valve is stuck open.

POSSIBLE CAUSE

- Electric throttle control actuator (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

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. Shift selector lever to D position and wait at least 3 seconds.
3. Shift selector lever to P position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Shift selector lever to D position and wait at least 3 seconds.
7. Shift selector lever to P position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1474, "Diagnosis Procedure"](#).
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

P1238 ELECTRIC THROTTLE CONTROL ACTUATOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch ON and wait at least 1 second.
2. Shift selector lever to D position and wait at least 3 seconds.
3. Shift selector lever to P position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1474, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922865

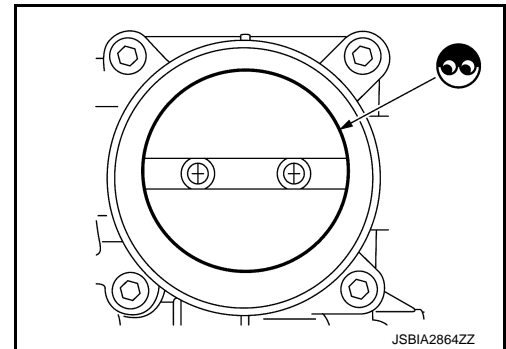
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> Replace malfunctioning electric throttle control actuator.
Refer to [EM-173, "Exploded View"](#).

- NO >> 1. Remove the foreign matter and clean the electric throttle control actuator inside.
2. Perform throttle valve closed position leaning. Refer to [EC6-272, "Work Procedure"](#).



P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1239, P2135 TP SENSOR

DTC Description

INFOID:000000013922866

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1239	TP SENSOR-B2 (Throttle position sensor bank 2)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.
P2135	TP SENSOR-B1 (Throttle/Pedal position sensor/switch "A"/ "B" voltage correlation)	

POSSIBLE CAUSE

DTC P1239

- Harness or connector [TP sensor 1 or 2 (bank 2) circuit is open or shorted.]
- Electric throttle control actuator (bank 2) (TP sensor 1 or 2)

DTC P2135

- Harness or connector [TP sensor 1 or 2 (bank 1) circuit is open or shorted.]
- Electric throttle control actuator (bank 1) (TP sensor 1 or 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	<p>The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.</p> <p>The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.</p> <p>So, the acceleration will be poor.</p>

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2135 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

P1239, P2135 TP SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-1476, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922867

1. CHECK DTC PRIORITY

If DTC P2135 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
NO >> GO TO 2.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

DTC	+			-	Voltage (Approx.)
	Electric throttle control actuator				
	Bank	Connector	Terminal		
P1239	2	F119	5	Ground	5 V
P2135	1	F118	5		

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P1239	2	F119	5	F142	105	Existed
P2135	1	F118	5	F143	35	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES-1 (P2135 is detected)>>Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
YES-2 (P1239 is detected)>>GO TO 4.
YES >> Perform trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
NO >> Repair or replace error-detected parts.

4. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
NO >> Repair or replace error-detected parts.

5. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

P1239, P2135 TP SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

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.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P1239	2	F119	4	F142	104	Existed
P2135	1	F118	4	F143	44	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	+			-		Continuity
	Electric throttle control actuator			ECM		
	Bank	Connector	Terminal	Connector	Terminal	
P1239	2	F119	3	F142	112	Existed
			6		106	
P2135	1	F118	3	F143	48	
			6		43	

2. 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.

EC6

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P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

8. CHECK THROTTLE POSITION SENSOR

Refer to [EC6-1478, "Component Inspection \(Throttle Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection (Throttle Position Sensor)

INFOID:000000013922868

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform [EC6-272, "Work Procedure"](#).
4. Turn ignition switch ON.
5. Set selector lever to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Voltage (V)
	+	-		
	Terminal	Terminal		
F143	43 [TP sensor 1 (bank 1)]	44	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F142	106 [TP sensor 1 (bank 2)]	104	Fully released	More than 0.36
			Fully depressed	Less than 4.75
F143	48 [TP sensor 2 (bank 1)]	44	Fully released	Less than 4.75
			Fully depressed	More than 0.36
F142	112 [TP sensor 2 (bank 2)]	104	Fully released	Less than 4.75
			Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Proceed to [EC6-272, "Description"](#).

>> INSPECTION END

P1290 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1290 THROTTLE CONTROL MOTOR RELAY

DTC Description

INFOID:0000000013922869

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1290	ETC MOT PWR-B2 [Throttle control motor relay circuit open (bank 2)]	ECM detects a voltage of power source for throttle control motor is excessively low.

POSSIBLE CAUSE

DTC P1290

- Harness or connectors (Throttle control motor relay circuit is open)
- Throttle control motor relay

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	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.

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.

>> 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 [EC6-1479, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922870

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 63) from IPDM E/R.
3. Check 15 A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

P1290 THROTTLE CONTROL MOTOR RELAY

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E124	65	F142	123	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Check the continuity between IPDM E/R sensor harness connector and ECM harness connector.

+		-		Continuity
IPDM E/R		ECM		
Connector	Terminal	Connector	Terminal	
E123	57	F142	96	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

P1334 TC SYSTEM

DTC Description

INFOID:000000013922871

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1334	TC SYSTEM-B2 (Turbocharger/supercharger "B" overboost condition)	Turbocharger boost is excessively high.

POSSIBLE CAUSE

- Harness or connectors
[Electric wastegate control actuator (bank 2) circuit.]
[Turbocharger boost sensor (bank 2) circuit]
- Electric wastegate control actuator (bank 2)
- Turbocharger boost sensor (bank 2)
- Turbocharger (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of turbocharger system circuit.

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "ACTIVE TEST" >> "WASTEGATE ACTUATOR".
3. Operate "Up" or "Down", set "W/G ACTUATOR POSITION B2" to 0.002 m, and make a quick short note of value "V1" of "W/G ACTUATOR POSI SEN B2".
4. Operate "Up" or "Down", set "W/G ACTUATOR POSITION B2" to 0.006 m, and make a quick short note of value "V2" of "W/G ACTUATOR POSI SEN B2".

Do the values of "V1" and "V2" change (visually, ACTUATOR SHAFT operates) and "V2" minus "V1" becomes equal to or more than 1.3 V?

YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

YES-2 >> Confirmation after repair: INSPECTION END

NO >> Proceed to [EC6-1481, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013922872

1.CHECK TURBOCHARGER BOOST SENSOR

Perform diagnosis procedure for turbocharger boost sensor. Refer to [EC6-1360, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Perform trouble diagnosis for electric wastegate control actuator. Refer to [EC6-1264, "Diagnosis Procedure"](#).

P1334 TC SYSTEM

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.PERFORM ELECTRIC WASTEGATE CONTROL ACTUATOR INITIALIZATION

1. Perform electric wastegate control actuator initialization. Refer to [EC6-277, "Description"](#).
2. Perform drive test.
3. Check DTC.

Is DTC P1334 detected again?

YES >> Replace ECM. Refer to [EC6-1014, "Removal and Installation"](#).

NO >> INSPECTION END

P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922876

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A2	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	A signal duty of the CAC coolant pump operation command sent from ECM is less than 2% for 3 seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

G

NOTE:

When 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

J

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

K

Is DTC P14A2 is detected?

L

- YES >> Proceed to [EC6-1483, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922877

1. COMPONENT FUNCTION CHECK

N

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

O

P

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

- YES >> INSPECTION END

P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

L

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CAC cooling relay.

M

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

P

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4	Ground	Existed

Is the inspection result normal?

P14A2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922878

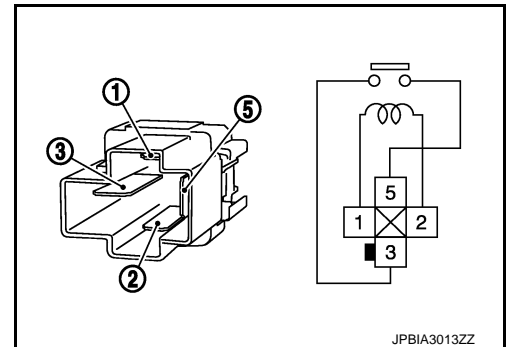
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922879

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A3	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	A signal duty of the CAC coolant pump operation command sent from ECM is more than 98% for 3 seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

G

NOTE:

When DTC Confirmation Procedure has been preciously 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

J

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

K

Is DTC P14A3 is detected?

L

- YES >> Proceed to [EC6-1487, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922880

1. COMPONENT FUNCTION CHECK

N

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

O

P

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

- YES >> INSPECTION END

P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

L

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

P

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4	Ground	Existed

Is the inspection result normal?

P14A3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922881

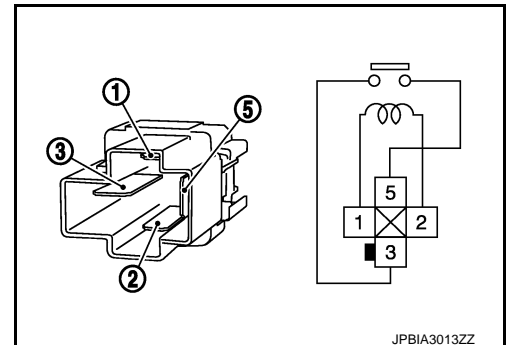
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922882

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A4	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is less than 2% for 10 consecutive seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

G

NOTE:

When DTC Confirmation Procedure has been preciously 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

J

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

K

Is DTC P14A4 is detected?

L

- YES >> Proceed to [EC6-1491, "DTC Description"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922883

1. COMPONENT FUNCTION CHECK

N

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

O

P

Item	Condition	Value
<ul style="list-style-type: none"> • Electric water pump 1 duty • Electric water pump 2 duty 	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

G

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	

K

2. Also check harness for short to power and short to ground.

L

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

P

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4		

Is the inspection result normal?

P14A4 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922884

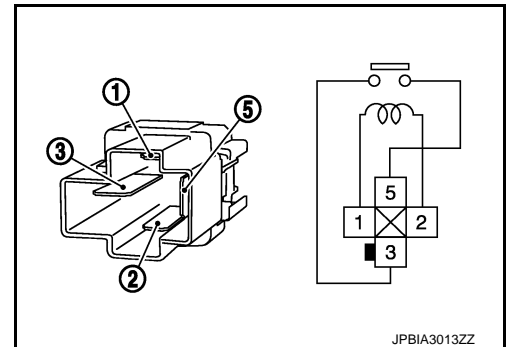
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922885

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A5	Charge air cooler coolant pump (Charge air cooler coolant pump control circuit high)	Pump feedback duty signal is more than 98% for 10 consecutive seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

J

K

Is DTC P14A5 is detected?

L

YES >> Proceed to [EC6-1495, "DTC Description"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922886

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

N

O

P

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

L

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

P

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4	Ground	Existed

Is the inspection result normal?

P14A5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922887

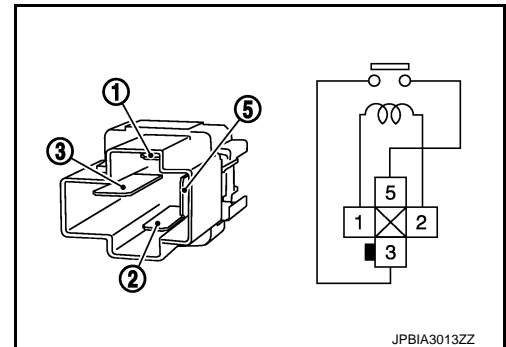
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922888

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A6	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Any one of the following conditions is maintained for 10 consecutive seconds or more when pump command signal is 10%: <ul style="list-style-type: none"> • Pump feedback duty is less than 7% • Pump feedback duty is more than 13%

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

G

NOTE:

When DTC Confirmation Procedure has been precisely 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

J

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

K

L

Is DTC P14A6 is detected?

- YES >> Proceed to [EC6-1499, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922889

1. COMPONENT FUNCTION CHECK

N

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

O

P

Item	Condition	Value
<ul style="list-style-type: none"> • Electric water pump 1 duty • Electric water pump 2 duty 	Normal mode	20 – 80

Is the inspection result normal?

P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

L

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

M

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

P

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4	Ground	Existed

Is the inspection result normal?

P14A6 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922890

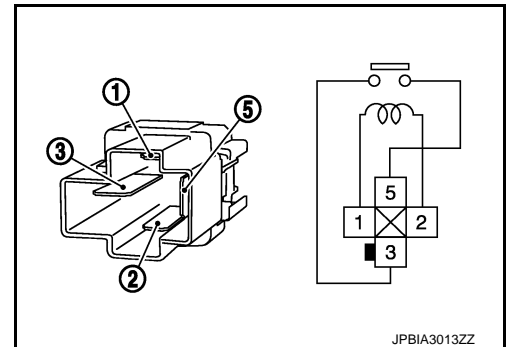
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922891

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A7	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is 12-18% for 10 consecutive seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

G

NOTE:

When 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

J

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

K

Is DTC P14A7 is detected?

L

YES >> Proceed to [EC6-1507, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922892

1. COMPONENT FUNCTION CHECK

N

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

O

P

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

P

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4	Ground	Existed

Is the inspection result normal?

P14A7 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922893

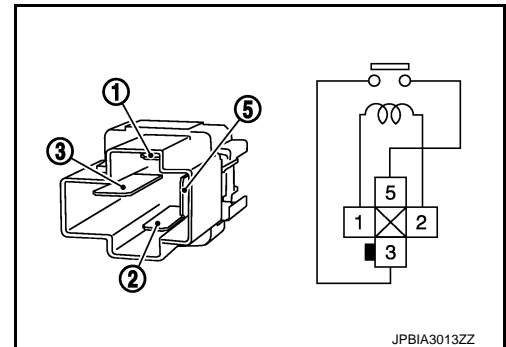
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922894

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A8	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is 2-8% for 19 consecutive seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 1 command circuit is open or shorted.]
- CAC cooling electric water pump 1

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

J

K

Is DTC P14A8 is detected?

L

YES >> Proceed to [EC6-1507, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922895

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

N

O

P

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 1 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 1			
Connector	Terminal		
E143	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check that the fuse is not blowing (open).

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 1 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 1 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E143	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

L

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 1 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 1 harness connector and ground.

P

CAC cooling electric water pump 1		-	Continuity
Connector	Terminal		
E143	4	Ground	Existed

Is the inspection result normal?

P14A8 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 1 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 1 harness connector.

ECM		CAC cooling electric water pump 1		Continuity
Connector	Terminal	Connector	Terminal	
F142	117	E143	1	Existed
	143		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922896

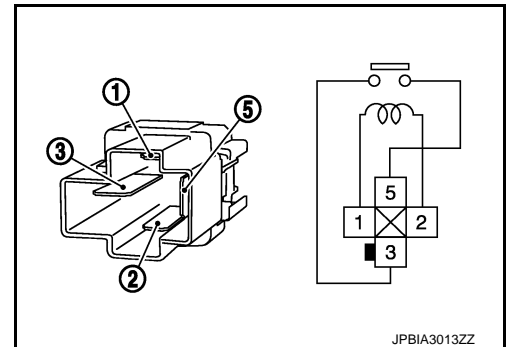
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14A9 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14A9 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922897

DTC DETECTION LOGIC

A

EC6

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14A9	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 12-19 consecutive seconds.

C

D

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 1

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been precisely 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

J

K

L

Is DTC P14A9 detected?

- YES >> Proceed to [EC6-1511, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922898

1. CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

N

O

2. CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P

P14A9 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-1511, "DTC Description"](#).

Is the DTC P14A9 detected again?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 1 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).

P14AA CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14AA CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:000000013922899

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AA	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 8-12 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 1

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-1515, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922900

1. CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14AA CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-1515, "DTC Description"](#).

Is the DTC P14AA detected again?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 1 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).

P14AC CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14AC CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

DTC Description

INFOID:0000000013922901

DTC DETECTION LOGIC

A

EC6

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AC	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 8-19 consecutive seconds.

C

D

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 1

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously 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.

H

I

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

J

K

L

Is DTC P14AC detected?

- YES >> Proceed to [EC6-1515, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:0000000013922902

1.CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 2.

N

O

2.CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
- YES-2 (Without CONSULT)>>GO TO 3.
- NO >> Repair or replace error-detected parts.

P

P14AC CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 1

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-1515, "DTC Description"](#).

Is the DTC P14AC detected again?

- YES >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 1 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 1. Refer to [CO-62, "Removal and Installation"](#).

P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922903

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AD	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	A signal duty of the CAC coolant pump operation command sent from ECM is less than 2% for 3 seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

J

K

Is DTC P14AD is detected?

L

YES >> Proceed to [EC6-1517, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922904

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

N

O

P

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

L

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

P

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4	Ground	Existed

Is the inspection result normal?

P14AD CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922905

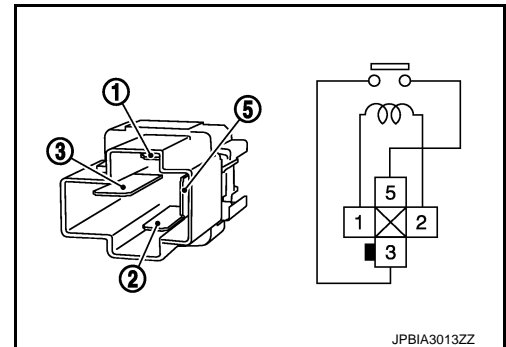
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922906

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AE	Charge air cooler coolant pump (Charge air cooler coolant pump control circuit high)	A signal duty of the CAC coolant pump operation command sent from ECM is more than 98% for 3 seconds or more.

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14AE is detected?

- YES >> Proceed to [EC6-1521, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922907

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

- YES >> INSPECTION END

P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1		

G

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	

K

2. Also check harness for short to power and short to ground.

L

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

P

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4		

Is the inspection result normal?

P14AE CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
- NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922908

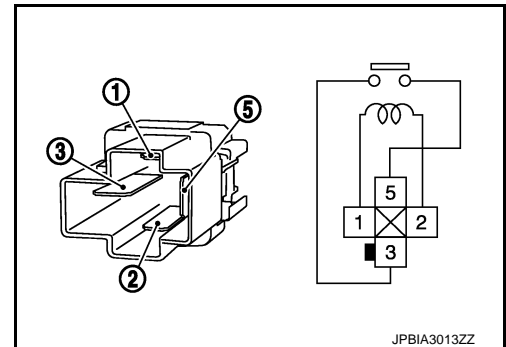
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922909

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14AF	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Any one of the following conditions is maintained for 10 consecutive seconds or more when pump command signal is 10 %: <ul style="list-style-type: none">• Pump feedback duty is less than 7%• Pump feedback duty is more than 13%

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been precisely conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is DTC P14AF is detected?

- YES >> Proceed to [EC6-1525, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922910

1. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 11.
NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	Existed

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4	Ground	Existed

Is the inspection result normal?

A

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P14AF CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922911

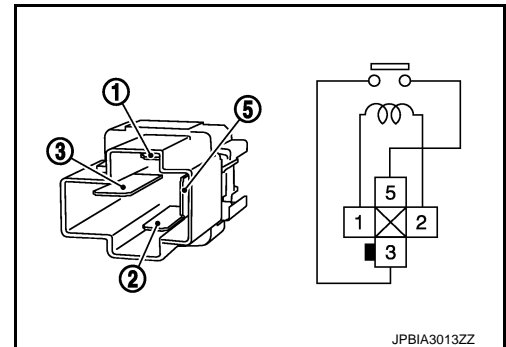
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922912

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B0	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is 12-18% for 10 consecutive seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

J

K

Is DTC P14B0 is detected?

L

YES >> Proceed to [EC6-1533, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922913

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

N

O

P

Item	Condition	Value
<ul style="list-style-type: none"> • Electric water pump 1 duty • Electric water pump 2 duty 	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

L

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

P

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4	Ground	Existed

Is the inspection result normal?

P14B0 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922914

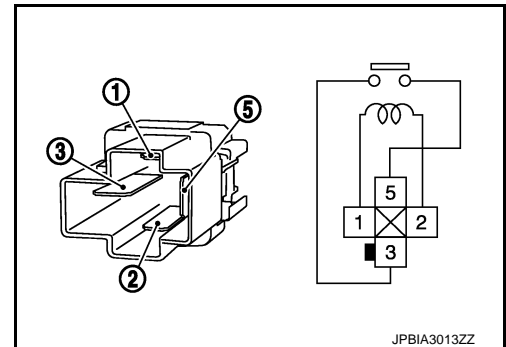
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



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P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922915

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B1	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump feedback duty signal is 2-8% for 19 consecutive seconds or more.

C

D

POSSIBLE CAUSE

- Harness and connectors
[Charge air cooler (CAC) cooling electric water pump 2 command circuit is open or shorted.]
- CAC cooling electric water pump 2

E

FAIL-SAFE

Not applicable

F

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When 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.

H

I

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

J

K

Is DTC P14B1 is detected?

L

YES >> Proceed to [EC6-1533, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

M

Diagnosis Procedure

INFOID:000000013922916

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "Charge air cooler cooling electric water pump".
3. Check the value of charge air cooler (CAC) cooling electric water pump duty under the following conditions:

N

O

P

Item	Condition	Value
<ul style="list-style-type: none">• Electric water pump 1 duty• Electric water pump 2 duty	Normal mode	20 – 80

Is the inspection result normal?

YES >> INSPECTION END

P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK CAC COOLING ELECTRIC WATER PUMP HARNESS CONNECTOR INSTALLATION

Check CAC cooling electric water pump harness connector installation condition visually and tectually.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK CAC COOLING ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect CAC cooling electric water pump 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling electric water pump 2 harness connector and ground.

+		-	Voltage
CAC cooling electric water pump 2			
Connector	Terminal		
E161	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 4.

4.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect CAC cooling relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CAC cooling relay harness connector and ground.

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and CAC cooling relay harness connector.

IPDM E/R		CAC cooling relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E151	2	Existed

4. Also check harness for short to power and short to ground.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

6.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY-3

1. Turn ignition switch OFF.
2. Check the voltage between CAC cooling relay harness connector and ground.

P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
CAC cooling relay			
Connector	Terminal		
E151	5	Ground	Battery voltage

A

EC6

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> GO TO 7.

C

7.CHECK FUSE

1. Disconnect 20A fuse (No. 71) from fuse and fusible link block.
2. Check the fuse is not blowing.

D

Is the fuse blown (open)?

- YES >> Replace the fuse after repairing the applicable circuit.
- NO >> Perform the trouble diagnosis for power supply circuit.

E

8.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-2

F

Check the continuity between CAC cooling relay and ground.

CAC cooling relay		-	Continuity
Connector	Terminal		
E151	1	Ground	Existed

G

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Repair or replace error-detected parts.

H

9.CHECK CAC COOLING ELECTRIC WATER PUMP 2 POWER SUPPLY CIRCUIT-3

I

1. Check the continuity between CAC cooling relay and CAC cooling electric water pump 2 harness connector.

J

CAC cooling relay		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
E151	3	E161	2	Existed

K

2. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace error-detected parts.

L

M

10.CHECK CAC COOLING RELAY

Check cac cooling relay. Refer to [EC6-1365. "Component Inspection \(Charge Air Cooler Cooling Relay\)".](#)

N

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace CAC cooling relay.

O

11.CHECK CAC COOLING ELECTRIC WATER PUMP 2 GROUND CIRCUIT

Check the continuity between CAC cooling electric water pump 2 harness connector and ground.

P

CAC cooling electric water pump 2		-	Continuity
Connector	Terminal		
E161	4	Ground	Existed

Is the inspection result normal?

P14B1 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 12.
 NO >> Repair or replace error-detected parts.

12.CHECK CAC COOLING ELECTRIC WATER PUMP 2 CONTROL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and CAC cooling electric water pump 2 harness connector.

ECM		CAC cooling electric water pump 2		Continuity
Connector	Terminal	Connector	Terminal	
F142	118	E161	1	Existed
	144		3	

3. Also check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
 NO >> Repair or replace error-detected parts.

Component Inspection (Charge Air Cooler Cooling Relay)

INFOID:000000013922917

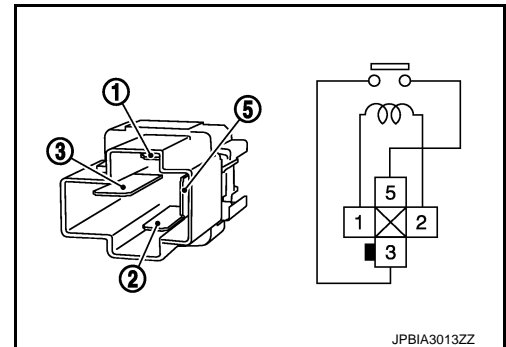
1.CHECK CHARGE AIR COOLER (CAC) COOLING RELAY

1. Turn ignition switch OFF.
2. Remove CAC cooling relay.
3. Check the continuity between CAC cooling relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 CAC cooling relay.



