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# SECTION EC

## ENGINE CONTROL SYSTEM

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# HOW TO USE THIS MANUAL

## HOW TO USE THIS SECTION

### Information

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Both “Idling stop system” and “stop/start system” are used in this manual. These indicate the same system.

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## SPEC CHANGE INFORMATION

### MODIFICATION NOTICE

#### Major Modification Item

INFOID:000000008895176

- With S-HYBRID system adoption, CONSULT function, self-diagnosis function, and circuit has been added.  
For the details of S-HYBRID system, refer to [HBC-3, "Major Modification Item"](#).
- With 2 battery adoption, sub battery current sensor and sub battery relay has been added.
- The adoption of the fuel control module (FPCM)
- The adoption of the cooling fan control module for cooling fan control.

PRECAUTION

PRECAUTIONS

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

INFOID:000000008842787

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

**WARNING:**

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see "SRS AIR BAG".
- Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

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

**WARNING:**

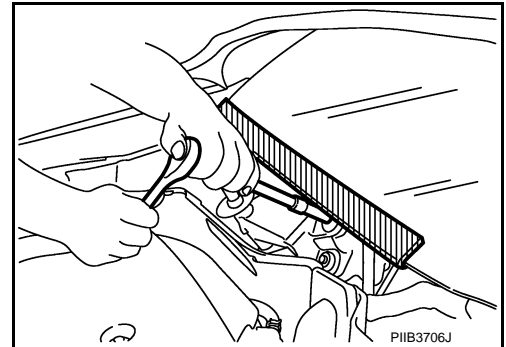
Always observe the following items for preventing accidental activation.

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

Precaution for Procedure without Cowl Top Cover

INFOID:000000008758318

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 Battery Name

INFOID:000000008837738

Vehicles equipped with the S-HYBRID system have two batteries. In this manual, when referring to as "battery," it means both "main battery" and "sub battery" except when described as "main battery" or "sub battery."

Precautions for Removal of Battery Terminal

INFOID:000000008837739

Vehicles equipped with the S-HYBRID system have two batteries. As for the disconnection of battery terminals, disconnect terminals of both main battery and sub battery except when described as "main battery" or "sub battery."

# PRECAUTIONS

[MR20DD]

< PRECAUTION >

## Precaution for Stop/Start System Service

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### CAUTION:

When performing an inspection and its related work with the engine at idle, always open the hood and release the stop/start system.

## On Board Diagnostic (OBD) System of Engine and CVT

INFOID:000000008758320

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

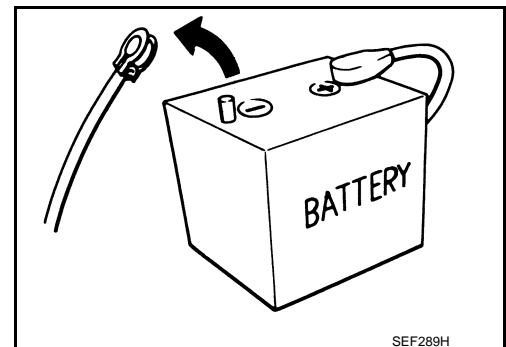
### CAUTION:

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

## General Precautions

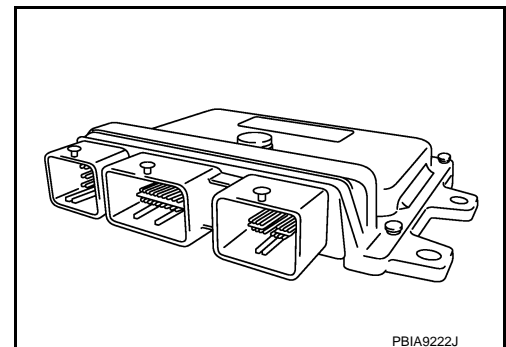
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- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure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



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- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.  
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
  - Diagnostic trouble codes
  - 1st trip diagnostic trouble codes
  - Freeze frame data
  - 1st trip freeze frame data
  - System readiness test (SRT) codes
  - Test values



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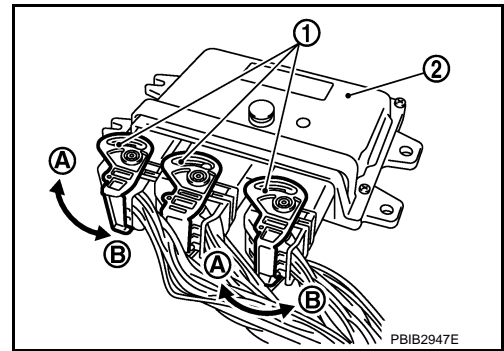
# PRECAUTIONS

[MR20DD]

## < PRECAUTION >

- When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.