JPBIA3013ZZ

P14B2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14B2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922918

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B2	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 12-19 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been precisely conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-1537, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922919

1. CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14B2 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-1537, "DTC Description"](#).

Is the DTC P14B2 detected again?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

Ⓟ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 2 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).

P14B3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14B3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:0000000013922920

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B3	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 8-19 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-1541, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922921

1. CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14B3 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-1541, "DTC Description"](#).

Is the DTC P14B3 detected again?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 2 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).

P14B5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P14B5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

DTC Description

INFOID:000000013922922

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P14B5	Charge air cooler cooling electric W/P (Charge air cooler cooling electric water pump)	Pump response duty becomes 83-92% after maintaining 2-8% (pump side: under protection control) for 8-19 consecutive seconds.

POSSIBLE CAUSE

- Charge air cooler (CAC) coolant leakage
- CAC coolant is mixed in air.
- Protection control is activated during pump idle running.
- Charge air cooler cooling electric water pump 2

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

NOTE:

When DTC Confirmation Procedure has been preciously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:

Before performing this procedure, check that the battery voltage is more than 11 V during ignition switch ON.

1. Start the engine and warm it up to the normal operating temperature.
2. Wait at least 20 seconds.
3. Check DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-1541, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922923

1.CHECK COOLANT LEVEL

Check the coolant level at the charge air cooler (CAC) coolant reservoir tank. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CAC COOLING SYSTEM FOR COOLANT LEAKAGE

Check CAC cooling system for coolant leakage. Refer to [CO-33, "Inspection"](#).

Is the inspection result normal?

- YES-1 (With CONSULT)>>Refill coolant until the specified range. Refer to [CO-34, "Refilling"](#). And then, GO TO 4.
YES-2 (Without CONSULT)>>GO TO 3.
NO >> Repair or replace error-detected parts.

P14B5 CHARGE AIR COOLER COOLING ELECTRIC WATER PUMP 2

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to [EC6-1541, "DTC Description"](#).

Is the DTC P14B5 detected again?

- YES >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).
NO >> INSPECTION END

4. COMPONENT FUNCTION CHECK

With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Active Test" >> "Charge air cooler cooling electric water pump".
3. Perform the test and check that the water pump 2 is activated.

Is the inspection result normal?

- YES >> INSPECTION END (Protection mode operation)
NO >> Replace CAC cooling electric water pump 2. Refer to [CO-62, "Removal and Installation"](#).

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1550 BATTERY CURRENT SENSOR

DTC Description

INFOID:000000013922924

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1550	BAT CURRENT SENSOR (Battery current sensor)	The output voltage of the battery current sensor remains within the specified range while engine is running.

C

POSSIBLE CAUSE

- Harness or connectors
 - Battery current sensor circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Battery current sensor
- Each sensor, connector with sensor power supply 2 circuit

D

FAIL-SAFE

Not applicable

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.
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 [EC6-1543, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922925

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.

+		-	Voltage (Approx.)
Battery current sensor Connector	Terminal		
E7	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 2.

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P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	4	F143	81	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

P1550 BATTERY CURRENT SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	1	F143	52	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair or replace error-detected parts.

7. CHECK BATTERY CURRENT SENSOR

Refer to [EC6-1545, "Component Inspection"](#).

Is the inspection result normal?

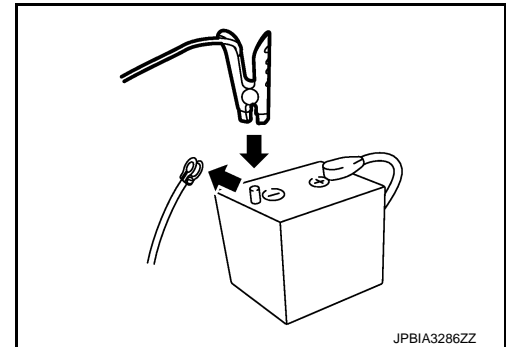
- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000013922926

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector terminals as per the following.



ECM				Voltage (Approx.)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245, "VR30DDTT : How to Handle Battery"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1551, P1552 BATTERY CURRENT SENSOR

DTC Description

INFOID:000000013922927

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1551	BAT CURRENT SENSOR (Battery current sensor)	An excessively low voltage from the sensor is sent to ECM.
P1552	BAT CURRENT SENSOR (Battery current sensor)	An excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
 - Battery current sensor circuit is open or shorted.
 - Sensor power supply 2 circuit is shorted.
- Battery current sensor
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

Not applicable

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 with ignition switch ON

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1543, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922928

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.

+		-	Voltage (Approx.)
Connector	Terminal		
E7	4	Ground	5 V

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 2.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	4	F143	81	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace error-detected parts.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).
- NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Continuity
ECM			
Connector	Terminal	Ground	Existed
F143	2		
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	Existed
E7	1	F143	52	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK BATTERY CURRENT SENSOR

Refer to [EC6-1545, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

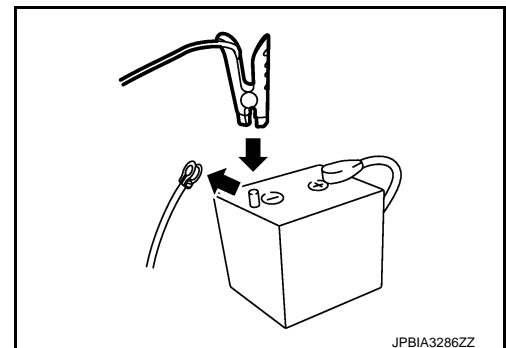
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:000000013922929

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector terminals as per the following.



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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

ECM				Voltage (Approx.)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245](#), "[VR30DDTT : How to Handle Battery](#)".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1553 BATTERY CURRENT SENSOR

DTC Description

INFOID:000000013922930

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1553	BAT CURRENT SENSOR (Battery current sensor)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.

POSSIBLE CAUSE

- Harness or connectors
- Battery current sensor circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Battery current sensor
- Each sensor, connector with sensor power supply 2 circuit

FAIL-SAFE

Not applicable

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 wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1550. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922931

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.

+		-	Voltage (Approx.)
Connector	Terminal		
E7	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 2.

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	4	F143	81	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

P1553 BATTERY CURRENT SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	1	F143	52	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair or replace error-detected parts.

7. CHECK BATTERY CURRENT SENSOR

Refer to [EC6-1545, "Component Inspection"](#).

Is the inspection result normal?

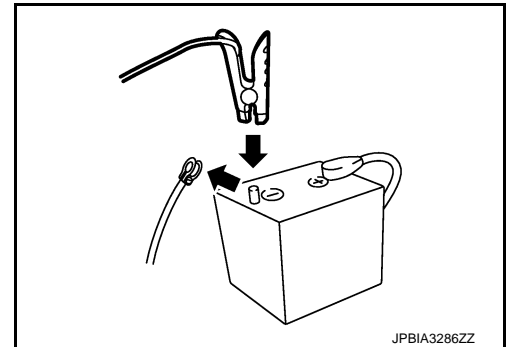
- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000013922932

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector terminals as per the following.



ECM				Voltage (Approx.)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245, "VR30DDTT : How to Handle Battery"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1554 BATTERY CURRENT SENSOR

DTC Description

INFOID:000000013922933

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1554	BAT CURRENT SENSOR (Battery current sensor)	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.

POSSIBLE CAUSE

- Harness or connectors
- Battery current sensor circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Battery current sensor
- Each sensor, connector with sensor power supply 2 circuit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.
- Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

>> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With CONSULT

1. Start engine and let it idle.
2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT.
3. Check "BAT CUR SEN" indication for 10 seconds.
"BAT CUR SEN" should be above 2,300 mV at least once.

Without CONSULT

1. Start engine and let it idle.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM				Voltage (V)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	Above 2.3 at least once

Is the inspection result normal?

- YES-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- YES-2 >> Confirmation after repair: INSPECTION END
- NO >> Proceed to [EC6-1554, "Diagnosis Procedure"](#)

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Diagnosis Procedure

INFOID:000000013922934

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E191. Refer to Ground Inspection in [GI-48. "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

Battery current sensor		Ground	Voltage (V)
Connector	Terminal		
E7	4	Ground	Approx. 5

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

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	
E7	4	F143	81	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 4.

4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E7	1	F143	52	Existed

P1554 BATTERY CURRENT SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK BATTERY CURRENT SENSOR

Refer to [EC6-1555, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

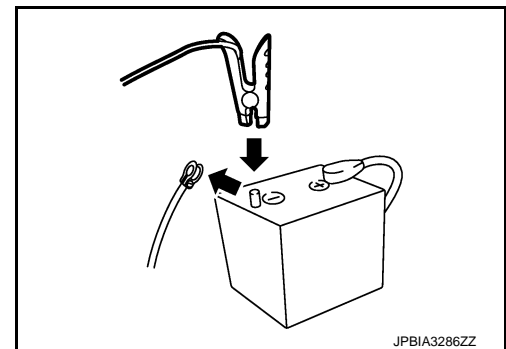
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:000000013922935

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector terminals as per the following.



ECM				Voltage (Approx.)
+		-		
Connector	Terminal	Connector	Terminal	
F143	52 (Battery current sensor signal)	F142	100	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-245, "VR30DDTT : How to Handle Battery"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Description

INFOID:000000013922936

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1556	BAT TMP SEN/CIRC (Battery temperature sensor circuit low input)	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 seconds or more.
P1557	BAT TMP SEN/CIRC (Battery temperature sensor circuit high input)	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 seconds or more.

POSSIBLE CAUSE

- Harness or connectors
- Battery current sensor (Battery temperature sensor) circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Refrigerant pressure sensor circuit is shorted.
- Battery current sensor (Battery temperature sensor)
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1556, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922937

1. CHECK BATTERY TEMPERATURE SENSOR INPUT SIGNAL

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (V)
Battery current sensor			
Connector	Terminal		
E7	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK BATTERY TEMPERATURE SENSOR INPUT SIGNAL CIRCUIT

P1556, P1557 BATTERY TEMPERATURE SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch ON.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	3	F143	54	Existed

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		-		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
E7	2	F142	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

6. CHECK BATTERY TEMPERATURE SENSOR

Refer to [EC6-1558, "Component Inspection \(Battery Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

Component Inspection (Battery Temperature Sensor)

INFOID:000000013922938

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		Resistance
+	-	
Terminal		
2	3	continuity with the resistance value 100 Ω or more

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1564 ASCD STEERING SWITCH

DTC Description

INFOID:0000000013922939

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1564	ASCD SW (ASCD steering switch)	<ul style="list-style-type: none">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.

POSSIBLE CAUSE

- Harness or connectors (The ASCD steering switch circuit is open or shorted.)
- ASCD steering switch
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1426, "DTC Description"](#).
NO >> GO TO 2.

2.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.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds.
- Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1559, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922940

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

P1564 ASCD STEERING SWITCH

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Perform diagnosis of applicable. Refer to [EC6-1426. "DTC Description"](#).
 NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

- Turn ignition switch ON.
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
- Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
E152	186 (ASCD steering switch signal)	187	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 1
			SET/COAST switch: Pressed	Approx. 2
			RESUME/ACCELERATE switch: Pressed	Approx. 3
			All ASCD steering switches: Released	Approx. 4

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect combination switch (spiral cable) harness connector.
- Check the continuity between combination switch harness and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M87	32	E152	187	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair or replace error-detected parts.

4.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M87	25	E152	186	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK COMBINATION SWITCH

Check the continuity between combination switch (spiral cable) connectot terminals.

Combination switch		Continuity
+	-	
Terminal		Existed
13	25	
16	32	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace spiral cable. Refer to [SR-22, "Removal and Installation"](#).

6. CHECK ASCD STEERING SWITCH

Refer to [EC6-1561, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [ST-32, "Removal and Installation"](#) (Vehicle speed sensitive P/S models), [ST-134, "Removal and Installation"](#) (Direct adaptive steering models).

Component Inspection

INFOID:0000000013922941

1. CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector M301.
3. Check resistance between combination switch harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M301	13 and 16	MAIN switch: Pressed	Approx. 0
		CANCEL switch: Pressed	Approx. 250
		SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to [ST-32, "Exploded View"](#) (Vehicle speed sensitive P/S models), [ST-134, "Removal and Installation"](#) (Direct adaptive steering models).

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1564 ICC STEERING SWITCH

DTC Description

INFOID:000000013922942

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1564	ASCD SW (ICC steering switch)	<ul style="list-style-type: none">• An excessively high voltage signal from the ICC steering switch is sent to ECM.• ECM detects that input signal from the ICC steering switch is out of the specified range.• ECM detects that the ICC steering switch is stuck ON.

POSSIBLE CAUSE

- Harness or connectors (The ICC steering switch circuit is open or shorted.)
- ICC steering switch
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1426, "DTC Description"](#).
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

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press DYNAMIC DRIVE ASSISTANCE SYSTEMS switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1562, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922943

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1426, "DTC Description"](#).
 NO >> GO TO 2.

2.CHECK ICC STEERING SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select "MAIN SW", "DYNAMIC DRIVE ASSISTANCE SYSTEMS SW", "CANCEL SW", "RESUME/ACC SW", "SET SW" and "DIST SW" in "DATA MONITOR" mode with CONSULT.
3. Check each item indication under the following conditions.

Monitor item	Condition	Indication	
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
DYNAMIC DRIVE ASSISTANCE SYSTEMS SW	DYNAMIC DRIVE ASSISTANCE SYSTEMS switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF
DIST SW	DISTANCE switch	Pressed	ON
		Released	OFF

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

Connector	ECM		Condition	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	186 (ICC steering switch signal)	187	MAIN switch: Pressed	Approx. 0
			DYNAMIC DRIVE ASSISTANCE SYSTEMS switch: Pressed	Approx. 1.0
			CANCEL switch: Pressed	Approx. 1.9
			DISTANCE switch: Pressed	Approx. 2.6
			SET/COAST switch: Pressed	Approx. 3.2
			RESUME/ACCELERATE switch: Pressed	Approx. 3.7
			All ICC steering switches: Released	Approx. 4.2

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> GO TO 4.

3.CHECK ICC STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connector.
4. Check the continuity between combination switch and ECM harness connector.

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M87	32	E152	187	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ICC STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M87	25	E152	186	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK COMBINATION SWITCH

Check the continuity between combination switch (spiral cable) connect terminals.

Combination switch		Continuity
+	-	
Terminal		Existed
13	25	
16	32	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace spiral cable. Refer to [SR-22. "Removal and Installation"](#).

6.CHECK ICC STEERING SWITCH

Refer to [EC6-1564. "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC steering switch. Refer to [ST-32. "Removal and Installation"](#) (Vehicle speed sensitive P/S models), [ST-134. "Removal and Installation"](#) (Direct adaptive steering models).

Component Inspection

INFOID:000000013922944

1.CHECK ICC STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector M301.
3. Check resistance between combination switch harness connector terminals under the following conditions.

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M301	13 and 16	MAIN switch: Pressed	Approx. 0
		DYNAMIC DRIVE ASSISTANCE SYSTEMS switch: Pressed	Approx. 270
		CANCEL switch: Pressed	Approx. 620
		DISTANCE switch: Pressed	Approx. 1,090
		SET/COAST switch: Pressed	Approx. 1,810
		RESUME/ACCELERATE switch: Pressed	Approx. 2,990
		All ICC steering switches: Released	Approx. 5,420

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC steering switch. Refer to [ST-32, "Removal and Installation"](#) (Vehicle speed sensitive P/S models), [ST-134, "Removal and Installation"](#) (Direct adaptive steering models).

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P1568 ICC FUNCTION

DTC Description

INFOID:000000013922945

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1568	ICC COMMAND VALUE (ICC function)	ECM detects a difference between signals from ADAS control unit is out of specified range.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- ADAS control unit
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1568 is displayed with DTC UXXXX, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- DTC P0605: Refer to [EC6-1426, "DTC Description"](#).
- DTC P0607: Refer to [EC6-1429, "DTC Description"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Step 4 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Press MAIN switch on ICC 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/COAST switch.
5. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1566, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922946

1.CHECK DTC PRIORITY

P1568 ICC FUNCTION

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P1568 is displayed with DTC UXXXX, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- DTC P0605: Refer to [EC6-1426, "DTC Description"](#).
- DTC P0607: Refer to [EC6-1429, "DTC Description"](#).

NO >> GO TO 2.

2. REPLACE ADAS CONTROL UNIT

1. Replace ADAS control unit.
2. Perform [CCS-126, "Work Procedure \(Vehicle-To-Vehicle Distance Control Mode\)"](#).
3. Check DTC of ADAS control unit. Refer to [DAS-26, "On Board Diagnosis Function \(With ICC\)"](#).

>> INSPECTION END

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P

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1572 BRAKE PEDAL POSITION SWITCH

WITHOUT ICC MODELS

WITHOUT ICC MODELS : DTC Description

INFOID:0000000013922947

When the brake pedal is depressed, brake pedal position switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).

Refer to [EC6-83. "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for the ASCD function.

DTC DETECTION LOGIC

NOTE:

- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P1572	ASCD BRAKE SW (Brake pedal position switch)	A	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the brake pedal position switch are sent to the ECM at the same time.
		B	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is being driven.

POSSIBLE CAUSE

- Harness or connectors (The stop lamp switch circuit is shorted.)
- Harness or connectors (The brake pedal position switch circuit is shorted.)
- Stop lamp switch
- Brake pedal position switch
- Incorrect stop lamp switch installation
- Incorrect brake pedal position switch installation
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1426. "DTC Description"](#).

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.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

P1572 BRAKE PEDAL POSITION SWITCH

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Start engine (VDC switch OFF).
2. Press MAIN switch and make sure that CRUISE lamp illuminates.
3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1569, "WITHOUT ICC MODELS : Diagnosis Procedure"](#).

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1569, "WITHOUT ICC MODELS : Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

WITHOUT ICC MODELS : Diagnosis Procedure

INFOID:000000013922948

1.CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1426, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK OVERALL FUNCTION-I

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
	Brake pedal	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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ECM			Condition		Voltage (V)	
Connector	+	-				
	Terminal		Terminal			
E152	192 (Brake pedal position switch signal)		204	Brake pedal	Slightly depressed	Approx. 0
				Brake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

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.

+		-	Voltage
Brake pedal position switch			
Connector	Terminal		
E44	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 4.

4. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Brake pedal position switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E44	1	E65	11F	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK FUSE

1. Disconnect 10A fuse (No. 12) from fuse block (J/B).
2. Check 10A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform trouble diagnosis for power supply circuit.

6. CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E44	2	E152	192	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK BRAKE PEDAL POSITION SWITCH

Refer to [EC6-1572, "WITHOUT ICC MODELS : Component Inspection \(Brake Pedal Position Switch\)"](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-24, "Exploded View"](#).

8. CHECK OVERALL FUNCTION-II

With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT

Check the voltage between ECM harness connector terminals as per the following.

Connector	ECM		Condition	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	191 (Stop lamp switch signal)	204	Slightly depressed	Battery voltage
			Fully released	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 9.

9. CHECK STOP LAMP SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

+		-	Voltage
Stop lamp switch			
Connector	Terminal		
E57	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 10.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.

A
C
D
E
F
G
H
I
J
K
L
M
N
O
P

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P1572 BRAKE PEDAL POSITION SWITCH

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- Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Stop lamp switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E57	3	E65	2F	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 11.
 NO >> Repair or replace error-detected parts.

11.CHECK FUSE

- Disconnect 10A fuse (No. 19) from fuse block (J/B).
- Check 10A fuse for blown.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
 NO >> Perform trouble diagnosis for power supply circuit.

12.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		-		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E57	4	E152	191	Existed

- Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 13.
 NO >> Repair or replace error-detected parts.

13.CHECK STOP LAMP SWITCH

Refer to [EC6-1573. "WITHOUT ICC MODELS : Component Inspection \(Stop Lamp Switch\)"](#)

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace stop lamp switch. Refer to [BR-24. "Exploded View"](#).

WITHOUT ICC MODELS : Component Inspection (Brake Pedal Position Switch)

INFOID:000000013922949

1.CHECK BRAKE PEDAL POSITION SWITCH-I

- Turn ignition switch OFF.
- Disconnect brake pedal position harness connector.
- Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal Fully released	Existed
		Slightly de-pressed	Not existed

Is the inspection result normal?

P1572 BRAKE PEDAL POSITION SWITCH

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to [BR-12. "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly de-pressed Not existed

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to [BR-24. "Exploded View"](#).

WITHOUT ICC MODELS : Component Inspection (Stop Lamp Switch)

INFOID:0000000013922950

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
3 and 4	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to [BR-12. "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
3 and 4	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to [BR-24. "Exploded View"](#).

WITH ICC MODELS

WITH ICC MODELS : DTC Description

INFOID:0000000013922951

DTC DETECTION LOGIC

NOTE:

- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P1572	ASCD BRAKE SW (Brake pedal position switch)	A	ON signals from the stop lamp switch and the BRAKE pedal position switch are sent to ECM at the same time.
		B	BRAKE pedal position switch signal is not sent to ECM for extremely long time while the vehicle is being driven

POSSIBLE CAUSE

- Harness or connectors (The stop lamp switch circuit is shorted.)
- Harness or connectors (The brake pedal position switch circuit is shorted.)
- Stop lamp switch
- Brake pedal position switch
- ICC brake hold relay
- Incorrect stop lamp switch installation
- Incorrect brake pedal position switch installation
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1426. "DTC Description"](#).

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.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine (VDC switch OFF).
2. Press MAIN switch and make sure that CRUISE lamp illuminates.
3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1575. "WITH ICC MODELS : Diagnosis Procedure"](#).

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle.

If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1575, "WITH ICC MODELS : Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

WITH ICC MODELS : Diagnosis Procedure

INFOID:000000013922952

1. CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0605, first perform the confirmation procedure (trouble diagnosis) for DTC P0605.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1426, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK OVERALL FUNCTION-I

 **With CONSULT**

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
	Brake pedal	Fully released	ON

 **Without CONSULT**

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals under the following conditions.

Connector	ECM		Condition	Voltage (V)	
	+	-			
	Terminal	Terminal			
E152	192 (Brake pedal position switch signal)	204	Brake pedal	Slightly depressed	Approx. 0
			Brake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

P1572 BRAKE PEDAL POSITION SWITCH

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

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.

+		-	Voltage
Brake pedal position switch			
Connector	Terminal		
E44	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Brake pedal position switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E44	1	E65	11F	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK FUSE

1. Disconnect 10A fuse (No. 12) from fuse block (J/B).
2. Check 10A fuse for blown.

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> Perform trouble diagnosis for power supply circuit.

6.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		-		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E44	2	E152	192	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK BRAKE PEDAL POSITION SWITCH

Refer to [EC6-1579, "WITH ICC MODELS : Component Inspection \(Brake Pedal Position Switch\)"](#)

Is the inspection result normal?

P1572 BRAKE PEDAL POSITION SWITCH

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-24, "Exploded View"](#).

8. CHECK OVERALL FUNCTION-II

With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT

Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition	Voltage (V)	
Connector	+	-			
	Terminal	Terminal			
E152	191 (Stop lamp switch signal)	204	Brake pedal	Slightly depressed	Battery voltage
			Fully released	Approx. 0	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 9.

9. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Disconnect ICC brake hold relay harness connector.
4. Check the voltage between stop lamp switch harness connector and ground.

+		-	Voltage
Stop lamp switch			
Connector	Terminal		
E57	3	Ground	Battery voltage

5. Check the voltage between ICC brake hold relay harness connector and ground.

+		-	Voltage
ICC brake hold relay			
Connector	Terminal		
E52	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 10.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Continuity
Stop lamp switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E57	3	E65	2F	Existed

4. Check the continuity between ICC brake hold relay harness connector and fuse block (J/B) harness connector.

+		-		Continuity
ICC brake hold relay		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E52	5	E65	2F	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace error-detected parts.

11.CHECK FUSE

1. Disconnect 10A fuse (No. 19) from fuse block (J/B).
2. Check 10A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform trouble diagnosis for power supply circuit.

12.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		-		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E57	4	E152	191	Existed

3. Check the continuity between ICC brake hold relay harness connector and ECM harness connector.

+		-		Continuity
ICC brake hold relay		ECM		
Connector	Terminal	Connector	Terminal	
E52	3	E152	191	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace error-detected parts.

13.CHECK STOP LAMP SWITCH

Refer to [EC6-1579, "WITH ICC MODELS : Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace stop lamp switch. Refer to [BR-24, "Exploded View"](#).

14.CHECK ICC BRAKE HOLD RELAY

Refer to [EC6-1580, "WITH ICC MODELS : Component Inspection \(ICC Brake Hold Relay\)"](#).

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace ICC brake hold relay.

WITH ICC MODELS : Component Inspection (Brake Pedal Position Switch)

INFOID:000000013922953

EC6

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect brake pedal position harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly de-pressed Not existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to [BR-12, "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly de-pressed Not existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace brake pedal position switch. Refer to [BR-24, "Exploded View"](#).

WITH ICC MODELS : Component Inspection (Stop Lamp Switch)

INFOID:000000013922954

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition	Continuity
3 and 4	Brake pedal	Fully released Not existed
		Slightly depressed Existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to [BR-12, "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals under the following conditions.

P1572 BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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Terminals	Condition		Continuity
3 and 4	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-24, "Exploded View"](#).

WITH ICC MODELS : Component Inspection (ICC Brake Hold Relay)

INFOID:000000013922955

1. CHECK ICC BRAKE HOLD RELAY

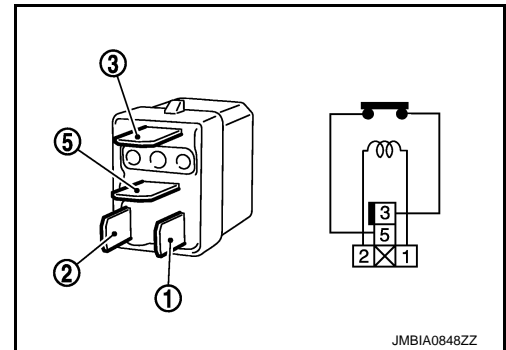
1. Turn ignition switch OFF.
2. Remove ICC brake hold relay.
3. Check the continuity between ICC brake hold relay terminals under the following conditions.

Terminals	Condition	Continuity
③ and ⑤	12V direct current supply between terminals ① and ②	Existed
	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake hold relay



JMBIA0848ZZ

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1574 ASCD VEHICLE SPEED SENSOR

DTC Description

INFOID:000000013922956

The ECM receives two vehicle speed signals via the CAN communication line. One is sent from “combination meter”, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to [EC6-83, "AUTOMATIC SPEED CONTROL DEVICE \(ASCD\) : System Description"](#) for ASCD functions.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1574	ASCD VHL SPD SEN (ASCD vehicle speed sensor)	The difference between the two vehicle speed signals is out of the specified range.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- Combination meter
- ABS actuator and electric unit (control unit)
- Wheel sensor
- TCM
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC UXXXX, P0500, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0500, P0605 or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
 - DTC P0500: Refer to [EC6-1403, "DTC Description"](#).
 - DTC P0605: Refer to [EC6-1426, "DTC Description"](#).
 - DTC P0607: Refer to [EC6-1429, "DTC Description"](#).

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

1. Start engine (VDC switch OFF).
2. Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

3. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1582, "Diagnosis Procedure"](#).

P1574 ASCD VEHICLE SPEED SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013922957

1.CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC UXXXX, P0500, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0500, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- DTC P0500: Refer to [EC6-1403, "DTC Description"](#).
- DTC P0605: Refer to [EC6-1426, "DTC Description"](#).
- DTC P0607: Refer to [EC6-1429, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-85, "Diagnosis Description"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to [BRC-61, "CONSULT Function"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

4.CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70, "CONSULT Function"](#).

>> INSPECTION END

P1574 ICC VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1574 ICC VEHICLE SPEED SENSOR

DTC Description

INFOID:000000013922958

The ECM receives two vehicle speed 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 ICC control. Refer to [CCS-14, "System Description"](#) for ICC functions.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1574	ASCD VHL SPD SEN (ICC vehicle speed sensor)	The difference between the two vehicle speed signals is out of the specified range.

POSSIBLE CAUSE

- Harness or connectors (The CAN communication line is open or shorted.)
- Combination meter
- ABS actuator and electric unit (control unit)
- Wheel sensor
- TCM
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC UXXXX, P0500, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0500, P0605 or P0607.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
 - DTC P0500: Refer to [EC6-1403, "DTC Description"](#).
 - DTC P0605: Refer to [EC6-1426, "DTC Description"](#).
 - DTC P0607: Refer to [EC6-1429, "DTC Description"](#).

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

1. Start engine (VDC switch OFF).
2. Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

3. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1584, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

P1574 ICC VEHICLE SPEED SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922959

1.CHECK DTC PRIORITY

If DTC P1574 is displayed with DTC UXXXX, P0500, P0605 or P0607, first perform the confirmation procedure for DTC UXXXX, P0500, P0605 or P0607.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable.

- DTC UXXXX: Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- DTC P0500: Refer to [EC6-1403, "DTC Description"](#).
- DTC P0605: Refer to [EC6-1426, "DTC Description"](#).
- DTC P0607: Refer to [EC6-1429, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [TM-85, "Diagnosis Description"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to [BRC-61, "CONSULT Function"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

4.CHECK DTC WITH "COMBINATION METER"

Check combination meter function.

Refer to [MWI-70, "CONSULT Function"](#).

>> INSPECTION END

P1805 STOP LAMP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P1805 STOP LAMP SWITCH

DTC Description

INFOID:000000013922960

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1805	BRAKE SW/CIRCUIT (Stop lamp switch circuit)	Stop lamp switch signal is not sent to ECM for extremely long time while the vehicle is being driven.

POSSIBLE CAUSE

- Harness or connectors (Stop lamp switch circuit is open or shorted.)
- Stop lamp switch

FAIL-SAFE

Fail safe mode	Vehicle behavior
Others	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor. <ul style="list-style-type: none"> • Vehicle condition: Driving condition • When engine is idling: Normal • When accelerating: Poor acceleration

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1585, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922961

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E57	3	Ground	Battery voltage

P1805 STOP LAMP SWITCH

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Stop lamp switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E57	3	E65	2F	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK FUSE

1. Disconnect 10A fuse (No. 19) from fuse block (J/B).
2. Check 10A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform trouble diagnosis for power supply circuit.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect stop lamp switch harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E57	4	E152	191	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK STOP LAMP SWITCH

Refer to [EC6-1586, "Component Inspection \(Stop Lamp Switch\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-24, "Exploded View"](#).

Component Inspection (Stop Lamp Switch)

INFOID:000000013922962

1. CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

P1805 STOP LAMP SWITCH

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Terminals	Condition	Continuity
3 and 4	Brake pedal Fully released	Not existed
	Brake pedal Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to [BR-12. "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition	Continuity
3 and 4	Brake pedal Fully released	Not existed
	Brake pedal Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to [BR-24. "Exploded View"](#).

A

EC6

C

D

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P

P2080 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2080 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013922963

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2080	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit range/ performance bank 1 sensor 1)	ECM detects the following status continuously for 20 seconds or more: <ul style="list-style-type: none">• The difference between estimated exhaust gas temperature calculated by ECM and temperature sent from exhaust gas temperature sensor is approx. 100°C (212°F) or more.• The difference between exhaust gas temperature sent from exhaust gas temperature calculated by ECM is approx. 100°C (212°F) or more.

POSSIBLE CAUSE

- Exhaust gas leaks
- Exhaust gas temperature sensor (BANK 1)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

1. DTC P2080 is displayed with DTCs related to following items, perform the trouble diagnosis for the detected DTCs.
 - Crankshaft position sensor
 - Misfire
 - Fuel system
 - A/F sensor 1
 - A/F sensor 1 heater
 - Mass air flow sensor
 - Engine coolant temperature sensor 1
 - Intake air temperature sensor
 - Vehicle speed signal
2. DTC P2080 is displayed with DTC P0544, P0545, P0546, or P2081, first perform the trouble diagnosis for DTC P0544, P0545, P0546, or P2081.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- 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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "DATA MONITOR".

P2080 EXHAUST GAS TEMPERATURE SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

3. Select the following items:
 - COOLANT TEMP/S
 - INT/A TEMP SE
 - VHCL SPEED SE
4. Start the engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 120 consecutive seconds.

CAUTION:

Always drive vehicle in safe manner and obey all traffic laws.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Items	Conditions
COOLANT TEMP/S	More than 65°C (149°F)
INT/A TEMP SE	<ul style="list-style-type: none">• More than 0°C (32°F)• Less than 50°C (122°F)
VHCL SPEED SE	90 – 100 km/h (56 – 62 MPH)

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1589, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922964

1.CHECK DTC PRIORITY

1. DTC P2080 is displayed with DTCs related to following items, perform the trouble diagnosis for the detected DTCs.
 - Crankshaft position sensor
 - Misfire
 - Fuel system
 - A/F sensor 1
 - A/F sensor 1 heater
 - Mass air flow sensor
 - Engine coolant temperature sensor 1
 - Intake air temperature sensor
 - Vehicle speed signal
2. DTC P2080 is displayed with DTC P0544, P0545, P0546, or P2081, first perform the trouble diagnosis for DTC P0544, P0545, P0546, or P2081.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
NO >> GO TO 2.

2.CHECK FOR EXHAUST GAS LEAKS

1. Start the engine and let it idle.
2. Listen for an exhaust gas leak upstream the three way catalyst.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.COMPONENT FUNCTION CHECK

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. On CONSULT screen, select ENGINE >> DATA MONITOR >> “EXHAUST GAS TEMP SEN 1 B1”.
3. Check that “EXHAUST GAS TEMP SEN 1 B1” indication as follows.

P2080 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B1	<ul style="list-style-type: none">Engine coolant temperature: Warmed-up conditionEngine speed: Idling	1.05 – 4.00 V

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	67	F142	100	<ul style="list-style-type: none">Engine coolant temperature: Warmed-up conditionEngine speed: Idling	1.05 – 4.00 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust gas temperature sensor (bank 1). Refer to [EM-231, "Exploded View"](#).

P2081 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2081 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013922965

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2081	EXHAUST GAS TEMP SENSOR 1 B1 (Exhaust gas temperature sensor circuit intermittent bank 1 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 1) is 4.84 V or more for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (BANK 1) circuit is open.]
- Exhaust gas temperature sensor (BANK 1)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

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 more than 11 V at idle.

>> GO TO 2.

2.PRECONDITIONING-2

With CONSULT

1. Turn ignition switch ON.
2. Select "COOLANT TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check the following conditions:

COOLANT TEMP/S	More than -30°C (-22°F)
----------------	-------------------------

With GST

Follow the procedure "With CONSULT" above.

Is the condition satisfied?

- YES >> GO TO 4.
NO >> GO TO 3.

3.PRECONDITIONING-3

With CONSULT

1. Start the engine until the following condition is satisfied.

COOLANT TEMP/S	More than -30°C (-22°F)
----------------	-------------------------

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.

With GST

Follow the procedure "With CONSULT" above.

>> GO TO 4.

P2081 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Shift the selector lever to P range.
2. Start engine and let it idle for at least 20 seconds.
3. Depress the accelerator pedal for 5 seconds or more.

NOTE:

Do not release the accelerator pedal during DTC confirmation procedure.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1592, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922966

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1)

With CONSULT

1. Turn ignition switch ON.
2. Select "EXHAUST GAS TEMP SEN 1 B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Start engine and warm it up to normal operating temperature.
4. Check that "EXHAUST GAS TEMP SEN 1 B1" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B1	<ul style="list-style-type: none">• Engine: After warming up• Selector lever: P or N• Air conditioner switch: OFF• No load Idle	2.53250 V
	2,000 rpm	1.29500 V

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	67	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] <ul style="list-style-type: none">• Warm-up condition• Idle speed	2.0 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust gas temperature sensor (bank 1). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust gas temperature sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust gas temperature sensor (bank 1) harness connector terminal and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F95	1	Ground	5 V

P2081 EXHAUST GAS TEMPERATURE SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (BANK 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (BANK 1)		ECM		
Connector	Terminal	Connector	Terminal	
F95	1	F143	67	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

P2082 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2082 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013922967

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2082	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit range/ performance bank 2 sensor 1)	ECM detects the following status continuously for 20 seconds or more: <ul style="list-style-type: none">• The difference between estimated exhaust gas temperature calculated by ECM and temperature sent from exhaust gas temperature sensor is approx. 100°C (212°F) or more.• The difference between exhaust gas temperature sent from exhaust gas temperature calculated by ECM is approx. 100°C (212°F) or more.

POSSIBLE CAUSE

- Exhaust gas leaks
- Exhaust gas temperature sensor (BANK 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

1. DTC P2082 is displayed with DTCs related to following items, perform the trouble diagnosis for the detected DTCs.
 - Crankshaft position sensor
 - Misfire
 - Fuel system
 - A/F sensor 1
 - A/F sensor 1 heater
 - Mass air flow sensor
 - Engine coolant temperature sensor 1
 - Intake air temperature sensor
 - Vehicle speed signal
2. DTC P2082 is displayed with DTC P0547, P0548, P0549, or P2083, first perform the trouble diagnosis for DTC P0547, P0548, P0549, or P2083.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#).

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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "DATA MONITOR".

P2082 EXHAUST GAS TEMPERATURE SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

3. Select the following items:
 - COOLANT TEMP/S
 - INT/A TEMP SE
 - VHCL SPEED SE
4. Start the engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 120 consecutive seconds.

CAUTION:

Always drive vehicle in safe manner and obey all traffic laws.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Items	Conditions
COOLANT TEMP/S	More than 65°C (149°F)
INT/A TEMP SE	<ul style="list-style-type: none">• More than 0°C (32°F)• Less than 50°C (122°F)
VHCL SPEED SE	90 – 100 km/h (56 – 62 MPH)

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1589, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922968

1. CHECK DTC PRIORITY

1. DTC P2082 is displayed with DTCs related to following items, perform the trouble diagnosis for the detected DTCs.
 - Crankshaft position sensor
 - Misfire
 - Fuel system
 - A/F sensor 1
 - A/F sensor 1 heater
 - Mass air flow sensor
 - Engine coolant temperature sensor 1
 - Intake air temperature sensor
 - Vehicle speed signal
2. DTC P2082 is displayed with DTC P0547, P0548, P0549, or P2083, first perform the trouble diagnosis for DTC P0547, P0548, P0549, or P2083.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- NO >> GO TO 2.

2. CHECK FOR EXHAUST GAS LEAKS

1. Start the engine and let it idle.
2. Listen for an exhaust gas leak upstream the three way catalyst.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace error-detected parts.

3. COMPONENT FUNCTION CHECK

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. On CONSULT screen, select ENGINE >> DATA MONITOR >> “EXHAUST GAS TEMP SEN 1 B2”.
3. Check that “EXHAUST GAS TEMP SEN 1 B2” indication as follows.

P2082 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B2	<ul style="list-style-type: none"> • Engine coolant temperature: Warmed-up condition • Engine speed: Idling 	1.05 – 4.00 V

⊗ Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	47	F142	100	<ul style="list-style-type: none"> • Engine coolant temperature: Warmed-up condition • Engine speed: Idling 	1.05 – 4.00 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust gas temperature sensor (bank 2). Refer to [EM-231, "Exploded View"](#).

P2083 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2083 EXHAUST GAS TEMPERATURE SENSOR

DTC Description

INFOID:000000013922969

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2083	EXHAUST GAS TEMP SENSOR 1 B2 (Exhaust gas temperature sensor circuit intermittent bank 2 sensor 1)	ECM detects that a voltage signal from exhaust gas temperature sensor (bank 2) is 4.84 V or more for 5 consecutive seconds.

POSSIBLE CAUSE

- Harness or connectors [Exhaust gas temperature sensor (BANK 2) circuit is open.]
- Exhaust gas temperature sensor (BANK 2)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

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 more than 11 V at idle.

>> GO TO 2.

2.PRECONDITIONING-2

With CONSULT

1. Turn ignition switch ON.
2. Select "COOLANT TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
3. Check the following conditions:

COOLANT TEMP/S	More than -30°C (-22°F)
----------------	-------------------------

With GST

Follow the procedure "With CONSULT" above.

Is the condition satisfied?

- YES >> GO TO 4.
NO >> GO TO 3.

3.PRECONDITIONING-3

With CONSULT

1. Start the engine until the following condition is satisfied.

COOLANT TEMP/S	More than -30°C (-22°F)
----------------	-------------------------

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.

With GST

Follow the procedure "With CONSULT" above.

>> GO TO 4.

P2083 EXHAUST GAS TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

4. PERFORM DTC CONFIRMATION PROCEDURE

- Shift the selector lever to P range.
- Start engine and let it idle for at least 20 seconds.
- Depress the accelerator pedal for 5 seconds or more.

NOTE:

Do not release the accelerator pedal during DTC confirmation procedure.

- Check 1st trip DTC.


Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1598, "Diagnosis Procedure"](#).
 NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
 NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922970

1. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2)

 With CONSULT

- Turn ignition switch ON.
- Select "EXHAUST GAS TEMP SEN 1 B2" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Start engine and warm it up to normal operating temperature.
- Check that "EXHAUST GAS TEMP SEN 1 B2" indication as follows.

Monitor item	Condition	Value (Approx.)
EXHAUST GAS TEMP SEN 1 B2	<ul style="list-style-type: none"> Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load Idle	2.45625 V
	2,000 rpm	1.33125 V

 Without CONSULT

- Start engine and warm it up to normal operating temperature.
- Check that voltage between ECM harness connector terminals as follows.

ECM				Condition	Value (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F143	47	F142	100	[Ignition switch: ON]	4.1 V
				[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	1.8 V

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Replace exhaust gas temperature sensor (bank 2). Refer to [EM-231, "Exploded View"](#).

2. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect exhaust gas temperature sensor (bank 2) (bank 2) harness connector.
- Turn ignition switch ON.
- Check the voltage between exhaust gas temperature sensor (bank 2) harness connector terminal and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F96	1	Ground	5 V

P2083 EXHAUST GAS TEMPERATURE SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 4.

3. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (BANK 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	2	F142	100	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

4. CHECK EXHAUST GAS TEMPERATURE SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between exhaust gas temperature sensor (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Exhaust gas temperature sensor (BANK 2)		ECM		
Connector	Terminal	Connector	Terminal	
F96	1	F143	47	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228. "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Description

INFOID:000000013922973

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
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.
P2103	ETC MOT PWR (Throttle control motor relay circuit short)	ECM detect the throttle control motor relay is stuck ON.

POSSIBLE CAUSE

DTC P2100

- Harness or connectors (Throttle control motor relay circuit is open)
- Throttle control motor relay

DTC P2103

- Harness or connectors (Throttle control motor relay circuit is shorted)
- Throttle control motor relay

FAIL-SAFE

Not applicable

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.

With DTC is detected?

P2100 >> GO TO 2.

P2103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1600. "Diagnosis Procedure"](#).

NO >> INSPECTION END

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1600. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922974

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connector and ground.

+		-		Voltage
ECM				
Connector	Terminal	Connector	Terminal	
F142	123	E152	204	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F142	123	E124	65	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
 NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector and ground as per the following conditions.

ECM				Condition	Voltage (Approx.)
Connector	+	Connector	-		
	Terminal		Terminal		
F142	96	E152	204	Ignition switch: OFF	0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

- YES >> INSPECTION END
 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.

+		-		Continuity
ECM				
Connector	Terminal	Connector	Terminal	
F142	96	E123	57	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Repair or replace error-detected parts.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Description

INFOID:000000013922975

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2101	ETC FNCTN/CIRC-B1 (Electric throttle control performance)	Electric throttle control function does not operate properly.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is open or shorted)
- Electric throttle control actuator

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the confirmation procedure for DTC P2100 or P2119.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P2100: Refer to [EC6-1600, "DTC Description"](#).
 - DTC P2119: Refer to [EC6-1608, "DTC Description"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 3.

3. 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 [EC6-1602, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000013922976

1. CHECK DTC PRIORITY

If DTC P2101 is displayed with DTC P2100 or P2119, first perform the confirmation procedure for DTC P2100 or P2119.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P2100: Refer to [EC6-1600, "DTC Description"](#).
 - DTC P2119: Refer to [EC6-1608, "DTC Description"](#).

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector terminals as per the following conditions.

ECM				Condition	Voltage (Approx.)
+		-			
Connector	Terminal	Connector	Terminal		
F142	123	E152	204	Ignition switch: OFF	0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.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.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F142	123	E124	65	Existed

5. 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 THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		-		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F142	96	E123	57	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.

5.CHECK THROTTLE CONTROL MOTOR (BANK 1) OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 1) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator (bank 1) harness connector and ECM harness connector.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric throttle control actuator (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F118	2	F142	150	Existed
			149	Not existed
	1		150	Not existed
			149	Existed

5. 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 THROTTLE CONTROL MOTOR (BANK 2) OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator (bank 2) harness connector and ECM harness connector.

Electric throttle control actuator (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F119	2	F142	148	Existed
			147	Not existed
	1		148	Not existed
			147	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to [EM-167, "Exploded View"](#).
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC6-272, "Description"](#).

8.CHECK THROTTLE CONTROL MOTOR (BANK 1) AND (BANK 2)

Check the throttle control motor (bank 1) and (bank 2). Refer to [EC6-1604, "Component Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection

INFOID:000000013922977

1.CHECK THROTTLE CONTROL MOTOR (BANK 1)

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 1) harness connector.
3. Check the resistance between electric throttle control actuator (bank 1) terminals as per the following.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric throttle control actuator (bank 1)		Resistance (Approx.)
+	-	
Terminals		
2	1	1 - 15 Ω [at 25°C (77°F)]

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EC6

Is the inspection result normal?

C

YES >> GO TO 2.

NO >> Replace electric throttle control actuator (bank 1). Refer to [EM-173. "Exploded View"](#).

2. CHECK THROTTLE CONTROL MOTOR (BANK 2)

D

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 2) harness connector.
3. Check the resistance between electric throttle control actuator (bank 2) terminals as per the following.

E

Electric throttle control actuator (bank 2)		Resistance (Approx.)
+	-	
Terminals		
2	1	1 - 15 Ω [at 25°C (77°F)]

F

G

Is the inspection result normal?

YES >> INSPECTION END

H

NO >> Replace electric throttle control actuator (bank 2). Refer to [EM-173. "Exploded View"](#).

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P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2118 THROTTLE CONTROL MOTOR

DTC Description

INFOID:000000013922978

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2118	ETC MOT-B1 (Throttle control motor circuit short)	ECM detects short in both circuits between ECM and throttle control motor.

POSSIBLE CAUSE

- Harness or connectors (Throttle control motor circuit is shorted.)
- Electric throttle control actuator (Throttle control motor)

FAIL-SAFE

Not applicable

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 [EC6-1606, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922979

1. CHECK THROTTLE CONTROL MOTOR (BANK 1) OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 1) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator (bank 1) harness connector and ECM harness connector.

Electric throttle control actuator (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F118	2	F142	150	Existed
			149	Not existed
	1		150	Not existed
			149	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

P2118 THROTTLE CONTROL MOTOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 2.
- NO >> Repair or replace error-detected parts.

2.CHECK THROTTLE CONTROL MOTOR (BANK 2) OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (bank 2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator (bank 2) harness connector and ECM harness connector.

Electric throttle control actuator (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F119	2	F142	148	Existed
			147	Not existed
	1		148	Not existed
			147	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 THROTTLE CONTROL MOTOR (BANK 1) AND (BANK 2)

Check the throttle control motor (bank 1) and (bank 2). Refer to [EC6-1607, "Component Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

Component Inspection

INFOID:000000013922980

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Resistance (Approx.)
+	-	
Terminals		
2	1	1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace electric throttle control actuator. Refer to [EM-173, "Exploded View"](#).

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Description

INFOID:000000013922981

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	
P2119	ETC ACTR-B1 (Electric throttle control actuator)	A	Electric throttle control actuator does not function properly due to the re- turn spring malfunction.
		B	Throttle valve opening angle in fail-safe mode is not in specified range.
		C	ECM detect the throttle valve is stuck open.