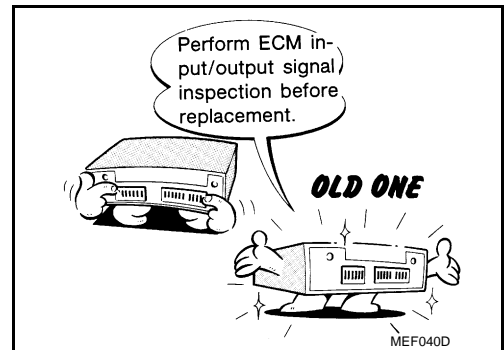
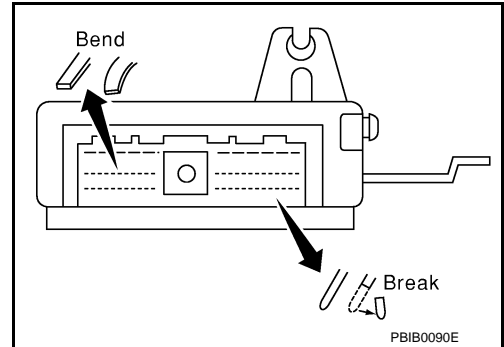
- 2. ECM
- A. Loosen



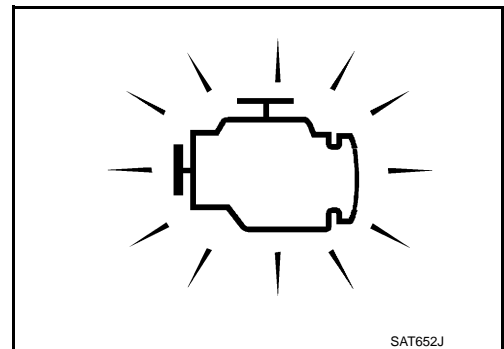
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

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

- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to [EC-27, "Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).



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



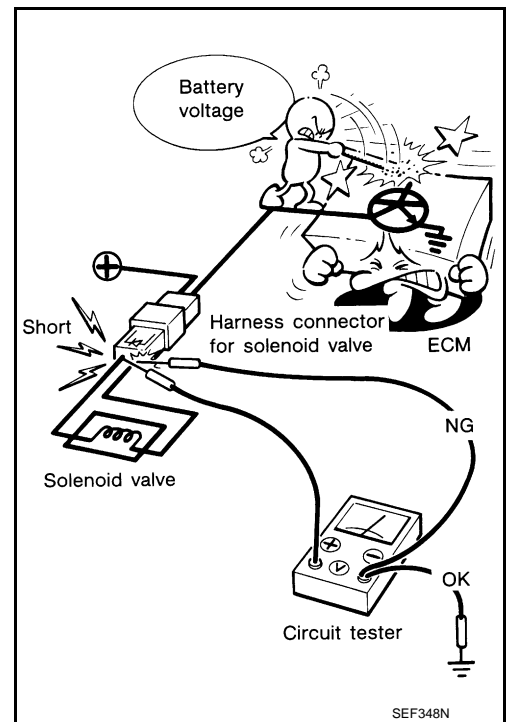
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## PRECAUTIONS

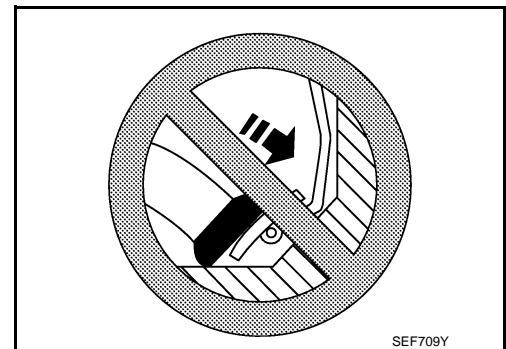
[MR20DD]

### < PRECAUTION >

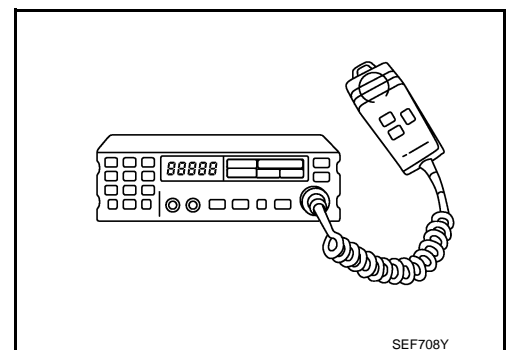
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