POSSIBLE CAUSE

Electric throttle control actuator

FAIL-SAFE

Not applicable

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 position and wait at least 3 seconds.
3. Set selector lever to P 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 position and wait at least 3 seconds.
7. Set selector lever to P position.
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1608, "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 position and wait at least 3 seconds.
3. Set selector lever to P position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1608, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922982

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

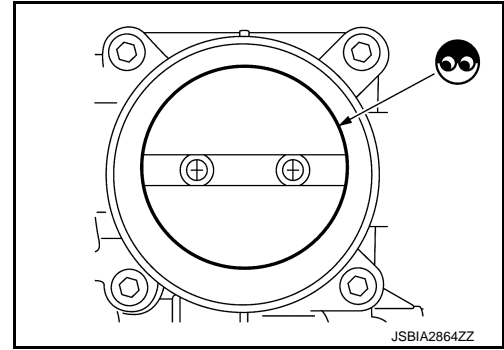
[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Remove the intake air duct. Refer to [EM-167, "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-173, "Exploded View"](#).
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to [EC6-272, "Description"](#).



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P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2122, P2123 APP SENSOR

DTC Description

INFOID:000000013922983

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2122	APP SEN 1/CIRC (Throttle/Pedal position sensor/switch "D" circuit low)	An excessively low voltage from the APP sensor 1 is sent to ECM.
P2123	APP SEN 1/CIRC (Throttle/Pedal position sensor/switch "D" circuit high)	An excessively high voltage from the APP sensor 1 is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (APP sensor 1 circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).

NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to [EC6-1610. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922984

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

P2122, P2123 APP SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
 NO >> GO TO 2.

2. CHECK APP SENSOR 1 POWER SUPPLY

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

+		-	Voltage (V)
APP sensor			
Connector	Terminal	Ground	Approx. 5
M124*1	4*1		
M126*2	5*2		

*1: With ICC
 *2: Without ICC

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.

3. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124*1	4*1	E152	198	Existed
M126*2	5*2			

*1: With ICC
 *2: Without ICC

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).
 NO >> Repair or replace error-detected parts.

4. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124*1	5*1	E152	203	Existed
M126*2	4*2			

*1: With ICC
 *2: Without ICC

4. Also check harness for short to ground and short to power.

P2122, P2123 APP SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Repair or replace error-detected parts.

5. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124*1	6*1	E152	202	Existed
M126*2	3*2			

*1: With ICC

*2: Without ICC

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Repair or replace error-detected parts.

6. CHECK APP SENSOR

Refer to [EC6-1612, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM) or [ACC-6, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITH DISTANCE CONTROL ASSIST SYSTEM).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000013922985

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage ECM harness connector terminals as per the following.

ECM			Condition	Voltage (V)
Connector	+	-		
	Terminal	Terminal		
E152	202 (APP sensor 1)	203	Fully released	0.45 – 1.0
			Fully depressed	4.4 – 4.8
	195 (APP sensor 2)	196	Fully released	0.22 – 0.50
			Fully depressed	2.1 – 2.5

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM) or [ACC-6, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITH DISTANCE CONTROL ASSIST SYSTEM).

P2127, P2128 APP SENSOR

DTC Description

INFOID:000000013922986

DTC DETECTION LOGIC

A
EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2127	APP SEN 2/CIRC (Throttle/Pedal position sensor/switch "E" circuit low)	An excessively low voltage from the APP sensor 2 is sent to ECM.
P2128	APP SEN 2/CIRC (Throttle/Pedal position sensor/switch "E" circuit high)	An excessively high voltage from the APP sensor 2 is sent to ECM.

C
D
E

POSSIBLE CAUSE

- Harness or connectors
- APP sensor 2 circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Accelerator pedal position sensor (APP sensor 2)
- Each sensor, connected with sensor power supply 2 circuit

F
G

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

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.

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TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

L

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

M

Is DTC detected?

N

- YES >> Proceed to [EC6-1613, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

O

Diagnosis Procedure

INFOID:000000013922987

1. CHECK APP SENSOR 2 POWER SUPPLY

P

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage (V)
APP sensor			
Connector	Terminal	Ground	Approx. 5
M124 ^{*1}	10 ^{*1}		
M126 ^{*2}	6 ^{*2}		

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124 ^{*1}	10 ^{*1}	E152	194	Existed
M126 ^{*2}	6 ^{*2}			

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

4. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124 ^{*1}	11 ^{*1}	E152	196	Existed
M126 ^{*2}	2 ^{*2}			

*1: With ICC

*2: Without ICC

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

5. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124*1	12*1	E152	195	Existed
M126*2	1*2			

*1: With ICC

*2: Without ICC

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK APP SENSOR

Refer to [EC6-1615, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM) or [ACC-6, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITH DISTANCE CONTROL ASSIST SYSTEM).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:000000013922988

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage ECM harness connector terminals as per the following.

Connector	ECM		Condition	Voltage (V)
	+	-		
	Terminal	Terminal		
E152	202 (APP sensor 1)	203	Fully released	0.45 – 1.0
			Fully depressed	4.4 – 4.8
	195 (APP sensor 2)	196	Fully released	0.22 – 0.50
			Fully depressed	2.1 – 2.5

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to [ACC-4, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM) or [ACC-6, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation"](#) (MODELS WITH DISTANCE CONTROL ASSIST SYSTEM).

P2138 APP SENSOR

DTC Description

INFOID:000000013922989

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2138	APP SENSOR (Throttle/Pedal position sensor/switch "D"/ "E" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.

POSSIBLE CAUSE

- Harness or connectors
- APP sensor 1 circuit is open or shorted.
- APP sensor 2 circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
- Accelerator pedal position sensor (APP sensor 1)
- Accelerator pedal position sensor (APP sensor 2)
- Each sensor, connected with sensor power supply 2 circuit

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2138 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).
- NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

- YES >> Proceed to [EC6-1616. "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922990

1.CHECK DTC PRIORITY

P2138 APP SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

If DTC P2138 is displayed with DTC P0643, first perform the confirmation procedure (trouble diagnosis) for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).

NO >> GO TO 2.

2.CHECK APP SENSOR 1

Check APP sensor 1. Refer to [EC6-1610, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2

Check APP sensor 2. Refer to [EC6-1613, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Refer to [EC6-1742, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

NO >> Repair or replace error-detected parts.

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P23E9 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P23E9 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013922993

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P23E9	A camshaft posi signal B2 ("A" camshaft position signal output circuit/ open bank 2)	When the signal voltage of Intake Camshaft Position Sensor is less than 1.0 V or more than 5.8 V for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 2) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 2)

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none"> • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Start the engine and wait at least 5 seconds.
3. Check DTC.

Is DTC P23E9 detected?

- YES >> Proceed to [EC6-1619, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

P23E9 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

INFOID:000000013922994

Diagnosis Procedure

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F97	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	1	F143	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	2	F143	82	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	3	F143	77	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

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P23E9 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

5. CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-1620, "Component Inspection \(Camshaft Position Sensor\)"](#).

Is the inspection result normal?

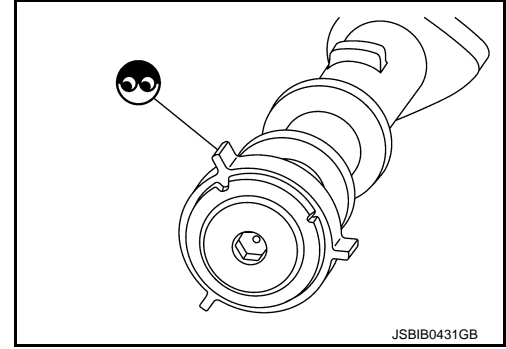
YES >> GO TO 6.

NO >> Replace intake CMP sensor. Refer to [EM-250, "Exploded View"](#).

6. CHECK INTAKE CAMSHAFT (BANK 2)

Check the following items:

- Accumulation of debris to the signal plate intake camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:000000013922995

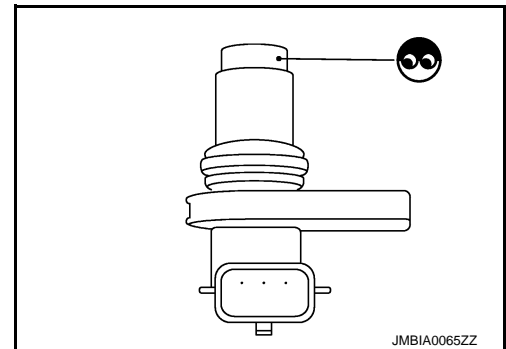
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P23EA INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P23EA INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013922996

DTC DETECTION LOGIC

A

EC6

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P23EA	A camshaft posi signal B2 ("A" camshaft position signal output circuit low bank 2)	When the intake camshaft position sensor signal edge count is less than 2 counts per one camshaft rotation for approx. 1 second.

C

D

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 2) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 2)

E

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

F

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

G

H

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none"> • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

I

J

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.

K

L

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

M

>> GO TO 2.

N

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

O

Is DTC P23EA detected?

P

YES >> Proceed to [EC6-1621, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013922997

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

P23EA INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F97	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	1	F143	85	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	2	F143	82	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	3	F143	77	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-1620, "Component Inspection \(Camshaft Position Sensor\)"](#).

P23EA INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

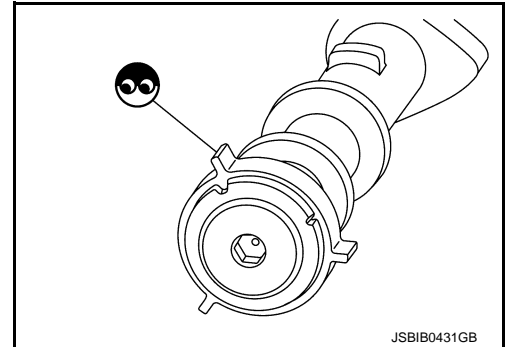
YES >> GO TO 6.

NO >> Replace intake CMP sensor. Refer to [EM-250, "Exploded View"](#).

6.CHECK INTAKE CAMSHAFT (BANK 2)

Check the following items:

- Accumulation of debris to the signal plate intake camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:0000000013922998

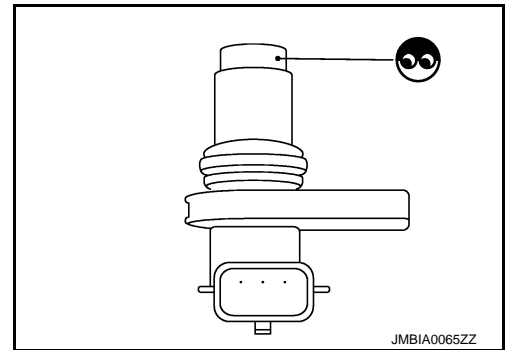
1.CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2.CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P23EB INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P23EB INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013922999

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P23EB	A camshaft posi signal B2 ("A" camshaft position signal output circuit high bank 2)	When the intake camshaft position sensor signal edge count is more than 4 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 2) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 2)
- Electric intake valve timing control actuator (bank 2) circuit is open or shorted.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P23EB is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0021
- P34B0
- P34A8
- P34A9
- P34AA
- P34AB
- P34B1

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P23EB detected?

P23EB INTAKE CAMSHAFT POSITION SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-1625, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

A

Diagnosis Procedure

INFOID:0000000013923000

EC6

1. CHECK DTC PRIORITY

If DTC P26EB is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0021
- P34B0
- P34A8
- P34A9
- P34AA
- P34AB
- P34B1

C

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E

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- NO >> GO TO 2.

F

2. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

G

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

H

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F97	1	Ground	5 V

I

J

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

K

3. CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

L

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

M

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	1	F143	85	Existed

N

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

O

4. CHECK INTAKE CMP SENSOR GROUND CIRCUIT

P

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

P23EB INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	2	F143	82	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F97	3	F143	77	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-1627. "Component Inspection \(Camshaft Position Sensor\)".](#)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace intake CMP sensor. Refer to [EM-250. "Exploded View".](#)

7. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR (BANK 2) CIRCUIT

1. Disconnect electric IVT control actuator (bank 2) harness connector.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and ECM harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F145	1	E153	4	Existed
	2		6	
	3		2	
F147	4		31	
	5		23	
	6		32	
	7		24	
	8		25	
	9		33	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK INTAKE CAMSHAFT (BANK 2)

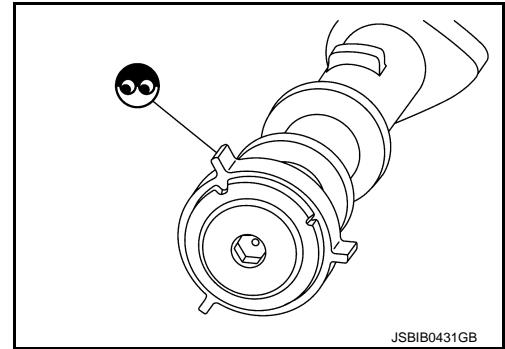
Check the following items:

P23EB INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate intake camshaft (bank 2) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:000000013923001

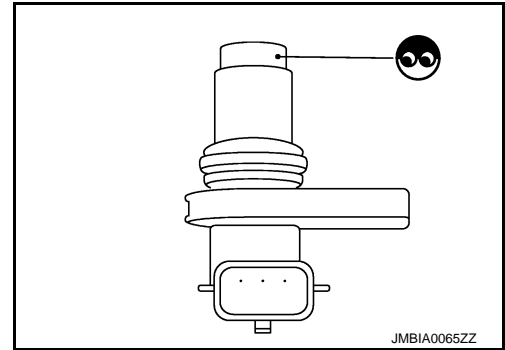
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

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P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013923002

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2562	TC BOOST CONTROL POSITN SEN A (Turbocharger boost control position sensor A circuit)	A voltage signal transmitted from the electric wastegate control valve position sensor (bank 1) is 4.7 V or more continuously for 5 seconds.
P2566	TC BOOST CONTROL POSITN SEN A (Turbocharger boost control position sensor A circuit intermittent)	A voltage signal transmitted from the electric wastegate control valve position sensor (bank 1) is 0.25 V or less continuously for 5 seconds.

POSSIBLE CAUSE

- Electric wastegate control valve position sensor
- Harness and connectors
(Electric wastegate control valve position sensor circuit is open or shorted.)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric wastegate actuator control. (Wastegate valve opens)

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2562 or P2566 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).
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

1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1629, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

INFOID:000000013923003

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P2562 or P2566 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric wastegate control actuator (bank 1)			
Connector	Terminal		
F139	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F139	2	F143	45	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 WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator (bank 1) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 1)		ECM		
Connector	Terminal	Connector	Terminal	
F139	1	F143	57	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.

P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

5. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

Check the electric wastegate control actuator (bank 1). Refer to [EC6-1630, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 1\)\]"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

Component Inspection [Electric Wastegate Control Actuator (Bank 1)]

INFOID:000000013976073

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

With CONSULT

1. Turn ignition switch ON.
2. On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
3. Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
4. Perform the test.
5. Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 1)

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 1) only). Refer to [EM-231, "Exploded View"](#).

P2578 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2578 TURBOCHARGER SPEED SENSOR

DTC Description

INFOID:0000000013923011

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2578	Turbocharger/Supercharger speed sensor A (Turbocharger/Supercharger speed sensor "A" circuit)	Sensor signal is not inputted for 2 consecutive seconds while the following condition is satisfied: <ul style="list-style-type: none">• Engine speed: more than 1,400 rpm• Boost pressure is applied enough.

C

D

POSSIBLE CAUSE

- Turbocharger speed sensor (bank 1)
- Harness and connectors
(Turbocharger speed sensor circuit is open or shorted.)

E

FAIL-SAFE

F

Fail safe mode	Vehicle behavior
Others	Torque have to be limited to the operating range that does not generate the over speed of the turbocharger.

G

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

H

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.

I

J

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

K

NOTE:

Before performing this procedure, check that the battery voltage is more than 10 V at idle.

1. Start engine.
2. Drive the vehicle at least 2 seconds under the following conditions:

L

Engine speed	More than 1,400 rpm
Accelerator pedal	Depressed more than 50%

M

NOTE:

The above conditions can be satisfied by accelerating from low speed to full throttle.

3. Check 1st trip DTC.

N

Is DTC detected?

O

- YES >> Proceed to [EC6-1631, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

P

Diagnosis Procedure

INFOID:0000000013923012

1. COMPONENT FUNCTION CHECK

Ⓜ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Data monitor" >> "TC/SC SPEED B1".

P2578 TURBOCHARGER SPEED SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

3. Check that the values displayed on "TC/SC SPEED B1" is 14,000 – 26,000 rpm when maintaining 3,000 rpm with no load condition.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK TURBOCHARGER SPEED SENSOR (BANK 1) INSTALLATION CONDITION

Check that the turbocharger speed sensor (bank 1) is installed correctly with no float and disconnection.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Install the sensor correctly.

3.CHECK TURBOCHARGER SPEED SENSOR

Check the turbocharger speed sensor. Refer to [EC6-1633, "Component Inspection \(Turbocharger Speed Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Replace turbocharger speed sensor (bank 1). Refer to [EM-231, "Exploded View"](#).

4.CHECK TURBOCHARGER SPEED SENSOR (BANK 1) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger speed sensor (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger speed sensor (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F141	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

5.CHECK TURBOCHARGER SPEED SENSOR (BANK 1) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger speed sensor (bank 1) harness connector and ECM harness connector.

Turbocharger speed sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F141	1	F142	109	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

6.CHECK TURBOCHARGER SPEED SENSOR (BANK 1) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger speed sensor (bank 1) harness connector and ECM harness connector.

P2578 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Turbocharger speed sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F141	3	F142	116	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 SPEED SENSOR (BANK 1) INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger speed sensor (bank 1) harness connector and ECM harness connector.

Turbocharger speed sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F141	2	F142	119	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK ECM GROUND CIRCUIT

1. Disconnect ECM harness connectors.

2. Check the continuity between ECM harness connector and ground.

ECM		-	Continuity
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Speed Sensor)

INFOID:0000000013923013

1.CHECK TURBOCHARGER SPEED SENSOR-1

1. Turn ignition switch OFF.

2. Disconnect turbocharger speed sensor harness connector.

3. Remove turbocharger speed sensor. Refer to [EM-231, "Exploded View"](#).

4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace turbocharger speed sensor. Refer to [EM-231, "Exploded View"](#).

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P2578 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

2. CHECK SENSOR-2

Check resistance between sensor terminals as follows.

Terminals (Polarity)	Resistance (Ω)
1 - 2	Except 0 or ∞ [at 25°C (77°F)]
1 - 3	
2 - 3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace sensor. Refer to [EM-231. "Exploded View"](#).

P2586, P2590 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2586, P2590 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:0000000013923014

DTC DETECTION LOGIC

A

EC6

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2586	TC BOOST CONTROL POSITN SEN B (Turbocharger boost control position sensor B circuit)	A voltage signal transmitted from the electric wastegate control valve position sensor (bank 2) is 4.7 V or more continuously for 5 seconds.
P2590	TC BOOST CONTROL POSITN SEN B (Turbocharger boost control position sensor B circuit intermittent/erratic)	A voltage signal transmitted from the electric wastegate control valve position sensor (bank 2) is 0.25 V or less continuously for 5 seconds.

C

D

E

POSSIBLE CAUSE

- Electric wastegate control valve position sensor
- Harness and connectors
(Electric wastegate control valve position sensor circuit is open or shorted.)

F

FAIL-SAFE

Fail safe mode	Vehicle behavior
Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. Driving at 70 km/h (43 MPH) or more is possible. NOTE: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Others	ECM stops the electric wastegate actuator control. (Wastegate valve opens)

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DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2586 or P2590 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).

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

1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to [EC6-1636, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

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P2586, P2590 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

INFOID:000000013923015

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P2586 or P2590 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-1439, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric wastegate control actuator (bank 2)			
Connector	Terminal		
F138	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform the trouble diagnosis for power supply circuit.

3. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F138	2	F143	66	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 WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator (bank 2) harness connector and ECM harness connector.

+		-		Continuity
Electric wastegate control actuator (bank 2)		ECM		
Connector	Terminal	Connector	Terminal	
F138	1	F143	61	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.

P2586, P2590 WASTEGATE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

5. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

Check the electric wastegate control actuator (bank 2). Refer to [EC6-1637, "Component Inspection \[Electric Wastegate Control Actuator \(Bank 2\)\]"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231, "Exploded View"](#).

Component Inspection [Electric Wastegate Control Actuator (Bank 2)]

INFOID:0000000013923016

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

With CONSULT

- Turn ignition switch ON.
- On CONSULT screen, select "ENGINE" >> "Active test" >> "WASTEGATE ACTUATOR".
- Select the following monitor items:
 - W/G ACTUATOR POSITION B1
 - W/G ACTUATOR POSITION B2
 - W/G ACTUATOR POSI SEN B1
 - W/G ACTUATOR POSI SEN B2
- Perform the test.
- Check that the relationship of the values displayed on the monitor items as the following.

Monitor item	W/G ACTUATOR POSITION B1/B2 (m)	W/G ACTUATOR POSI SEN B1/B2 (V)
Value	0.0073 – 0.0087	3.61 – 4.11
	0.0033 – 0.0047	2.25 – 2.75

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231, "Exploded View"](#).

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR (BANK 2)

Without CONSULT

- Turn ignition switch OFF.
- Disconnect Wastegate control actuator harness connector.
- While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator (bank 2) only). Refer to [EM-231, "Exploded View"](#).

P2593 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2593 TURBOCHARGER SPEED SENSOR

DTC Description

INFOID:000000013923023

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2593	Turbocharger/Supercharger speed sensor B (Turbocharger speed sensor "B" circuit)	Sensor signal is not inputted for 2 consecutive seconds while the following condition is satisfied: <ul style="list-style-type: none">• Engine speed: more than 1,400 rpm• Boost pressure is applied enough.

POSSIBLE CAUSE

- Turbocharger speed sensor (bank 2)
- Harness and connectors
(Turbocharger speed sensor circuit is open or shorted.)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Others	Torque have to be limited to the operating range that does not generate the over speed of the turbocharger.

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

NOTE:

Before performing this procedure, check that the battery voltage is more than 10 V at idle.

1. Start engine.
2. Drive the vehicle at least 2 seconds under the following conditions:

Engine speed	More than 1,400 rpm
Accelerator pedal	Depressed more than 50%

NOTE:

The above conditions can be satisfied by accelerating from low speed to full throttle.

3. Check 1st trip DTC.

Is the DTC detected?

- YES >> Proceed to [EC6-1638, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923024

1. COMPONENT FUNCTION CHECK

Ⓟ With CONSULT

1. Start the engine.
2. On CONSULT screen, select "ENGINE" >> "Data monitor" >> "TC/SC SPEED B2".

P2593 TURBOCHARGER SPEED SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

3. Check that the values displayed on "TC/SC SPEED B2" is 14,000 – 26,000 rpm when maintaining 3,000 rpm with no load condition.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 2.

2.CHECK TURBOCHARGER SPEED SENSOR (BANK 2) INSTALLATION CONDITION

Check that the turbocharger speed sensor (bank 2) is installed correctly with no float and disconnection.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Install the sensor correctly.

3.CHECK TURBOCHARGER SPEED SENSOR

Check the turbocharger speed sensor. Refer to [EC6-1633. "Component Inspection \(Turbocharger Speed Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Replace turbocharger speed sensor (bank 2). Refer to [EM-231. "Exploded View"](#).

4.CHECK TURBOCHARGER SPEED SENSOR (BANK 2) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger speed sensor (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger speed sensor (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F140	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

5.CHECK TURBOCHARGER SPEED SENSOR (BANK 2) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger speed sensor (bank 2) harness connector and ECM harness connector.

Turbocharger speed sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F140	1	F142	108	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Repair or replace error-detected parts.

6.CHECK TURBOCHARGER SPEED SENSOR (BANK 2) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger speed sensor (bank 2) harness connector and ECM harness connector.

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P2593 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Turbocharger speed sensor (bank 2)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F140	3	F142	132	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 SPEED SENSOR (BANK 2) INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger speed sensor (bank 2) harness connector and ECM harness connector.

Turbocharger speed		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F140	2	F142	120	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK ECM GROUND CIRCUIT

1. Disconnect ECM harness connectors.

2. Check the continuity between ECM harness connector and ground.

ECM		-	Continuity
Connector	Terminal		
F143	2	Ground	Existed
	7		
F142	87		
	88		
	95		
E152	199		
	201		
	204		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

Component Inspection (Turbocharger Speed Sensor)

INFOID:000000013923025

1.CHECK TURBOCHARGER SPEED SENSOR-1

1. Turn ignition switch OFF.

2. Disconnect turbocharger speed sensor harness connector.

3. Remove turbocharger speed sensor. Refer to [EM-231, "Exploded View"](#).

4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace turbocharger speed sensor. Refer to [EM-231, "Exploded View"](#).

2.CHECK SENSOR-2

P2593 TURBOCHARGER SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Check resistance between sensor terminals as follows.

Terminals (Polarity)	Resistance (Ω)
1 - 2	Except 0 or ∞ [at 25°C (77°F)]
1 - 3	
2 - 3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace sensor. Refer to [EM-231, "Exploded View"](#).

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P2614 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2614 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013923029

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2614	A camshaft posi signal B1 ("A" camshaft position signal output circuit/ open bank 1)	When the signal voltage of Intake Camshaft Position Sensor is less than 1.0 V or more than 5.8 V for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 1) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 1)

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none"> • Stops feedback control of idle speed and controls with specified speed. • Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Start the engine and wait at least 5 seconds.
3. Check DTC.

Is DTC P2614 detected?

- YES >> Proceed to [EC6-1643, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

P2614 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000013923030

Diagnosis Procedure

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F135	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	1	F143	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	2	F143	29	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	3	F143	26	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

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P2614 INTAKE CAMSHAFT POSITION SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

5. CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-1644, "Component Inspection \(Camshaft Position Sensor\)"](#).

Is the inspection result normal?

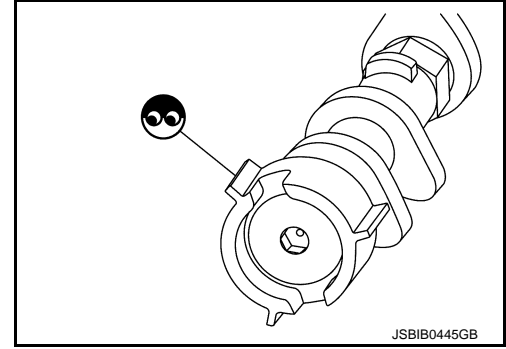
YES >> GO TO 6.

NO >> Replace intake CMP sensor. Refer to [EM-250, "Exploded View"](#).

6. CHECK INTAKE CAMSHAFT (BANK 1)

Check the following items:

- Accumulation of debris to the signal plate intake camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:000000013923031

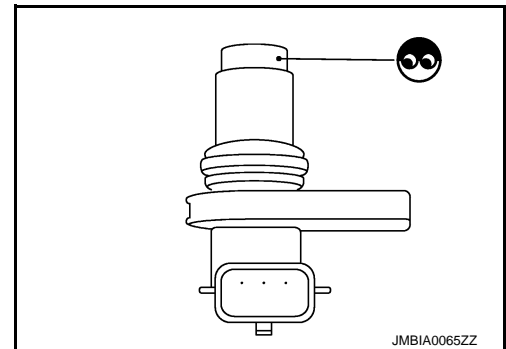
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P2615 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2615 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:0000000013923032

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2615	A camshaft posi signal B1 ("A" camshaft position signal output circuit low bank 1)	When the intake camshaft position sensor signal edge count is less than 2 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 1) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 1)

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P2615 detected?

- YES >> Proceed to [EC6-1645, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013923033

1. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

P2615 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F135	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	1	F143	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE CMP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	2	F143	29	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	3	F143	26	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-1644, "Component Inspection \(Camshaft Position Sensor\)"](#).

P2615 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

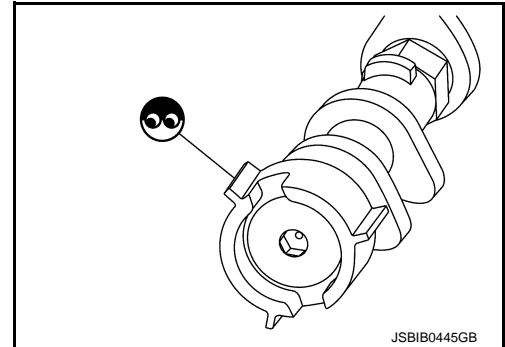
YES >> GO TO 6.

NO >> Replace intake CMP sensor. Refer to [EM-250, "Exploded View"](#).

6.CHECK INTAKE CAMSHAFT (BANK 1)

Check the following items:

- Accumulation of debris to the signal plate intake camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250, "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:0000000013923034

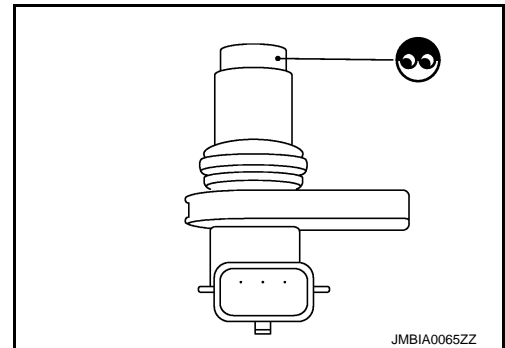
1.CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250, "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).



2.CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250, "Exploded View"](#).

P2616 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2616 INTAKE CAMSHAFT POSITION SENSOR

DTC Description

INFOID:000000013923035

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2616	A camshaft posi signal B1 ("A" camshaft position signal output circuit high bank 1)	When the intake camshaft position sensor signal edge count is more than 4 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 1) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 1)
- Electric intake valve timing control actuator (bank 1) circuit is open or shorted.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2616 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P34A4
- P34A5
- P34A6
- P34A7
- P34AC
- P34AD

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P2616 detected?

P2616 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Proceed to [EC6-1649, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

A

Diagnosis Procedure

INFOID:0000000013923036

EC6

1. CHECK DTC PRIORITY

If DTC P2616 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P34A4
- P34A5
- P34A6
- P34A7
- P34AC
- P34AD

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Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- NO >> GO TO 2.

F

2. CHECK INTAKE CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY

G

1. Turn ignition switch OFF.
2. Disconnect intake CKP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake CMP sensor harness connector and ground.

H

+		-	Voltage (Approx.)
Intake CMP sensor			
Connector	Terminal		
F135	1	Ground	5 V

I

J

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

K

3. CHECK INTAKE CMP SENSOR POWER SUPPLY CIRCUIT

L

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

M

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	1	F143	36	Existed

N

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

O

4. CHECK INTAKE CMP SENSOR GROUND CIRCUIT

P

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

P2616 INTAKE CAMSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	2	F143	29	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 INTAKE CMP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake CMP sensor harness connector and ECM harness connector.

Intake CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F135	3	F143	26	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK INTAKE CMP SENSOR

Check intake CMP sensor. Refer to [EC6-1651. "Component Inspection \(Camshaft Position Sensor\)".](#)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace intake CMP sensor. Refer to [EM-250. "Exploded View".](#)

7. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR (BANK 1) CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.

2. Disconnect electric IVT control module harness connector.

3. Check the continuity between electric IVT control actuator (bank 1) harness connector and ECM harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	
F146	4		7	
	5		15	
	6		8	
	7		16	
	8		17	
	9		9	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK INTAKE CAMSHAFT (BANK 1)

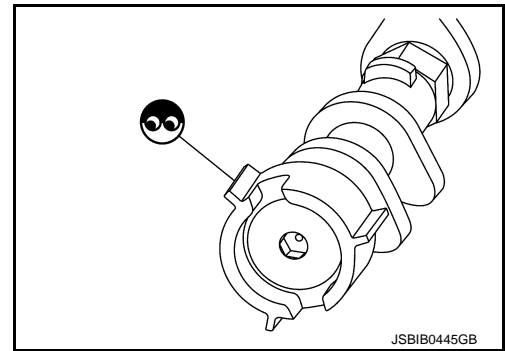
Check the following items:

P2616 INTAKE CAMSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate intake camshaft (bank 1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> INSPECTION END

NO >> Remove debris and clean the signal plate of the camshaft rear end or replace the camshaft. Refer to [EM-250. "Exploded View"](#).

Component Inspection (Camshaft Position Sensor)

INFOID:0000000013923037

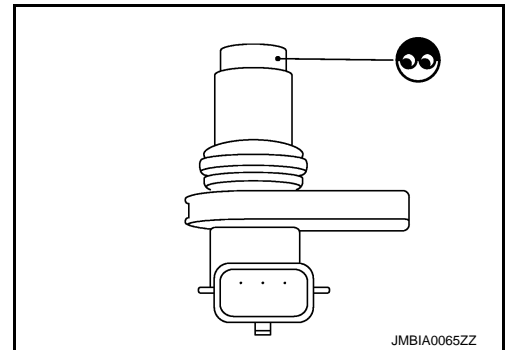
1. CHECK CAMSHAFT POSITION (CMP) SENSOR-1

1. Turn ignition switch OFF.
2. Disconnect CMP sensor harness connector.
3. Remove the sensor. Refer to [EM-250. "Exploded View"](#).
4. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250. "Exploded View"](#).



2. CHECK CMP SENSOR-2

Check resistance CMP sensor terminals as follows.

CMP sensor		Resistance [at 25°C (77°F)]
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the malfunctioning CMP sensor. Refer to [EM-250. "Exploded View"](#).

P2617 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2617 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:000000013923038

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2617	Crankshaft position signal (Crankshaft position signal output circuit/ open)	When the signal voltage of Crankshaft Position Sensor is less than 1.0 V or more than 5.8 V for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
(Crankshaft Position Sensor circuit is open or shorted.)
- Crankshaft Position Sensor

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Start the engine and wait at least 5 seconds.
3. Check DTC.

Is DTC P2617 detected?

- YES >> Proceed to [EC6-1652, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923039

1. CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector and ground.

P2617 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F88	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 2.

2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F143	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

3. CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F143	28	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 INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	F143	31	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace error-detected parts.

5. CHECK CKP SENSOR

Check CKP sensor . Refer to [EC6-1662, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace CKP sensor . Refer to [EM-198, "Exploded View"](#).

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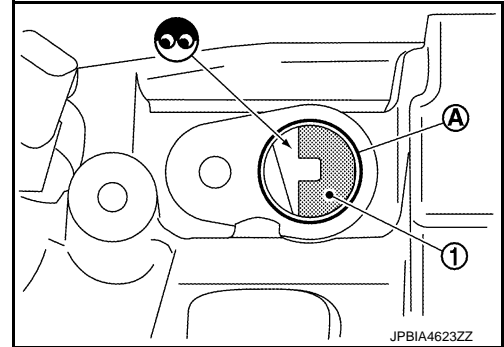
P2617 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

6. CHECK GEAR TOOTH

1. Remove CKP sensor . Refer to [EM-198. "Exploded View"](#).
2. Look into the mounting hole (A) of the CKP sensor to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the signal plate. Refer to [EM-198. "Removal and Installation"](#).

Component Inspection (Crankshaft Position Sensor)

INFOID:0000000013923040

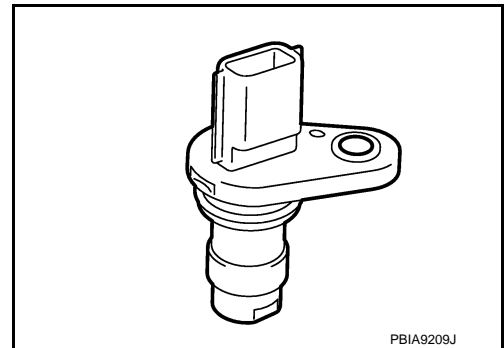
1. CHECK CRANKSHAFT POSITION (CKP) SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect CKP sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace CKP sensor. Refer to [EM-198. "Exploded View"](#).



2. CHECK CKP SENSOR-2

Check the resistance between CKP sensor terminals as per the following.

CKP sensor		Resistance [at 25°C (77°F)]
+	-	
Terminal (Polarity)		Except 0 or ∞ Ω
1	2	
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EM-198. "Exploded View"](#).

P2618 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2618 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:000000013923041

DTC DETECTION LOGIC

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DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2618	Crankshaft position signal (Crankshaft position signal output circuit low)	When the crankshaft position sensor signal edge count is less than 18 counts per one camshaft rotation for approx. 1 second.

C

POSSIBLE CAUSE

- Harness or connectors
(Crankshaft Position Sensor circuit is open or shorted.)
- Crankshaft Position Sensor

D

E

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none"> • Fixes electric intake valve timing control motor in the reference position. • Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

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DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2618 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P0021
- P34A4
- P34A5
- P34A6
- P34A7
- P34A8
- P34A9
- P34AA
- P34AB
- P34AC
- P34AD
- P34B0
- P34B1

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Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#).

NO >> GO TO 2.

N

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.

O

P

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 3.

P2618 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P2618 detected?

- YES >> Proceed to [EC6-1656, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013923042

1.CHECK DTC PRIORITY

If DTC P2618 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P0021
- P34A4
- P34A5
- P34A6
- P34A7
- P34A8
- P34A9
- P34AA
- P34AB
- P34AC
- P34AD
- P34B0
- P34B1

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
- NO >> GO TO 2.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector and ground.

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F88	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 3.

3.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F143	34	Existed

P2618 CRANKSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F143	28	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 CKP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	F143	31	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK CKP SENSOR

Check CKP sensor. Refer to [EC6-1662, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

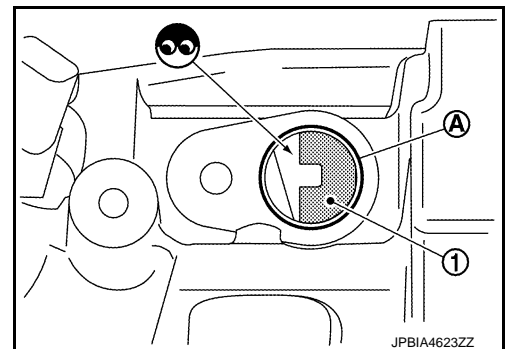
YES >> GO TO 7.

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

7.CHECK GEAR TOOTH

1. Remove CKP sensor. Refer to [EM-198, "Exploded View"](#).

2. Look into the mounting hole (A) of the CKP sensor to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the signal plate. Refer to [EM-198, "Exploded View"](#).

P2618 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Component Inspection (Crankshaft Position Sensor)

INFOID:000000013923043

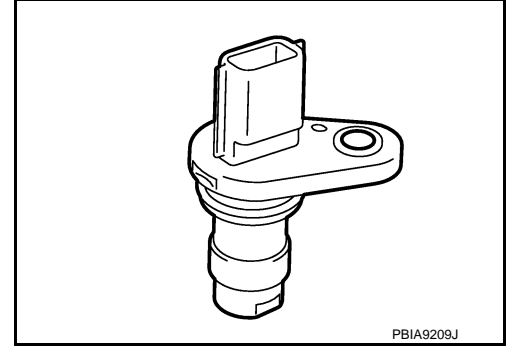
1. CHECK CRANKSHAFT POSITION (CKP) SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect CKP sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).



2. CHECK CKP SENSOR-2

Check the resistance between CKP sensor terminals as per the following.

CKP sensor		Resistance [at 25°C (77°F)]
+	-	
Terminal (Polarity)		Except 0 or ∞ Ω
1	2	
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

P2619 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P2619 CRANKSHAFT POSITION SENSOR

DTC Description

INFOID:000000013923044

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P2619	Crankshaft position signal (Crankshaft position signal output circuit high)	When the crankshaft position sensor signal edge count is more than 18 counts per one camshaft rotation for approx. 1 second.

POSSIBLE CAUSE

- Harness or connectors
[Intake Camshaft Position Sensor (bank 1) circuit is open or shorted.]
- Intake Camshaft Position Sensor (bank 1)
- Electric intake valve timing control actuator (bank 1) circuit is open or shorted.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">• Stops feedback control of idle speed and controls with specified speed.• Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P2619 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P0021
- P34A4
- P34A5
- P34A6
- P34A7
- P34A8
- P34A9
- P34AA
- P34AB
- P34AC
- P34AD
- P34B0
- P34B1

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to [EC6-164, "TURBO HIGH PRESSURE MODEL : DTC Index"](#).

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

P2619 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Start the engine and wait at least 5 seconds.
2. Check DTC.

Is DTC P2619 detected?

- YES >> Proceed to [EC6-1660. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013923045

1.CHECK DTC PRIORITY

If DTC P2619 is displayed with the following DTC, perform the confirmation procedure (trouble diagnosis) for the applicable DTC.

- P0011
- P0021
- P34A4
- P34A5
- P34A6
- P34A7
- P34A8
- P34A9
- P34AA
- P34AB
- P34AC
- P34AD
- P34B0
- P34B1

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-164. "TURBO HIGH PRESSURE MODEL : DTC Index"](#).
NO >> GO TO 2.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect crankshaft position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CKP sensor harness connector and ground.

+		-	Voltage (Approx.)
CKP sensor			
Connector	Terminal		
F88	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

P2619 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	1	F143	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ECM power supply circuit.
- NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	2	F143	28	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 CKP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F88	3	F143	31	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6.CHECK CKP SENSOR

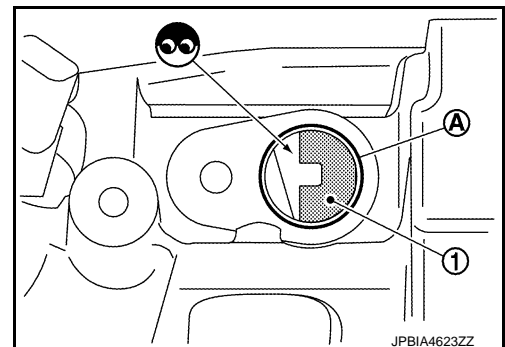
Check CKP sensor. Refer to [EC6-1662, "Component Inspection \(Crankshaft Position Sensor\)"](#).

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

7.CHECK GEAR TOOTH

1. Remove CKP sensor. Refer to [EM-198, "Exploded View"](#).
2. Look into the mounting hole (A) of the CKP sensor to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

P2619 CRANKSHAFT POSITION SENSOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 8.
 NO >> Replace the signal plate. Refer to [EM-198, "Exploded View"](#).

8. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR (BANK 1) CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and ECM harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	
F146	4		7	
	5		15	
	6		8	
	7		16	
	8		17	
	9		9	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Repair or replace error-detected parts.

Component Inspection (Crankshaft Position Sensor)

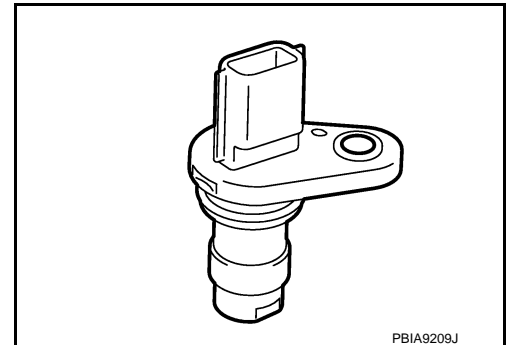
INFOID:000000013923046

1. CHECK CRANKSHAFT POSITION (CKP) SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect CKP sensor harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).



2. CHECK CKP SENSOR-2

Check the resistance between CKP sensor terminals as per the following.

P2619 CRANKSHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

CKP sensor		Resistance [at 25°C (77°F)]
+	-	
Terminal (Polarity)		Except 0 or ∞ Ω
1	2	
	3	
2	3	

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor. Refer to [EM-198, "Exploded View"](#).

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P26A3 MULTI-WAY CONTROL VALVE MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P26A3 MULTI-WAY CONTROL VALVE MOTOR

DTC Description

INFOID:000000013923047

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P26A3	ENGINE COOLANT BYPASS VALVE (Engine coolant bypass valve A range/performance)	ECM detects the following status continuously for 10 seconds or more: Target valve angle - actual valve angle $\geq \pm 5^\circ$

POSSIBLE CAUSE

- Harness or connectors (Multi-way control valve motor circuit is open or shorted.)
- Multi-way control valve

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

- If DTC P26A3 is displayed with DTC P0643 first perform the trouble diagnosis for DTC P0643.
- If DTC P26A3 is displayed with DTC P26A6 and/or P26A7 first perform the trouble diagnosis for DTC P26A6 and/or P26A7.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0643: Refer to [EC6-1439, "DTC Description"](#).
 - DTC P26A6: Refer to [EC6-1666, "DTC Description"](#).
 - DTC P26A7: Refer to [EC6-1666, "DTC Description"](#).

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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is between more than 10 V and less than 16 V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and let it idle for 60 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1664, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923048

1.CHECK DTC PRIORITY

- If DTC P26A3 is displayed with DTC P0643 first perform the trouble diagnosis for DTC P0643.
- If DTC P26A3 is displayed with DTC P26A6 and/or P26A7 first perform the trouble diagnosis for DTC P26A6 and/or P26A7.

P26A3 MULTI-WAY CONTROL VALVE MOTOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable.
- DTC P0643: Refer to [EC6-1439, "DTC Description"](#).
 - DTC P26A6: Refer to [EC6-1666, "DTC Description"](#).
 - DTC P26A7: Refer to [EC6-1666, "DTC Description"](#).
- NO >> GO TO 2.

2.CHECK MULTI-WAY CONTROL VALVE MOTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect multi-way control valve harness connector and ECM harness connector.
3. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		-		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	
F117	1	F142	141	Existed
	2		146	

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK MULTI-WAY CONTROL VALVE MOTOR

Check the multi-way control valve motor. Refer to [EC6-1665, "Component Inspection \(Multi-way Control Valve\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

Component Inspection (Multi-way Control Valve)

INFOID:0000000013923049

1.CHECK MULTI-WAY CONTROL VALVE-1

Ⓜ With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "ENGINE COOLANT BYPASS VALVE".
3. Check that indication of "ENGINE COOLANT B/V POSI".

Is "205°" or more displayed on CONSULT screen?

- YES >> GO TO 2.
NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

2.CHECK MULTI-WAY CONTROL VALVE-2

Ⓜ With CONSULT

1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check "ENGINE COOLANT B/V POSI" approximately 2 seconds after engine start.

Is "40°" or less displayed on CONSULT screen?

- YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to [CO-63, "Exploded View"](#).

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

DTC Description

INFOID:000000013923053

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P26A6	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve A position sensor circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the multi-way control valve position sensor is 0.34 V or less.
P26A7	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve A position sensor circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the multi-way control valve position sensor is 4.76 V or more.

POSSIBLE CAUSE

- Harness or connectors (Multi-way control valve position sensor circuit is open or shorted.)
- Multi-way control valve position sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P26A6 or P26A7 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).
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.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and let it idle for 20 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to [EC6-1666. "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923054

1.CHECK DTC PRIORITY

If DTC P26A6 or P26A7 is displayed with another DTC P0643, first perform the trouble diagnosis for DTC P0643.

Is applicable DTC detected?

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

- YES >> Perform diagnosis of applicable. Refer to [EC6-1439. "DTC Description"](#).
NO >> GO TO 2.

2.CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect multi-way control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between multi-way control valve harness connector and ground.

+		-	Voltage (Approx.)
Multi-way control valve			
Connector	Terminal	Ground	5 V
F117	5		

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		-		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	Existed
F117	3	F142	97	

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 MULTI-WAY CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		-		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	Existed
F117	4	F143	69	

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 MULTI-WAY CONTROL VALVE POSITION SENSOR

Check the multi-way control valve position sensor. Refer to [EC6-1667. "Component Inspection \(Multi-way Control Valve\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to [CO-63. "Exploded View"](#).

Component Inspection (Multi-way Control Valve)

INFOID:000000013923055

1.CHECK MULTI-WAY CONTROL VALVE-1

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

⑧ With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select "ENGINE" >> "WORK SUPPORT" >> "ENGINE COOLANT BYPASS VALVE".
3. Check that indication of "ENGINE COOLANT B/V POSI".

Is "205°" or more displayed on CONSULT screen?

YES >> GO TO 2.

NO >> Replace multi-way control valve. Refer to [CO-63. "Exploded View"](#).

2. CHECK MULTI-WAY CONTROL VALVE-2

⑧ With CONSULT

1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check "ENGINE COOLANT B/V POSI" approximately 2 seconds after engine start.