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



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



PREPARATION

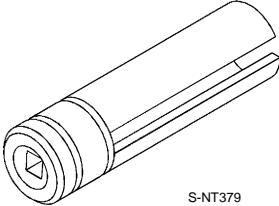
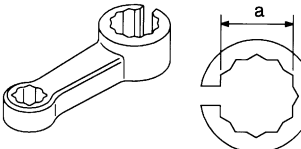
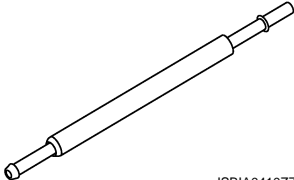
PREPARATION

Special Service Tools

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EC

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  <p style="text-align: center;">S-NT379</p>	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench  <p style="text-align: center;">S-NT636</p>	Loosening or tightening heated oxygen sensor 2 <b>a: 22 mm (0.87 in)</b>
KV10120000 Fuel tube adapter  <p style="text-align: center;">JSBIA0410ZZ</p>	Measuring fuel pressure

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# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]

## SYSTEM DESCRIPTION

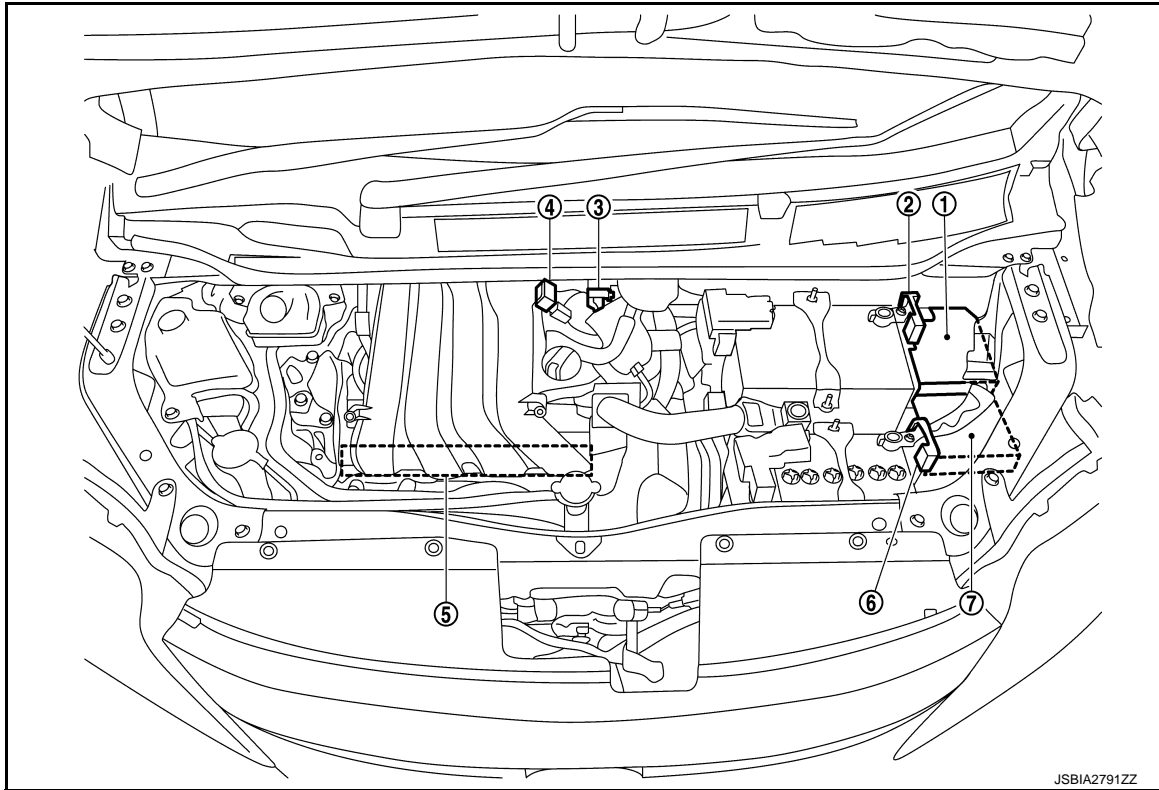