Is "40°" or less displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Replace multi-way control valve. Refer to [CO-63. "Exploded View"](#).

P34A4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34A4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923060

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A4	A camshaft posi actuator temp sens B1 ("A" camshaft position actuator temperature sensor circuit bank1)	<ul style="list-style-type: none">An excessively low voltage from the temperature sensor is sent to the electric intake valve timing (IVT) control module.An excessively high voltage from the temperature sensor is sent to the electric intake valve timing (IVT) control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34A4 is detected with DTC P34A7, first perform the confirmation procedure (trouble diagnosis) for P34A7.

Is DTC P34A7 detected?

YES >> Perform diagnosis for DTC P34A7. Refer to [EC6-1678, "DTC Description"](#).

NO >> GO TO 2.

2. 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P31A4 detected?

YES >> Proceed to [EC6-1670, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P34A4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000013923061

1. CHECK DTC PRIORITY

If DTC P34A4 is detected with DTC P34A7, first perform the confirmation procedure (trouble diagnosis) for P34A7.

Is DTC P34A7 detected?

- YES >> Perform diagnosis for DTC P34A7. Refer to [EC6-1678, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34A4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	9	E153	9	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-1672, "DTC Description"](#).

Is the DTC P34A4 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

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P34A5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34A5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923062

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A5	A camshaft posi actuator temp sens B1 ("A" camshaft position actuator temperature sensor range/performance bank1)	The temperature difference between the electric intake valve timing control actuator temperature and the engine oil temperature is more than the threshold.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34A5 is detected with DTC P0197 or P0198, perform the confirmation procedure (trouble diagnosis) for DTC P0197 or P0198.

Is DTC P0197 or P0198 detected?

- YES >> Perform diagnosis of applicable.
- DTC P0197: Refer to [EC6-1350, "DTC Description"](#).
 - DTC P0198: Refer to [EC6-1350, "DTC Description"](#).

NO >> GO TO 2.

2. 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

Ⓢ With CONSULT

- Turn ignition switch ON.
- On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "ENG OIL TEMP".
- Start the engine and warm it up until "ENG OIL TEMP" indicates more than 60°C (140°F).
- Wait at least 7 minutes with engine running.
- Check DTC.

Is DTC P34A5 detected?

- YES >> Proceed to [EC6-1673, "Diagnosis Procedure"](#).

P34A5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013923063

1. CHECK DTC PRIORITY

If DTC P34A5 is detected with DTC P0197 or P0198, perform the confirmation procedure (trouble diagnosis) for DTC P0197 or P0198.

Is DTC P0197 or P0198 detected?

YES >> Perform diagnosis of applicable.

- DTC P0197: Refer to [EC6-1350, "DTC Description"](#).
- DTC P0198: Refer to [EC6-1350, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal	Ground	5 V
F146	4		

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34A5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	9	E153	9	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-1672, "DTC Description"](#).

Is the DTC P34A5 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P34A6 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34A6 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923064

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A6	A camshaft posi actuator temp sens B1 ("A" camshaft position actuator temperature sensor circuit low bank1)	An excessively low temperature from the sensor is sent to the electric intake valve timing control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34A6 detected?

- YES >> Proceed to [EC6-1675, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923065

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric IVT control actuator (bank 1) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

P34A6 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal	Ground	5 V
F146	4		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	9	E153	9	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34A6 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-1672, "DTC Description"](#).

Is the DTC P34A6 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

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P34A7 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34A7 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923066

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A7	A camshaft posi actuator temp sens B1 ("A" camshaft position actuator temperature sensor circuit high bank1)	An excessively high temperature from the sensor is sent to the electric intake valve timing control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34A7 detected?

YES >> Proceed to [EC6-1678, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923067

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR TEMPERATURE SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric IVT control actuator (bank 1) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

P34A7 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	9	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	9	E153	9	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.REPLACE ELECTRIC IVT CONTROL ACTUATOR

P34A7 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-1678, "DTC Description"](#).

Is the DTC P34A7 detected?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> INSPECTION END

P34A8 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34A8 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923068

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A8	A camshaft posi actuator temp sens B2 ("A" camshaft position actuator temperature sensor circuit bank2)	<ul style="list-style-type: none">An excessively low voltage from the temperature sensor is sent to the electric intake valve timing (IVT) control module.An excessively high voltage from the temperature sensor is sent to the electric intake valve timing (IVT) control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34A8 is detected with DTC P34AB, first perform the confirmation procedure (trouble diagnosis) for P34A8.

Is DTC P34AB detected?

YES >> Perform diagnosis for DTC P34AB. Refer to [EC6-1690, "DTC Description"](#).

NO >> GO TO 2.

2. 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34A8 detected?

YES >> Proceed to [EC6-1682, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

P34A8 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

INFOID:000000013923069

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P34A8 is detected with DTC P34AB, first perform the confirmation procedure (trouble diagnosis) for P34A8.

Is DTC P34AB detected?

- YES >> Perform diagnosis for DTC P34AB. Refer to [EC6-1690, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal		
F147	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

P34A8 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	25	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	9	E153	33	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-1684, "DTC Description"](#).

Is the DTC P34A8 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

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P34A9 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34A9 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923070

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34A9	A camshaft posi actuator temp sens B2 ("A" camshaft position actuator temperature sensor range/performance bank2)	The temperature difference between the electric intake valve timing control actuator temperature and the engine oil temperature is more than the threshold.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34A9 is detected with DTC P0197 or P0198, perform the confirmation procedure (trouble diagnosis) for DTC P0197 or P0198.

Is DTC P0197 or P0198 detected?

- YES >> Perform diagnosis of applicable.
- DTC P0197: Refer to [EC6-1350, "DTC Description"](#).
 - DTC P0198: Refer to [EC6-1350, "DTC Description"](#).

NO >> GO TO 2.

2. 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

Ⓢ With CONSULT

- Turn ignition switch ON.
- On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "ENG OIL TEMP".
- Start the engine and warm it up until "ENG OIL TEMP" indicates more than 60°C (140°F).
- Wait at least 7 minutes with engine running.
- Check DTC.

Is DTC P34A9 detected?

- YES >> Proceed to [EC6-1685, "Diagnosis Procedure"](#).

P34A9 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013923071

1. CHECK DTC PRIORITY

If DTC P34A7 is detected with DTC P0197 or P0198, perform the confirmation procedure (trouble diagnosis) for DTC P0197 or P0198.

Is DTC P0197 or P0198 detected?

YES >> Perform diagnosis of applicable.

- DTC P0197: Refer to [EC6-1350, "DTC Description"](#).
- DTC P0198: Refer to [EC6-1350, "DTC Description"](#).

NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal	Ground	5 V
F147	4		

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

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P34A9 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	25	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	9	E153	33	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-1684, "DTC Description"](#).

Is the DTC P34A9 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P34AA ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34AA ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923072

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34AA	A camshaft posi actuator temp sens B2 ("A" camshaft position actuator temperature sensor circuit low bank2)	An excessively low temperature from the sensor is sent to the electric intake valve timing control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34AA detected?

- YES >> Proceed to [EC6-1687, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923073

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric IVT control actuator (bank 2) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

P34AA ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal	Ground	5 V
F147	4		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	25	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC IVT CONTROL ACTUATOR TEMPERATURE SENSOR CIRCUIT

1. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

P34AA ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	9	E153	33	Existed

2. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-1684, "DTC Description"](#).

Is the DTC P34AA detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

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P34AB ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34AB ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923074

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34AB	A camshaft posi actuator temp sens B2 ("A" camshaft position actuator temperature sensor circuit high bank2)	An excessively high temperature from the sensor is sent to the electric intake valve timing control module.

POSSIBLE CAUSE

Electric IVT control actuator (temperature sensor) (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34AB detected?

YES >> Proceed to [EC6-1690, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923075

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR TEMPERATURE SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect electric IVT control actuator (bank 2) harness connector.
- Turn ignition switch ON.
- Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

P34AB ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal		
F147	9	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	9	E153	33	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	25	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. REPLACE ELECTRIC IVT CONTROL ACTUATOR

P34AB ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-1690, "DTC Description"](#).

Is the DTC P34AB detected?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> INSPECTION END

P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923076

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34AC	A camshaft posi actuator posi sens B1 ("A" camshaft position actuator position sensor circuit bank1)	<ul style="list-style-type: none">An excessively low voltage from the sensor is sent to the electric intake valve timing (IVT) control module.An excessively high voltage from the sensor is sent to the electric IVT control module.

POSSIBLE CAUSE

- Harness or connectors
[Electric intake valve timing (IVT) control actuator position sensor (bank 1) circuit is open or shorted.]
- Electric IVT control actuator position sensor (bank 1)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1. CHECK DTC PRIORITY

If DTC P34AC is displayed with P34AD, first perform the confirmation procedure (trouble diagnosis) for P34AD.

Is DTC P34AD detected?

- YES >> Perform diagnosis for P34AD. Refer to [EC6-1697, "DTC Description"](#).
- NO >> GO TO 2.

2. 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Turn ignition switch ON.
- Check DTC.

Is DTC P34AC detected?

- YES >> Proceed to [EC6-1694, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000013923077

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P34AC is displayed with P34AD, first perform the confirmation procedure (trouble diagnosis) for P34AD.

Is DTC P34AD detected?

- YES >> Perform diagnosis for P34AD. Refer to [EC6-1697, "DTC Description"](#).
- NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
- NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	25	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	5	E153	15	Existed
	6		8	
	7		16	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK ELECTRIC IVT CONTROL ACTUATOR PHASE SIGNAL CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.
2. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	

3. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238. "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-1697. "DTC Description"](#).

Is the DTC P34AC detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015. "Removal and Installation"](#).

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P34AC ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> INSPECTION END

P34AD ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34AD ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923078

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34AD	A camshaft posi actuator posi sens B1 ("A" camshaft position actuator position sensor range/performance bank1)	The correlation between position signal and phase signal of electric intake valve timing control actuator motor is incorrect.

POSSIBLE CAUSE

- Harness or connectors
[Electric intake valve timing (IVT) control actuator (bank 1)]
- Electric IVT control actuator (bank 1)
- Electric IVT control module

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P34AD detected?

YES >> Proceed to [EC6-1697. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923079

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 1) harness connector.
3. Turn ignition switch ON.

P34AD ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

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< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between electric IVT control actuator (bank 1) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 1)			
Connector	Terminal		
F146	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	4	E153	7	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	8	E153	17	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34AD ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F146	5	E153	15	Existed
	6		8	
	7		16	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK ELECTRIC IVT CONTROL ACTUATOR PHASE SIGNAL CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.
2. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F144	1	E153	3	Existed
	2		5	
	3		1	

3. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238. "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-1697. "DTC Description"](#).

Is the DTC P34AD detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015. "Removal and Installation"](#).

NO >> INSPECTION END

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P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923080

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34B0	A camshaft posi actuator posi sens B2 ("A" camshaft position actuator position sensor circuit bank2)	<ul style="list-style-type: none">• An excessively low voltage from the sensor is sent to the electric intake valve timing (IVT) control module.• An excessively high voltage from the sensor is sent to the electric IVT control module.

POSSIBLE CAUSE

- Harness or connectors
[Electric intake valve timing (IVT) control actuator position sensor (bank 2) circuit is open or shorted.]
- Electric IVT control actuator position sensor (bank 2)

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve timing.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P34B0 is displayed with P34B1, first perform the confirmation procedure (trouble diagnosis) for P34B1.

Is DTC P34B1 detected?

- YES >> Perform diagnosis for P34B1. Refer to [EC6-1704, "DTC Description"](#).
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

ⓅWith CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P34B0 detected?

- YES >> Proceed to [EC6-1701, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000013923081

Diagnosis Procedure

1. CHECK DTC PRIORITY

If DTC P34B0 is displayed with P34B1, first perform the confirmation procedure (trouble diagnosis) for P34B1.

Is DTC P34B1 detected?

YES >> Perform diagnosis for P34B1. Refer to [EC6-1704. "DTC Description"](#).

NO >> GO TO 2.

2. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Electric IVT control actuator (bank 2)			
Connector	Terminal		
F147	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3. CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231. "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> Replace electric IVT control module. Refer to [EC6-1015. "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	17	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	5	E153	23	Existed
	6		32	
	7		24	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK ELECTRIC IVT CONTROL ACTUATOR PHASE SIGNAL CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.
2. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F145	1	E153	4	Existed
	2		6	
	3		2	

3. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).
2. Perform DTC confirmation procedure again. Refer to [EC6-1704, "DTC Description"](#).

Is the DTC P34B0 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

P34B0 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NO >> INSPECTION END

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P34B1 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34B1 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923082

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34B1	A camshaft posi actuator posi sens B2 ("A" camshaft position actuator position sensor range/performance bank2)	The correlation between position signal and phase signal of electric intake valve timing control actuator motor is incorrect.

POSSIBLE CAUSE

- Harness or connectors
[Electric intake valve timing (IVT) control actuator (bank 2)]
- Electric IVT control actuator (bank 2)
- Electric IVT control module

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).
Others	ECM stops the electric valve timing control. (The camshaft returns to the position of most retard angle.) NOTE: Normal bank transitions intermediate F/S valve 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V when ignition switch is ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is DTC P34B1 detected?

YES >> Proceed to [EC6-1704, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923083

1. CHECK ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric IVT control actuator (bank 2) harness connector.

P34B1 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

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< DTC/CIRCUIT DIAGNOSIS >

3. Turn ignition switch ON.
4. Check the voltage between electric IVT control actuator (bank 2) harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
F147	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK ELECTRIC IVT CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Check electric IVT control module power supply and ground circuit. Refer to [EC6-1231, "ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	4	E153	31	Existed

4. Check harness for short to power and short to ground.

Is the inspection result normal?

- YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC IVT CONTROL ACTUATOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	8	E153	17	Existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC IVT CONTROL ACTUATOR POSITION SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric IVT control module harness connector.
3. Check the continuity between electric IVT control actuator (bank 2) harness connector and electric IVT control module harness connector.

P34B1 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

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Electric IVT control actuator (bank 2)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F147	5	E153	23	Existed
	6		32	
	7		24	

4. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6. CHECK ELECTRIC IVT CONTROL ACTUATOR PHASE SIGNAL CIRCUIT

1. Disconnect electric IVT control actuator (bank 1) harness connector.

2. Check the continuity between electric IVT control actuator (bank 1) harness connector and electric IVT control module harness connector.

Electric IVT control actuator (bank 1)		Electric IVT control module		Continuity
Connector	Terminal	Connector	Terminal	
F145	1	E153	4	Existed
	2		6	
	3		2	

3. Check harness for short to power and short to ground.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. REPLACE ELECTRIC IVT CONTROL ACTUATOR

1. Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

2. Perform DTC confirmation procedure again. Refer to [EC6-1704, "DTC Description"](#).

Is the DTC P34B1 detected?

YES >> Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

NO >> INSPECTION END

P34C4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34C4 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923084

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34C4	A camshaft posi actuator control B1 ("A" camshaft position actuator control circuit driver current/temperature too high bank 1)	The electric intake valve timing (IVT) control module detects malfunction of the electric IVT control actuator internal temperature sensor.
		The electric IVT control module detects malfunction of the electric IVT control actuator internal temperature sensor.

POSSIBLE CAUSE

- Electric intake valve timing (IVT) control actuator (bank 1)
 - Internal temperature is too high.
 - Internal temperature sensor has malfunction.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC P34C4 detected?

YES >> Proceed to [EC6-1707, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923085

1. REPLACE ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR

Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

>> INSPECTION END

P34C5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34C5 ELECTRIC INTAKE VALVE TIMING CONTROL ACTUATOR

DTC Description

INFOID:000000013923086

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34C5	A camshaft posi actuator control B2 ("A" camshaft position actuator control circuit driver current/temperature too high bank 2)	The electric intake valve timing (IVT) control module detects malfunction of the electric IVT control actuator internal temperature sensor.
		The electric IVT control module detects malfunction of the electric IVT control actuator internal temperature sensor.

POSSIBLE CAUSE

- Electric intake valve timing (IVT) control actuator (bank 2)
 - Internal temperature is too high.
 - Internal temperature sensor has malfunction.

FAIL-SAFE

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">• Fixes electric intake valve timing control motor in the reference position.• Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

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 when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC P34C5 detected?

- YES >> Proceed to [EC6-1708, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000013923087

1. REPLACE ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL ACTUATOR

Replace electric IVT control actuator. Refer to [EM-238, "Exploded View"](#).

>> INSPECTION END

P34C8 ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

P34C8 ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

DTC Description

INFOID:0000000013923088

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P34C8	Camshaft position control module (Camshaft position control module performance)	Internal CPU error is detected.

POSSIBLE CAUSE

Electric intake valve timing (IVT) control module

FAIL-SAFE

NOTE:

Any of the following fail-safe is applied.

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	No stratified charge combustion at starting (cold start).

Fail safe mode	Vehicle behavior
Device fix mode	<ul style="list-style-type: none">Fixes electric intake valve timing control motor in the reference position.Fixes exhaust valve timing control solenoid valve in the reference position.
Combustion control mode	<ul style="list-style-type: none">Stops feedback control of idle speed and controls with specified speed.Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

- Turn ignition switch ON and wait at least 5 seconds.
- Check DTC.

Is DTC P34C8 detected?

- YES >> Proceed to [EC6-1709, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-45, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013923089

1. REPLACE ELECTRIC INTAKE VALVE TIMING (IVT) CONTROL MODULE

Replace electric IVT control module. Refer to [EC6-1015, "Removal and Installation"](#).

P34C8 ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

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>> INSPECTION END

BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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BRAKE PEDAL POSITION SWITCH

Component Function Check

INFOID:000000013923090

1. CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
	Brake pedal	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

Connector	ECM		Condition		Voltage (V)
	+	-			
	Terminal	Terminal			
E152	192 (Brake pedal position switch signal)	204	Brake pedal	Slightly depressed	Approx. 0
			Brake pedal	Fully released	Battery voltage

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Proceed to [EC6-1711. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013923091

1. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

Brake pedal position switch		Ground	Voltage
Connector	Terminal		
E44	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 2.

2. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuse block (J/B) harness connector.
3. Check the continuity between brake pedal position switch harness connector and fuse block (J/B) harness connector.

+		-		Continuity
Brake pedal position switch		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	
E44	1	E65	11F	Existed

BRAKE PEDAL POSITION SWITCH

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4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK FUSE

1. Disconnect 10A fuse (No. 12) from fuse block (J/B).

2. Check 10A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform trouble diagnosis for power supply circuit.

4.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

Brake pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E44	2	E152	192	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK BRAKE PEDAL POSITION SWITCH

Refer to [EC6-1712. "Component Inspection \(Brake Pedal Position Switch\)"](#)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace brake pedal position switch. Refer to [BR-24. "Exploded View"](#).

6.CHECK INTERMITTENT INCIDENT

Refer to [GI-45. "Intermittent Incident"](#).

>> INSPECTION END

Component Inspection (Brake Pedal Position Switch)

INFOID:000000013923092

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect brake pedal position harness connector.

3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly de-pressed Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

BRAKE PEDAL POSITION SWITCH

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2. CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to [BR-12. "Inspection and Adjustment"](#).
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition	Continuity
+	-		
Terminals			
1	2	Brake pedal	Fully released Existed
			Slightly de-pressed Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to [BR-24. "Exploded View"](#).

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ASC D INDICATOR

Component Function Check

INFOID:000000013923093

1. CHECK ASC D INDICATOR FUNCTION

Check ASC D indicator under the following conditions.

ASC D INDICATOR	CONDITION	SPECIFICATION	
CRUISE LAMP	<ul style="list-style-type: none"> • Ignition switch: ON 	<ul style="list-style-type: none"> • MAIN switch: Pressed at the 1st time → at the 2nd time 	ON → OFF
SET LAMP	<ul style="list-style-type: none"> • MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH) 	<ul style="list-style-type: none"> • ASC D: Operating 	ON
		<ul style="list-style-type: none"> • ASC D: Not operating 	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-1714, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013923094

1. CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

2. CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70, "CONSULT Function"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3. CHECK INTERMITTENT INCIDENT

Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace combination meter. Refer to [MWI-141, "Removal and Installation"](#).

NO >> Repair or replace.

COOLING FAN

Component Function Check

INFOID:0000000013923095

1.CHECK COOLING FAN FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to [PCS-12. "Diagnosis Description"](#).
2. Make sure that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-1715. "Diagnosis Procedure \(Cooling Fan Motor 1\)"](#) or [EC6-1717. "Diagnosis Procedure \(Cooling Fan Motor 2\)"](#).

Diagnosis Procedure (Cooling Fan Motor 1)

INFOID:0000000013923096

1.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Voltage
Connector	Terminal		
E167	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Continuity
Connector	Terminal		
E167	1	Ground	Existed

3. 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 IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors.
2. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E120	7	Ground	Existed
E121	41		

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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 COOLING FAN CONTROL SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.

2. Check the continuity between IPDM E/R harness connector and cooling fan control module 1 harness connector.

IPDM E/R		Cooling fan control module 1		Continuity
Connector	Terminal	Connector	Terminal	
E126	93	E167	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK COOLING FAN CONTROL MODULE 1 OUTPUT SIGNAL CIRCUIT

1. Reconnect all harness connectors disconnected.

2. Disconnect cooling fan control module 1 harness connectors.

3. Turn ignition switch ON.

4. Check the voltage between cooling fan control module 1 harness connector and ground.

Cooling fan control module 1		Ground	Voltage
Connector	Terminal		
E301	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module 1. Refer to [CO-44, "Exploded View"](#).

6. CHECK COOLING FAN MOTOR 1

Refer to [EC6-1721, "Component Inspection \(Cooling Fan Motor\)"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace cooling fan motor 1. Refer to [CO-44, "Exploded View"](#).

7. CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY-2

1. Turn ignition switch OFF.

2. Disconnect cooling fan relay 1.

3. Turn ignition switch ON.

4. Check the voltage between cooling fan relay 1 harness connector and ground.

Cooling fan relay 1		Ground	Voltage
Connector	Terminal		
E103	2	Ground	Battery voltage
	3		

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 8.

8. CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.

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2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	2	E121	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK FUSE

1. Disconnect 50 A fuse (No. T) from fuse and fusible link holder.
2. Check 50 A fuse for blown.

Is the fuse blown (open)?

YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]

NO >> Perform the trouble diagnosis for power supply circuit.

10.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	1	E121	27	Existed

4. Check the continuity between cooling fan relay 1 harness connector and cooling fan control module 1 harness connector.

Cooling fan relay 1		Cooling fan control module 1		Continuity
Connector	Terminal	Connector	Terminal	
E103	5	E167	3	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace error-detected parts.

11.CHECK COOLING FAN RELAY 1

Refer to [EC6-1721, "Component Inspection \(Cooling Fan Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace cooling fan relay 1.

12.CHECK INTERMITTENT INCIDENT

Perform [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

Diagnosis Procedure (Cooling Fan Motor 2)

INFOID:0000000013923097

1.CHECK COOLING FAN CONTROL MODULE 2 POWER SUPPLY-1

1. Turn ignition switch OFF.

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2. Disconnect cooling fan control module 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module 2 harness connector and ground.

Cooling fan control module 2		Ground	Voltage
Connector	Terminal		
E168	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan control module 2 harness connector and ground.

Cooling fan control module 2		Ground	Continuity
Connector	Terminal		
E168	1	Ground	Existed

3. 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 IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors.
2. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E120	7	Ground	Existed
E121	41		

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 COOLING FAN CONTROL SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan control module 2 harness connector.

IPDM E/R		Cooling fan control module 2		Continuity
Connector	Terminal	Connector	Terminal	
E126	93	E168	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK COOLING FAN CONTROL MODULE 2 OUTPUT SIGNAL CIRCUIT

1. Reconnect all harness connectors disconnected.
2. Disconnect cooling fan control module 2 harness connectors.

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3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module 2 harness connector and ground.

Cooling fan control module 2		Ground	Voltage
Connector	Terminal		
E303	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module 2. Refer to [CO-44, "Exploded View"](#).

6.CHECK COOLING FAN MOTOR 2

Refer to [EC6-1721, "Component Inspection \(Cooling Fan Motor\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Replace cooling fan motor 2. Refer to [CO-44, "Exploded View"](#).

7.CHECK COOLING FAN CONTROL MODULE 2 POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay 2.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relay 2 harness connector and ground.

Cooling fan relay 2		Ground	Voltage
Connector	Terminal		
E169	2	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 8.

8.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay 1.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relay 1 harness connector and ground.

Cooling fan relay 1		Ground	Voltage
Connector	Terminal		
E103	2	Ground	Battery voltage
	3		

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 9.

9.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	2	E121	36	Existed

4. Also check harness for short to ground and short to power.

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Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10.CHECK FUSE

Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
Fusible link holder	#T	50A
	#U	50A

Is the fuse blown (open)?

- YES >> Replace malfunctioning the fuse. [Check the power supply if fuse is blown (open) again.]
NO >> Perform the trouble diagnosis for power supply circuit.

11.CHECK COOLING FAN CONTROL MODULE 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

Cooling fan relay 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E103	1	E121	27	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12.CHECK COOLING FAN CONTROL MODULE 2 POWER SUPPLY CIRCUIT-1

1. Check the continuity between cooling fan relay 1 harness connector and cooling fan relay 2 harness connector.

Cooling fan relay 1		Cooling fan relay 2		Continuity
Connector	Terminal	Connector	Terminal	
E103	5	E169	2	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 13.
NO >> Repair or replace error-detected parts.

13.CHECK COOLING FAN RELAY 1

Refer to [EC6-1721, "Component Inspection \(Cooling Fan Relay\)"](#).

Is the inspection result normal?

- YES >> GO TO 14.
NO >> Replace cooling fan relay 1.

14.CHECK INTERMITTENT INCIDENT

Perform [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to [PCS-44, "Removal and Installation"](#).
NO >> GO TO 15.

15.CHECK COOLING FAN CONTROL MODULE 2 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan relay 1 harness connector and IPDM E/R harness connector.

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Cooling fan relay 2		Cooling fan control module 2		Continuity
Connector	Terminal	Connector	Terminal	
E169	3	E168	3	Existed

3. Check the continuity between cooling fan relay 2 harness connector and ground.

Cooling fan relay 2		—	Continuity
Connector	Terminal		
E169	1	Ground	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace error-detected parts.

16.CHECK COOLING FAN RELAY 2

Refer to [EC6-1721, "Component Inspection \(Cooling Fan Relay\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Replace cooling fan relay 2.

Component Inspection (Cooling Fan Motor)

INFOID:000000013923098

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module harness connectors.
3. Supply cooling fan control module terminals with battery voltage and check operation.

Cooling fan control module			Operation
Motor	Connector	Terminal	
		+	–
1	E301	4	5
2	E303		
Cooling fan operates.			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning cooling fan motor. Refer to [CO-44, "Exploded View"](#).

Component Inspection (Cooling Fan Relay)

INFOID:000000013923099

1.CHECK COOLING FAN RELAY

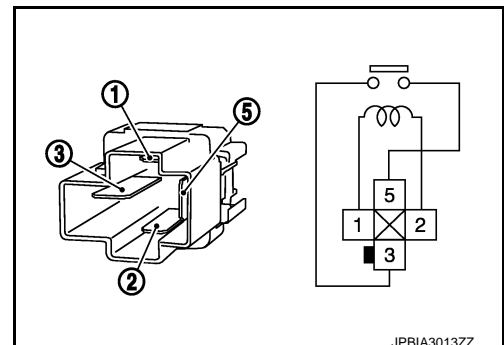
1. Turn ignition switch OFF.
2. Remove cooling fan relay.
3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
③ and 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 malfunctioning cooling fan relay.



JPBIA3013ZZ

ELECTRICAL LOAD SIGNAL

Description

INFOID:000000013923100

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

INFOID:000000013923101

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT and select "DATA MONITOR" mode.
3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to [EC6-1722, "Diagnosis Procedure"](#).

2. CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to [EC6-1722, "Diagnosis Procedure"](#).

3. CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to [EC6-1722, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013923102

1. INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to [EC6-1722, "Component Function Check"](#).

Which circuit is related to the incident?

Rear window defogger >> GO TO 2.

Headlamp >> GO TO 3.

Heater fan >> GO TO 4.

2. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [DEF-23, "Work Flow"](#).

ELECTRICAL LOAD SIGNAL

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to [EXL-125, "Work Flow"](#).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to [HAC-70, "Work Flow"](#).

>> INSPECTION END

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FUEL INJECTOR

Component Function Check

INFOID:0000000013923103

1.INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

- YES >> GO TO 2.
- NO >> Proceed to [EC6-1724, "Diagnosis Procedure"](#).

2.CHECK FUEL INJECTOR FUNCTION

Ⓜ With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

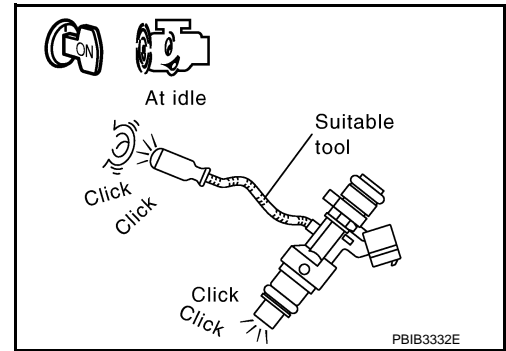
ⓧ Without CONSULT

1. Start engine.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to [EC6-1724, "Diagnosis Procedure"](#).



Diagnosis Procedure

INFOID:0000000013923104

1.CHECK FUEL INJECTOR DRIVER 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 and ground.

+		-	Voltage
ECM			
Connector	Terminal		
F143	3	Ground	Battery voltage
	4		
	5		
	6		

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> GO TO 2.

2.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blowing.

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

Location	Fuse No.	Capacity
fuse and fusible link holder - 3	#80	15A
	#81	15A

Is the fuse blown (open)?

- YES >> Replace the fuse. [Check the power supply if fuse is blown (open) again.]
 NO >> GO TO 3.

3. CHECK FUEL INJECTOR DRIVER POWER SUPPLY CIRCUIT

1. Disconnect fuel injector relay harness connector.
2. Check the continuity between ECM harness connector and fuel injector relay harness connector.

+		-		Continuity
ECM		Fuel injector relay		
Connector	Terminal	Connector	Terminal	
F143	3	E150	5	Existed
	5		7	
	4			
	6			

3. Also check harness for short to ground.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Repair or replace error-detected parts

4. CHECK FUEL INJECTOR RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between fuel injector relay harness connector and ground.

+		-	Voltage
Fuel injector relay			
Connector	Terminal		
E150	3	Ground	Battery voltage
	6		

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Perform the trouble diagnosis for power supply circuit.

5. CHECK FUEL INJECTOR RELAY POWER SUPPLY (EXCITATION COIL SIDE)

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between fuel injector relay harness connector and ground.

+		-	Voltage
Fuel injector relay			
Connector	Terminal		
E150	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 6.

6. CHECK FUEL INJECTOR RELAY POWER SUPPLY CIRCUIT (EXCITATION COIL SIDE)

1. Turn ignition switch OFF.

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FUEL INJECTOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect fuel injector relay harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and fuel injector harness connector.

+		-		Continuity
IPDM E/R		Fuel injector relay		
Connector	Terminal	Connector	Terminal	
E123	59	E150	1	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 FUEL INJECTOR RELAY GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector relay harness connector.
3. Check the continuity between fuel injector relay harness connector and ground.

+		-	Continuity
Fuel injector relay			
Connector	Terminal		
E150	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK FUEL INJECTOR RELAY

Check the fuel injector relay. Refer to [EC6-1728, "Component Inspection \(Fuel Injector Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace fuel injector relay. Refer to [PG-10, "VR30DDTT : Standardized Relay"](#).

9.CHECK FUEL INJECTOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F205	1	Ground	Battery voltage
2	F206	1		
3	F207	1		
4	F208	1		
5	F209	1		
6	F210	1		

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

FUEL INJECTOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F205	1	F143	11	Existed
2	F206	1		15	
3	F207	1		12	
4	F208	1		16	
5	F209	1		13	
6	F210	1		19	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

11.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F205	2	F143	17	Existed
2	F206	2		20	
3	F207	2		14	
4	F208	2		21	
5	F209	2		18	
6	F210	2		22	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

12.CHECK FUEL INJECTOR

Check fuel injector. Refer to [EC6-1727, "Component Inspection \(Fuel Injector\)"](#).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Replace malfunctioning fuel injector. Refer to [EM-182, "Removal and Installation"](#).

Component Inspection (Fuel Injector)

INFOID:0000000013923105

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance (Ω)
1 and 2	11.1 - 14.3 [at 10 - 60°C (60 - 140°F)]

Is the inspection result normal?

FUEL INJECTOR

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to [EM-182, "Exploded View"](#).

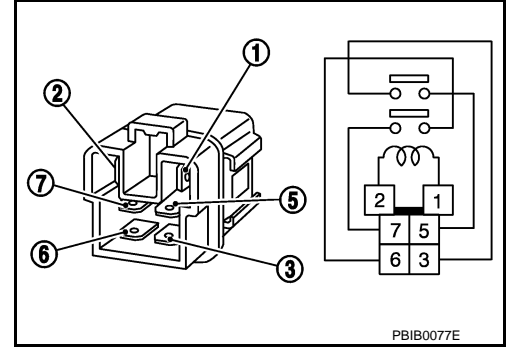
Component Inspection (Fuel Injector Relay)

INFOID:000000013924684

1. CHECK FUEL INJECTOR RELAY

1. Turn ignition switch OFF.
2. Remove fuel injector relay.
3. Check the continuity between fuel heater relay terminals as per the following conditions.

Fuel injector relay		Conditions	Continuity
+	-		
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed
6	7	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed



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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel injector relay.

FUEL PUMP

Component Function Check

INFOID:000000013923106

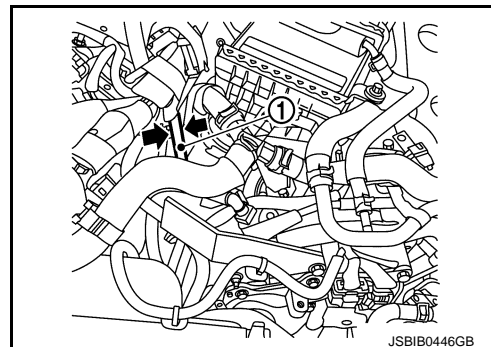
1. CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose ① with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> [EC6-1729, "Diagnosis Procedure"](#).



Diagnosis Procedure

INFOID:000000013923107

1. CHECK FUEL PUMP CONTROL MODULE POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect Fuel pump control module harness connector.
3. Turn ignition switch ON.
4. Check the voltage between Fuel pump control module harness connector and ground.

Fuel pump control module		Ground	Voltage
Connector	Terminal		
B11	6	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> GO TO 2.

2. CHECK FUEL PUMP CONTROL MODULE POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and Fuel pump control module harness connector.

IPDM E/R		Fuel pump control module		Continuity
Connector	Terminal	Connector	Terminal	
E120	15	B11	6	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Repair or replace error-detected parts.

3. CHECK FUSE

1. Disconnect 15 A fuse (No. 52) from IPDM E/R.
2. Check 15 A fuse.

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> Replace 15 A fuse.

4. CHECK INTERMITTENT INCIDENT

FUEL PUMP

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Check intermittent incident. Refer to [GI-45. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to [PCS-44. "Removal and Installation"](#).
NO >> Repair or replace error-detected parts.

5. CHECK FUEL PUMP CONTROL MODULE GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between Fuel pump control module harness connector and ground.

Fuel pump control module		Ground	Continuity
Connector	Terminal		
B11	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK FUEL PUMP CONTROL MODULE INPUT AND OUTPUT CIRCUITS FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between Fuel pump control module harness connector and ECM harness connector.

Fuel pump control module		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B11	4	E152	182	Existed
	5		188	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK FUEL PUMP CONTROL CIRCUIT FOR OPEN AND SHORT

1. Disconnect "fuel level sensor unit" harness connector.
2. Check the continuity between Fuel pump control module harness connector and "fuel level sensor unit" harness connector.

Fuel pump control module		Fuel level sensor unit		Continuity
Connector	Terminal	Connector	Terminal	
B11	1	B101	5	Existed
	2		6	

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK FUEL PUMP

Check fuel pump. Refer to [EC6-1731. "Component Inspection \(Fuel Pump\)"](#).

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Replace fuel pump. Refer to [FL-9. "Exploded View"](#).

9. CHECK FUEL PUMP CONTROL MODULE

Check fuel pump control module. Refer to [EC6-1731. "Component Inspection \(Fuel Pump Control Module\)"](#).

Is the inspection result normal?

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

- YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).
NO >> Replace fuel pump. Refer to [FL-9, "Exploded View"](#).

A

Component Inspection (Fuel Pump)

INFOID:000000013923108

1. CHECK FUEL PUMP

EC6

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Check resistance between "fuel level sensor unit and fuel pump" terminals as follows.

C

Terminals	Resistance (Ω)
5 and 6	0.2 - 5.0 [at 25°C (77°F)]

D

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace "fuel level sensor unit and fuel pump". Refer to [FL-9, "Exploded View"](#).

E

Component Inspection (Fuel Pump Control Module)

INFOID:000000013923109

1. CHECK FUEL PUMP CONTROL MODULE

F

1. Check the voltage between Fuel pump control module terminals under the following conditions.

G

FUEL PUMP CONTROL MODULE			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
B11	1	2	For 1 second after turning ignition switch ON	Approx. 9.9 V
			More than 1 second after turning ignition switch ON	Approx. 0 V
			Idle speed	Approx. 9.9 V

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Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace Fuel pump control module. Refer to [EC6-1016, "Removal and Installation"](#).

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HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

HIGH PRESSURE FUEL PUMP

Component Function Check

INFOID:0000000013923110

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
FUEL PRES SEN V	Engine speed: Idle	730 – 1,000 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,000 – 2,900 mV

Without CONSULT

1. Start engine.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

Connector	ECM		Condition	Voltage
	+	-		
Terminal				
F137	53	83	Engine speed: idle	0.73 – 1.0 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.0 – 2.9 V

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC6-1732, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013923111

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out #82 fuse (10A) and check that the fuse is not blown (open).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace the fuse or fusible link after repairing the applicable circuit.

2. CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (COIL SIDE)-1

1. Reinsert the fuse.
2. Remove high pressure fuel pump relay.
3. Turn ignition switch ON.
4. Check the voltage between high pressure fuel pump relay harness connector and ground.

+		-	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E149	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (COIL SIDE)-1

Check the voltage between IPDM E/R harness connector and ground.

HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-	Voltage
IPDM E/R			
Connector	Terminal		
E123	59	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Check ECM power supply. Refer to [EC6-1228, "ECM : Diagnosis Procedure"](#).

4.CHECK HIGH PRESSURE FUEL PUMP RELAY 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 high pressure fuel pump relay harness connector.

IPDM E/R		High pressure fuel pump relay		Continuity
Connector	Terminal	Connector	Terminal	
E123	59	E149	1	Existed

4. Check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Repair or replace error-detected parts.

5.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (CONTACTOR SIDE)

Check the voltage between high pressure fuel pump relay harness connector and ground.

+		-	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E149	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform diagnosis for power supply circuit.

6.CHECK HIGH PRESSURE FUEL PUMP RELAY GROUND CIRCUIT

Check the continuity between high pressure fuel pump relay harness connector and ground.

High pressure fuel pump relay		-	Continuity
Connector	Terminal		
E149	2	Ground	Existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK HIGH PRESSURE FUEL PUMP RELAY

Check the high pressure fuel pump relay. Refer to [EC6-1735, "Component Inspection \(High Pressure Fuel Pump Relay\)"](#).

Is inspection result normal?

YES >> GO TO 8.

NO >> Replace high pressure fuel pump relay.

8.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY CIRCUIT

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HIGH PRESSURE FUEL PUMP

[VR30DDTT FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and high pressure fuel pump relay harness connector.

ECM		High pressure fuel pump relay		Continuity
Connector	Terminal	Connector	Terminal	
F143	1	E149	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts

9.CHECK HIGH PRESSURE FUEL PUMP

Check the high pressure fuel pump. Refer to [EC6-1734, "Component Inspection \(High Pressure Fuel Pump\)"](#).

Is inspection result normal?

YES >> GO TO 10.

NO >> Replace high pressure fuel pump. Refer to [EM-178, "Removal and Installation"](#).

10.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

1. Check the continuity between ECM harness connector and high pressure fuel pump harness connector.

ECM		High pressure fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
F143	9	F120	2	Existed
	10		1	

2. Also check harness for short to ground and short to power.

Is inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace error-detected parts.

11.CHECK HIGH PRESSURE FUEL PUMP INSTALLATION CONDITION

Check that the high pressure fuel pump is installed with no backlash and looseness.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace error-detected parts.

12.CHECK CAMSHAFT

1. Remove camshaft. Refer to [EM-251, "Removal and Installation"](#).
2. Check camshaft. Refer to [EM-255, "Inspection"](#).

Is inspection result normal?

YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).

NO >> Replace camshaft. Refer to [EM-251, "Removal and Installation"](#).

Component Inspection (High Pressure Fuel Pump)

INFOID:000000013923112

1.CHECK HIGH PRESSURE FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

HIGH PRESSURE FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

+		-		Condition	Resistance	
High pressure fuel pump						
Terminal						
1		2		Temperature °C (°F)	20 – 30 (68 – 86)	0.47 – 0.53 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to [EM-178. "Removal and Installation"](#).

Component Inspection (High Pressure Fuel Pump Relay)

INFOID:000000013923113

1. CHECK HIGH PRESSURE FUEL PUMP RELAY

1. Turn ignition switch OFF.
2. Remove high pressure fuel pump relay.
3. Check the continuity between high pressure fuel pump relay terminals as per the following conditions.

+		-		Conditions	Continuity
High pressure fuel pump relay					
Terminal					
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 high pressure fuel pump relay.

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IGNITION SIGNAL

Component Function Check

INFOID:000000013923114

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

- YES-1 >> With CONSULT: GO TO 2.
- YES-2 >> Without CONSULT: GO TO 3.
- No >> Proceed to [EC6-1736, "Diagnosis Procedure"](#).

2.CHECK IGNITION SIGNAL FUNCTION

With CONSULT

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
2. Make sure that each circuit produces a momentary engine speed drop.

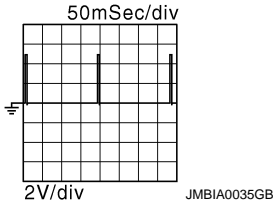
Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to [EC6-1736, "Diagnosis Procedure"](#).

3.CHECK IGNITION SIGNAL FUNCTION

Without CONSULT

1. Let engine idle.
2. Read the voltage signal between ECM harness connector terminals under the following conditions with an oscilloscope.

ECM				Voltage signal
+		-		
Connector	Terminal	Connector	Terminal	
F142	153	E152	204	
	154			
	161			
	162			
	164			
	168			

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to [EC6-1736, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013923115

1.CHECK IGNITION COIL POWER SUPPLY-1

1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Voltage
Connector	+	-	
	Terminal	Terminal	
E152	185	204	Battery voltage

Is the inspection result normal?

- YES >> GO TO 2.

IGNITION SIGNAL

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Proceed to [EC6-1228. "ECM : Diagnosis Procedure"](#).

2.CHECK IGNITION COIL POWER SUPPLY-2

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F85	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E123	55	F85	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Proceed to [GI-45. "Intermittent Incident"](#).

NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal		
F85	2	Ground	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 CONDENSER

Refer to [EC6-1740. "Component Inspection \(Condenser\)"](#)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace condenser.

6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-3

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

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Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F111	3	Ground	Battery voltage
2	F112	3		
3	F113	3		
4	F114	3		
5	F115	3		
6	F116	3		

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform the trouble diagnosis for power supply circuit.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F111	2	Ground	Existed
2	F112	2		
3	F113	2		
4	F114	2		
5	F115	2		
6	F116	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ignition coil harness connector and ECM harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F111	1	F142	161	Existed
2	F112	1		164	
3	F113	1		153	
4	F114	1		162	
5	F115	1		168	
6	F116	1		154	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC6-1739, "Component Inspection \(Ignition Coil with Power Transistor\)"](#).

Is the inspection result normal?

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

- YES >> Check intermittent incident. Refer to [GI-45, "Intermittent Incident"](#).
NO >> Replace malfunctioning ignition coil with power transistor. Refer to [EM-193, "Exploded View"](#).

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000013923116

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.

Terminals	Resistance (Ω) [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor. Refer to [EM-193, "Exploded View"](#).

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

- For the fuse number, refer to [EC6-224, "Wiring Diagram"](#).
 - For the fuse arrangement, refer to [PG-203, "Fuse, Connector and Terminal Arrangement"](#).
 - Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
 5. After engine stalls, crank it two or three times to release all fuel pressure.
 6. Turn ignition switch OFF.
 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
 8. Remove ignition coil and spark plug of the cylinder to be checked.
 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
 10. Connect spark plug and harness connector to ignition coil.
 11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

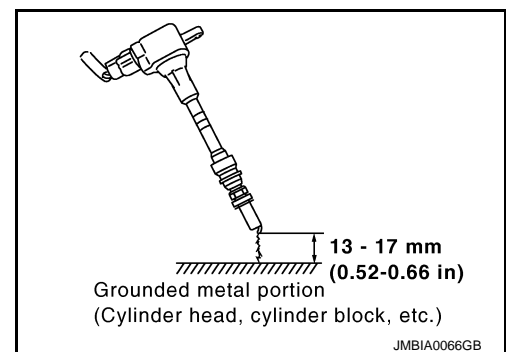
- **Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.**

NOTE:

When the gap is less than 13 mm (0.52 in), 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-193, "Exploded View"](#).



IGNITION SIGNAL

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Component Inspection (Condenser)

INFOID:0000000013923117

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as per the following.

Terminals	Resistance (MΩ)
1 and 2	Above 1 [at 25°C (77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace condenser.

MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

MALFUNCTION INDICATOR LAMP

Component Function Check

INFOID:0000000013923118

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Make sure that MIL illuminates.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC6-1741, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000013923119

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC UXXXX.

2.CHECK DTC WITH "COMBINATION METER"

Refer to [MWI-70, "CONSULT Function"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace combination meter. Refer to [MWI-141, "Removal and Installation"](#).
NO >> Repair or replace.

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SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

SENSOR POWER SUPPLY 2 CIRCUIT

Description

INFOID:000000013923123

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor (bank 2)
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

Sensor power supply 3

- Turbocharger speed sensor (bank 1)
- Turbocharger speed sensor (bank 2)

Diagnosis Procedure

INFOID:000000013923124

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	Ground	5 V
M124*1	10		
M126*2	6		

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.

SENSOR POWER SUPPLY 2 CIRCUIT

[VR30DDTT FOR MEXICO]

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2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		-		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
M124*1	10	E152	194	Existed
M126*2	6			

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

1. Disconnect following sensors harness connector.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F142	105	Throttle position sensor (bank 2)	F119	5
F143	76	Mass air flow sensor (bank 2)	F98	2
	80	Engine oil pressure sensor	E42	3
		Fuel rail pressure sensor	F137	3
	81	Battery current sensor	E7	4
85	Intake camshaft position sensor (bank 2)	F97	1	
E152	194	Accelerator pedal position sensor 2	M124*1	10
			M126*2	6

*1: With ICC

*2: Without ICC

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Throttle position sensor (bank 2) (Refer to [EC6-1306, "Component Inspection \(Throttle Position Sensor\)"](#).)
- Mass air flow sensor (bank 2) (Refer to [EC6-1288, "Component Inspection \(Mass Air Flow Sensor\)"](#).)
- Engine oil pressure sensor (Refer to [EC6-1407, "Component Inspection"](#).)
- Fuel rail pressure sensor (Refer to [EC6-1349, "Component Inspection \(Fuel Rail Pressure Sensor\)"](#).)
- Battery current sensor (Refer to [EC6-1545, "Component Inspection"](#).)
- Intake camshaft position sensor (bank 2) (Refer to [EC6-1387, "Component Inspection"](#).)
- Accelerator pedal position sensor 2 (Refer to [EC6-1612, "Component Inspection \(Accelerator Pedal Position Sensor\)"](#).)

Is the inspection result normal?

YES >> Perform [GI-45, "Intermittent Incident"](#).