### COMPONENT PARTS

#### ENGINE CONTROL SYSTEM

#### ENGINE CONTROL SYSTEM : Component Parts Location

INFOID:000000008758323

#### ENGINE ROOM COMPARTMENT



JSBIA2791ZZ

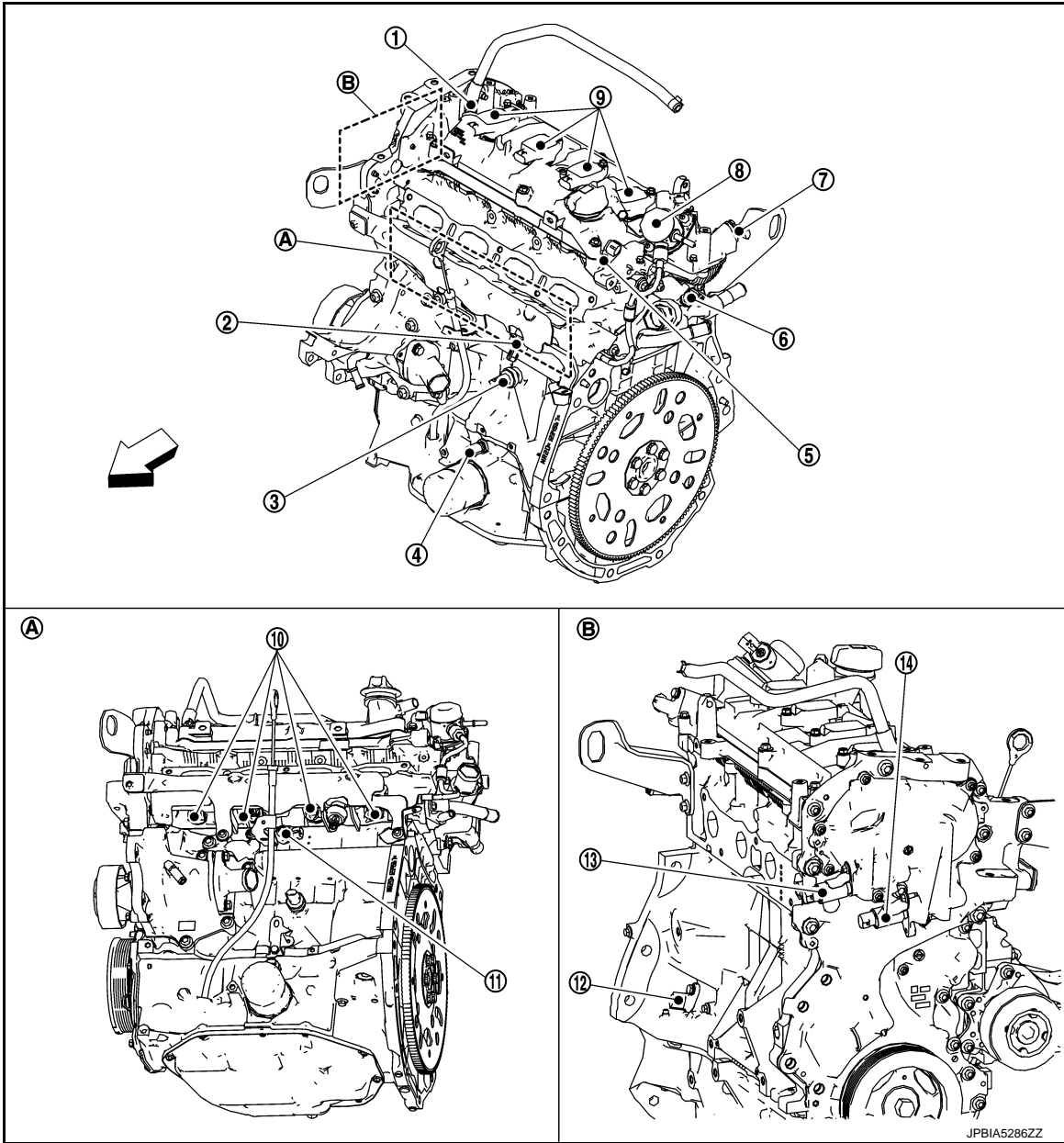
No.	Component	Function
①	IPDM E/R	<ul style="list-style-type: none"> <li>• IPDM E/R control the internal relays and the actuators.</li> <li>• When CAN communication with ECM is impossible, IPDM E/R performs fail-safe control.</li> </ul>
②	Main battery current sensor (with main battery temperature sensor)	—
③	Electric throttle control actuator (with built in throttle position sensor and throttle control motor)	—
④	EVAP canister purge volume control solenoid valve	—
⑤	Tumble control valve (Built in intake manifold)	—
⑥	Sub battery current sensor (with sub battery temperature sensor)	—
⑦	Fuel injector relay	—
	High pressure fuel pump relay	—