NO >> Replace malfunctioning component.

SENSOR POWER SUPPLY 3 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

SENSOR POWER SUPPLY 3 CIRCUIT

Description

INFOID:000000013923125

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 3 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- Crankshaft position sensor
- Intake camshaft position sensor (bank 1)
- Throttle position sensor (bank 1)
- Mass air flow sensor (bank 1)
- Multi-way control valve
- Electric wastegate control actuator (bank 1)
- Electric wastegate control actuator (bank 2)
- Accelerator pedal position sensor 1
- Turbocharger boost sensor (bank 1)
- Turbocharger boost sensor (bank 2)

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor (bank 2)
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Battery current sensor
- Intake camshaft position sensor (bank 2)
- Throttle position sensor (bank 2)
- Accelerator pedal position sensor 2
- Refrigerant pressure sensor
- Manifold absolute pressure sensor

Sensor power supply 3

- Turbocharger speed sensor (bank 1)
- Turbocharger speed sensor (bank 2)

Diagnosis Procedure

INFOID:000000013923126

1. CHECK SENSOR POWER SUPPLY 3 CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect following sensors harness connector.
3. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F142	109	Turbocharger speed sensor (bank 1)	F141	1
	108	Turbocharger speed sensor (bank 2)	F140	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair short to ground or short to power in harness or connectors.

2. CHECK COMPONENTS

Check the following.

- Turbocharger speed sensor (bank 1) (Refer to [EC6-1633. "Component Inspection \(Turbocharger Speed Sensor\)".](#))
- Turbocharger speed sensor (bank 2) (Refer to [EC6-1633. "Component Inspection \(Turbocharger Speed Sensor\)".](#))

Is the inspection result normal?

SENSOR POWER SUPPLY 3 CIRCUIT

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- YES >> Perform [GI-45. "Intermittent Incident"](#).
- NO >> Replace malfunctioning component.

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REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VR30DDTT FOR MEXICO]

REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:000000013923127

1. CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector terminals as per the following.

ECM				Voltage (V)
+		-		
Connector	Terminal	Connector	Terminal	
F143	70 (Refrigerant pressure sensor signal)	F142	97	1.0 - 4.0

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Proceed to [EC6-1746, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000013923128

1. CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Turn ignition switch OFF.
3. Check ground connection E191. Refer to Ground Inspection in [GI-48, "Circuit Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage (V)
Connector	Terminal		
E162	3	Ground	Approx. 5

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E162	3	F143	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

REFRIGERANT PRESSURE SENSOR

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> Check sensor power supply 2 circuit. Refer to [EC6-1742, "Diagnosis Procedure"](#).
NO >> Repair or replace error-detected parts.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E162	1	F142	97	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E162	2	F143	70	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK INTERMITTENT INCIDENT

Refer to [GI-45, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace refrigerant pressure sensor. Refer to [HA-38, "Exploded View"](#).
NO >> Repair or replace error-detected parts.

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR MEXICO]

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:000000013844606

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Low pressure fuel pump circuit	1	1	2	3	2		2	2			3		2	EC6-1729
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC6-1212
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC6-1724
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC6-1073
	FRP sensor circuit	1	1	2	2	2		2	2			2			EC6-1346
	High pressure fuel pump circuit			4		3									EC6-1732
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC6-1758
	Incorrect idle speed adjustment						1	1	1	1		1			EC6-1195
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC6-1468 , EC6-1473
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC6-1195
	Ignition circuit	1	1	2	2	2		2	2			2			EC6-1736
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC6-1228
Mass air flow sensor circuit		1			2										EC6-1285
Engine coolant temperature sensor circuit					3										
Air fuel ratio (A/F) sensor 1 circuit		1	2		3	2		2	2			2			EC6-1307 , EC6-1311 , EC6-1314
Throttle position sensor circuit															
Accelerator pedal position sensor circuit				3	2	1									EC6-1610 , EC6-1613 , EC6-1616
Heated oxygen sensor 2 circuit				6		6		6	6			5			EC6-1377

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

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	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Knock sensor circuit			2								3			EC6-1377
Engine oil temperature sensor circuit			4		2						3			EC6-1350
Engine oil pressure sensor circuit			4		4	3	3	3			3			EC6-1408
Crankshaft position sensor circuit	2	2												EC6-1380
Intake camshaft position sensor circuit			3		2	3								EC6-1448 , EC6-1451
Exhaust valve timing control position sensor circuit	2	2			3		3	3						EC6-1389 , EC6-1392
Turbocharger boost sensor circuit			3		3									EC6-1359
Manifold absolute pressure sensor circuit					2									EC6-1293
Vehicle speed signal circuit		2	3		3						3			EC6-1403
ECM	2	2	3	3	3	3	3	3	3	3	3			EC6-1423 , EC6-1425 , EC6-1426 , EC6-1427 , EC6-1429 , EC6-1430 , EC6-1432 , EC6-1434
Electric intake valve timing control module circuit			3		3	3								EC6-1231 , EC6-1236 , EC6-1238 , EC6-1240
Electric intake valve timing control actuator circuit					3									EC6-1669 , EC6-1672 , EC6-1675 , EC6-1678 , EC6-1681 , EC6-1684 , EC6-1687 , EC6-1690 , EC6-1693 , EC6-1697 , EC6-1700 , EC6-1700
Exhaust valve timing control solenoid valve circuit	2	2	2		2		2	2						EC6-1248 , EC6-1266
PNP signal circuit			3		3		3	3			3			EC6-1445
Refrigerant pressure sensor circuit		2				3			3		4			EC6-1746

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

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	SYMPTOM												Reference page	
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Electric wastegate control actuator circuit					1									EC6-1635
Battery current sensor circuit						4	5	5					3	EC6-1543 , EC6-1546 , EC6-1550 , EC6-1553
Electrical load signal circuit							3							EC6-1722
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-70
ABS actuator and electric unit (control unit)			4											BRC-87

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

	SYMPTOM												Reference page		
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Fuel		5													
Fuel tank	5														FL-17
Fuel piping			5	5	5		5	5			5			—	
Vapor lock															—
Valve deposit															—
Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			—	

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR MEXICO]

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Air duct														EM-166
	Air cleaner														EM-159
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			EM-166
	Electric throttle control actuator	5			5		5			5					EM-165
	Air leakage from intake manifold/Collector/Gasket														EM-173
Cranking	Battery														PG-245
	Generator circuit	1	1	1		1		1	1					1	CHG-41, CHG-45
	Starter circuit	3										1			STR-36, STR-39
	Signal plate	6													EM-200
	PNP signal circuit	4													EC6-1446
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-267
	Cylinder head gasket										4		3		
	Cylinder block														
	Piston												4		
	Piston ring														
	Connecting rod	6	6	6	6	6		6	6			6			EM-279
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain														EM-248
	Camshaft														EM-255
	Intake valve timing control														EC6-1062
	Exhaust valve timing control	5	5	5	5	5		5	5			5			EC6-1063
	Intake valve														
	Exhaust valve												3		EM-260
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-226, EX-5
	Three way catalyst														

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR MEXICO]

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			EM-189 , EM-190 , EM-191 , EM-217 , EM-220 , EM-221 , EM-225 , LU-40 , LU-31
	Oil level (Low)/Filthy oil														LU-27
	Variable displacement oil pump	5	5		4								4		
Cooling	Radiator/Hose/Radiator filler cap														CO-39 , CO-65
	Water pump														CO-47
	Water gallery											5			CO-26
	Cooling fan	5	5	5	5	5		5	5		4				CO-44
	Coolant level (Low)/Contaminated coolant										5				CO-33
	Multi-way control valve												4		EC6-1664 , EC6-1666
IVIS (INFINITI Vehicle Immobilizer System — NATS)		1	1												SEC-92

1 - 6: The numbers refer to the order of inspection.

INFINITI DRIVE MODE SELECTOR

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR MEXICO]

INFINITI DRIVE MODE SELECTOR

Symptom Table

INFOID:000000013844607

SYSTEM - DRIVE MODE SELECTOR -

A

EC6

Malfunction	Check item		Probable malfunctioning part/Action
ECO pedal reaction force is not generated when in ECO mode.	Only ECO pedal reaction force is not generated. [Intelligent pedal (distance control assist) operates normally.]	The central switch of the navigation system operates normally.	Perform self-diagnosis of the engine control system. Refer to EC6-1139, "DTC Index" .
		The central switch of the navigation system malfunctions.	Perform self-diagnosis of the navigation system. Refer to AV-397, "Symptom Table" .
	Intelligent pedal (distance control assist) reaction force is not generated as well.		Perform self-diagnosis of the ADAS control unit, ICC sensor, and Accelerator pedal actuator. <ul style="list-style-type: none"> • ADAS C/U: Refer to DAS-53, "DTC Index". • ICC SENSOR: Refer to DAS-342, "DTC Index". • ACCELERATOR PEDAL ACTUATOR: Refer to DAS-345, "DTC Index".
When in ECO mode, settings of ECO pedal reaction force cannot be changed or vehicle behavior does not agree to the settings.	Intelligent pedal (distance control assist) reaction force has a malfunction as well.		Perform self-diagnosis of the ADAS control unit, ICC sensor, and Accelerator pedal actuator. <ul style="list-style-type: none"> • ADAS C/U: Refer to DAS-53, "DTC Index". • ICC SENSOR: Refer to DAS-342, "DTC Index". • ACCELERATOR PEDAL ACTUATOR: Refer to DAS-345, "DTC Index".
	Intelligent pedal (distance control assist) reaction force is normal.	The central switch of the navigation system operates normally.	Perform self-diagnosis of the engine control system. Refer to EC6-1139, "DTC Index" .
		The central switch of the navigation system malfunctions.	Perform self-diagnosis of the navigation system. Refer to AV-397, "Symptom Table" .

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NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

[VR30DDTT FOR MEXICO]

NORMAL OPERATING CONDITION

Description

INFOID:000000013844608

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under direct Injection gasoline System, [EC6-1057](#).
["DIRECT INJECTION GASOLINE SYSTEM : System Description"](#).

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:000000013844609

A


EC6

CHECK IDLE SPEED

 **With CONSULT**

Check idle speed in "DATA MONITOR" mode of "ENGINE" using CONSULT.

C

 **With GST**

Check idle speed with Service \$01 of GST.

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IGNITION TIMING

< PERIODIC MAINTENANCE >

[VR30DDTT FOR MEXICO]

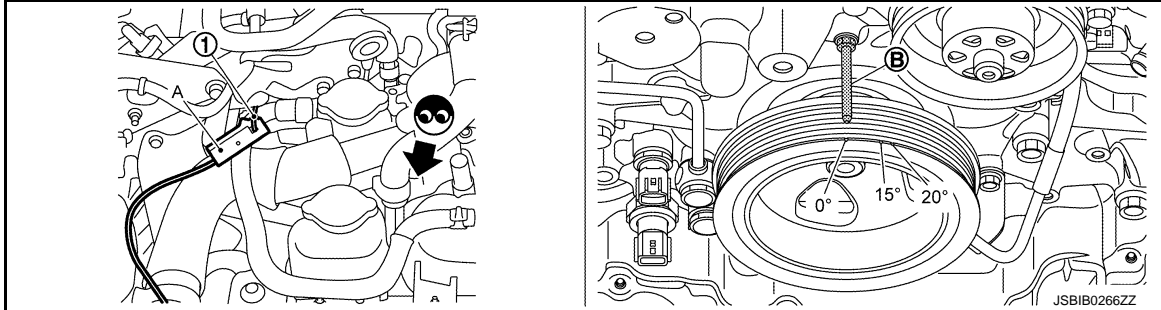
IGNITION TIMING

Inspection

INFOID:000000013844610

CHECK IGNITION TIMING

1. Attach timing light (A) to loop wire as shown.



- ①. Loop wire
- Ⓑ. Timing indicator

2. Check ignition timing.

EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

[VR30DDTT FOR MEXICO]

EVAP LEAK CHECK

Inspection

INFOID:000000013844611

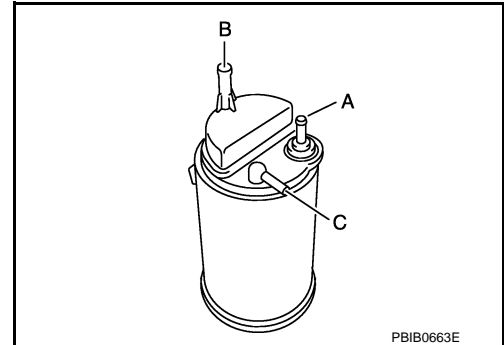
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1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.

EC6

2. Check EVAP canister as follows:

- a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).
- b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).



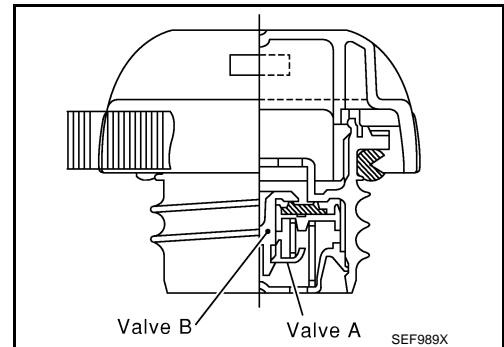
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3. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

- a. Wipe clean valve housing.



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- b. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.060 to -0.033 bar, -0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

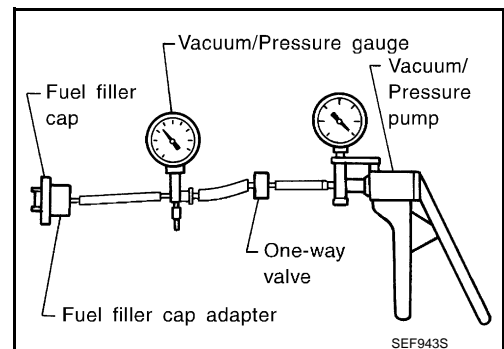
- c. If out of specification, replace fuel filler cap as an assembly. Refer to [FL-15. "Exploded View"](#).

4. Check water separator as follows:

- a. Check visually for insect nests in the water separator air inlet.
- b. Check visually for cracks or flaws in the appearance.
- c. Check visually for cracks or flaws in the hose.
- d. Check that (A) and (C) are not clogged by blowing air into (B) with (A), and then (C) plugged.
- e. In case of NG in items 2 - 4, replace the parts.

NOTE:

Do not disassemble water separator.

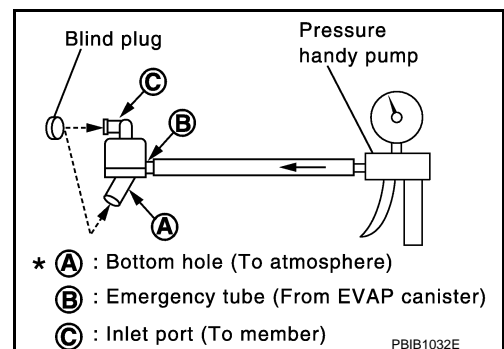


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- * (A) : Bottom hole (To atmosphere)
- (B) : Emergency tube (From EVAP canister)
- (C) : Inlet port (To member)

POSITIVE CRANKCASE VENTILATION

< PERIODIC MAINTENANCE >

[VR30DDTT FOR MEXICO]

POSITIVE CRANKCASE VENTILATION

Inspection

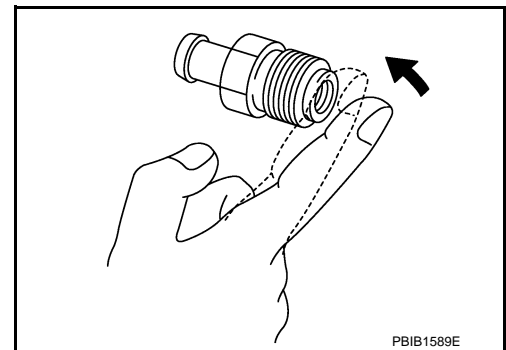
INFOID:000000013844612

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.



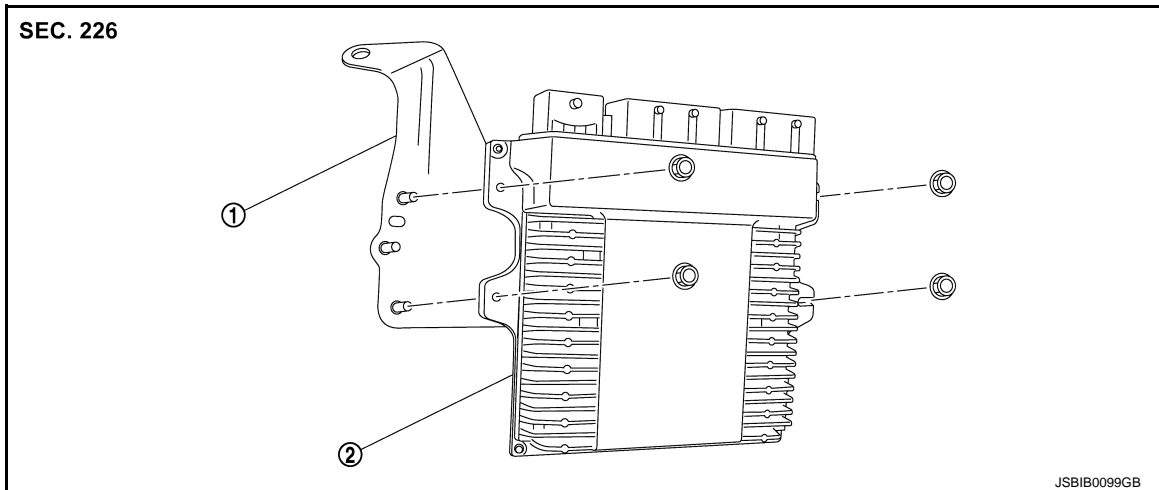
REMOVAL AND INSTALLATION

ECM

Exploded View

INFOID:000000013844613

EC6



① ECM bracket

② ECM

Removal and Installation

INFOID:000000013844614

CAUTION:

Perform **ADDITIONAL SERVICE WHEN REPLACING ECM**. Refer to [EC6-1200, "Description"](#).

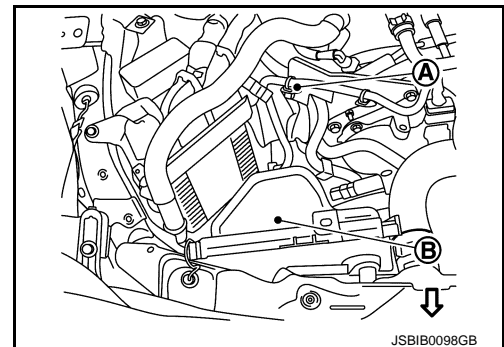
REMOVAL

1. Remove air duct (inlet). Refer to [EM-165, "Exploded View"](#).
2. Remove hoodledge cover (RH) and cowl top cover (RH). Refer to [EXT-27, "Exploded View"](#).
3. Remove air cleaner body (bank 1). Refer to [EM-165, "Exploded View"](#).
4. Remove clip of water hose 1 installed to ECM bracket.
5. Disconnect the ECM harness connectors. Refer to HARNESS CONNECTOR (LEVER LOCKING TYPE) in [PG-8, "VR30DDTT : Harness Connector"](#).
6. Disconnect harness (A) installed to air cleaner cover (bank 1) (B) and move air cleaner cover (bank 1) to secure work space.
7. Remove bracket nut of water pipe installed to ECM bracket.

NOTE:

Do not bend water hose 1 forcibly.

8. Remove the bolts of the ECM bracket.
9. Remove the ECM assembly from the vehicle.
10. Remove the ECM from the bracket.



INSTALLATION

Install in the reverse order of removal.

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

< REMOVAL AND INSTALLATION >

[VR30DDTT FOR MEXICO]

ELECTRIC INTAKE VALVE TIMING CONTROL MODULE

Removal and Installation

INFOID:000000013844615

REMOVAL

1. Remove hoodledge cover (RH) and cowl top cover (RH). Refer to [EXT-27, "Exploded View"](#).
2. Remove the battery and battery tray. Refer to [PG-259, "VR30DDTT : Removal and Installation"](#).
3. Move IPDM E/R and relay box to a location that does not inhibit work. Refer to [PCS-44, "Removal and Installation"](#).
4. Remove the bracket. Refer to [PCS-44, "Removal and Installation"](#).
5. Disconnect electric intake valve timing control module harness connector. Refer to HARNESS CONNECTOR (LEVER LOCKING TYPE) in [PG-8, "VR30DDTT : Harness Connector"](#).
6. Remove electric intake valve timing control module from the vehicle.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Perform **ELECTRIC IVT CONTROL ACTUATOR POSITION LEARNING**. Refer to [EC6-1209, "Description"](#)

FUEL PUMP CONTROL MODULE (FPCM)

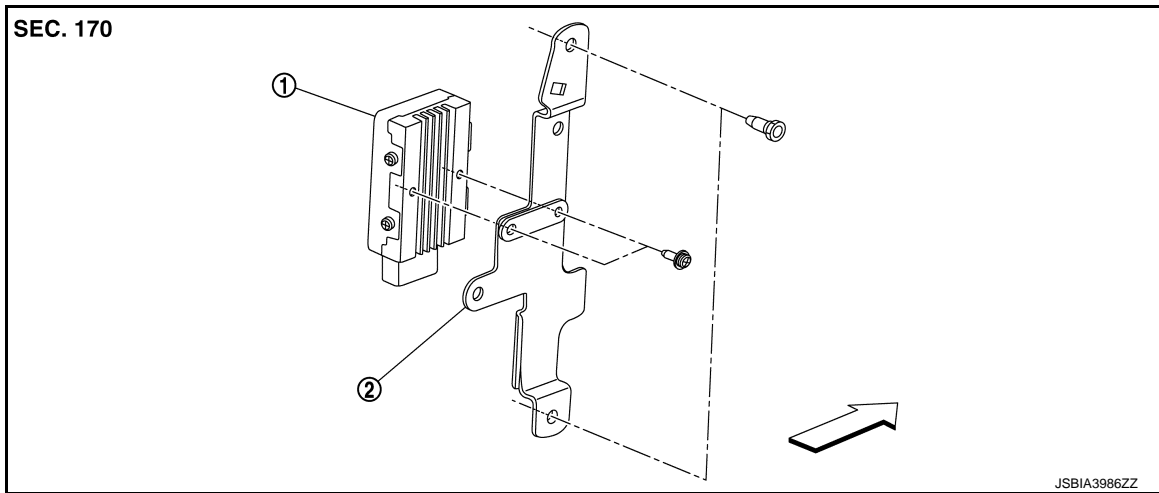
< REMOVAL AND INSTALLATION >

[VR30DDTT FOR MEXICO]

FUEL PUMP CONTROL MODULE (FPCM)

Exploded View

INFOID:000000013844616



- ① Fuel pump control module ② Bracket

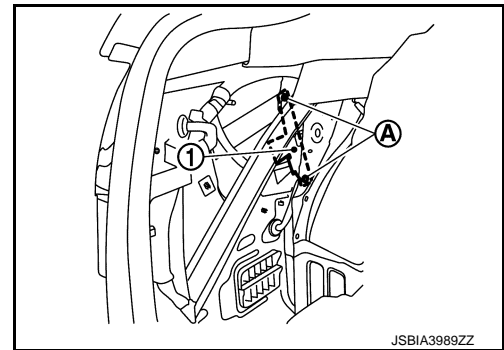
← : Vehicle front

Removal and Installation

INFOID:000000013844617

REMOVAL

1. Remove the trunk side finisher LH. Refer to [EXT-58, "TRUNK LID FINISHER : Removal and Installation"](#).
2. Disconnect fuel pump control module (FPCM) connector.
3. Remove mounting bolts (A) and then remove fuel pump control module (FPCM) (1).



INSTALLATION

Install in the reverse order of removal.

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SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VR30DDTT FOR MEXICO]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000013844618

Condition	Specification
No load* (in P or N position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000013844619

Condition	Specification
No load* (in P or N 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

INFOID:0000000013844620

Condition	Specification (Using CONSULT or GST)
At idle	5 – 35 %
At 2,500 rpm	5 – 35 %

Mass Air Flow Sensor

INFOID:0000000013844621

Supply voltage	Approx. 5 V
Output frequency at idle	2.8 – 3.1 kHz*
Mass air flow (Using CONSULT or GST)	1.2 – 2.0 g/s at idle* 4.6 – 7.6 g/s at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.