#### ENGINE COMPARTMENT

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]



A. Cylinder block left side  
(vehicle front)

B. Cylinder head front  
(vehicle right side)

← : Vehicle front

No.	Component	Function
①	PCV valve	—
②	Fuel rail pressure sensor	—
③	Engine oil pressure sensor	—
④	Engine oil temperature sensor	—
⑤	Camshaft position sensor (PHASE)	—
⑥	Engine coolant temperature sensor	—
⑦	Exhaust valve timing control position sensor	—
⑧	High pressure fuel pump	—

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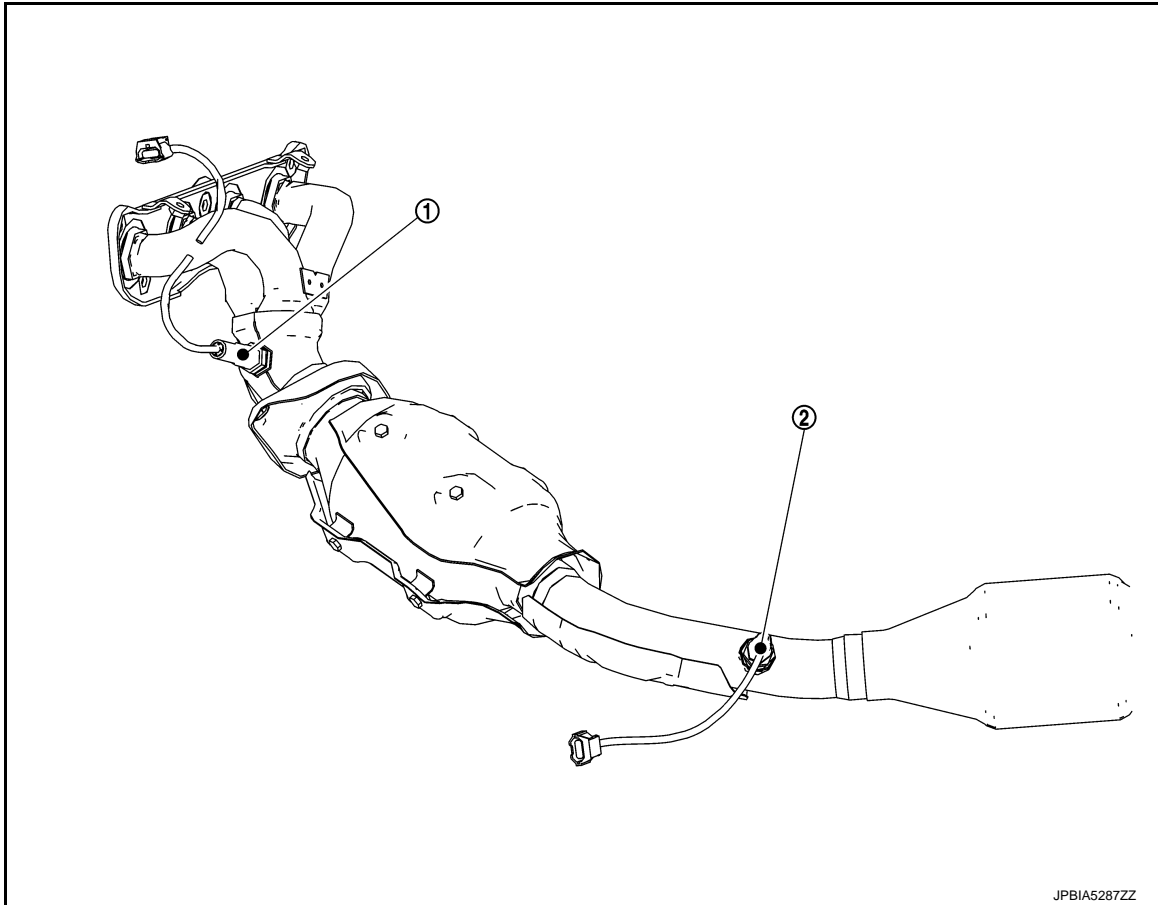
# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]

No.	Component	Function
⑨	Ignition coil (with power transistor)	—
⑩	Fuel injector	—
⑪	Knock sensor	—
⑫	Crankshaft position sensor 1 (POS)	—
⑬	Exhaust valve timing control solenoid valve	—
⑭	Intake valve timing control solenoid valve	—

## EXHAUST COMPARTMENT



JPBIA5287ZZ

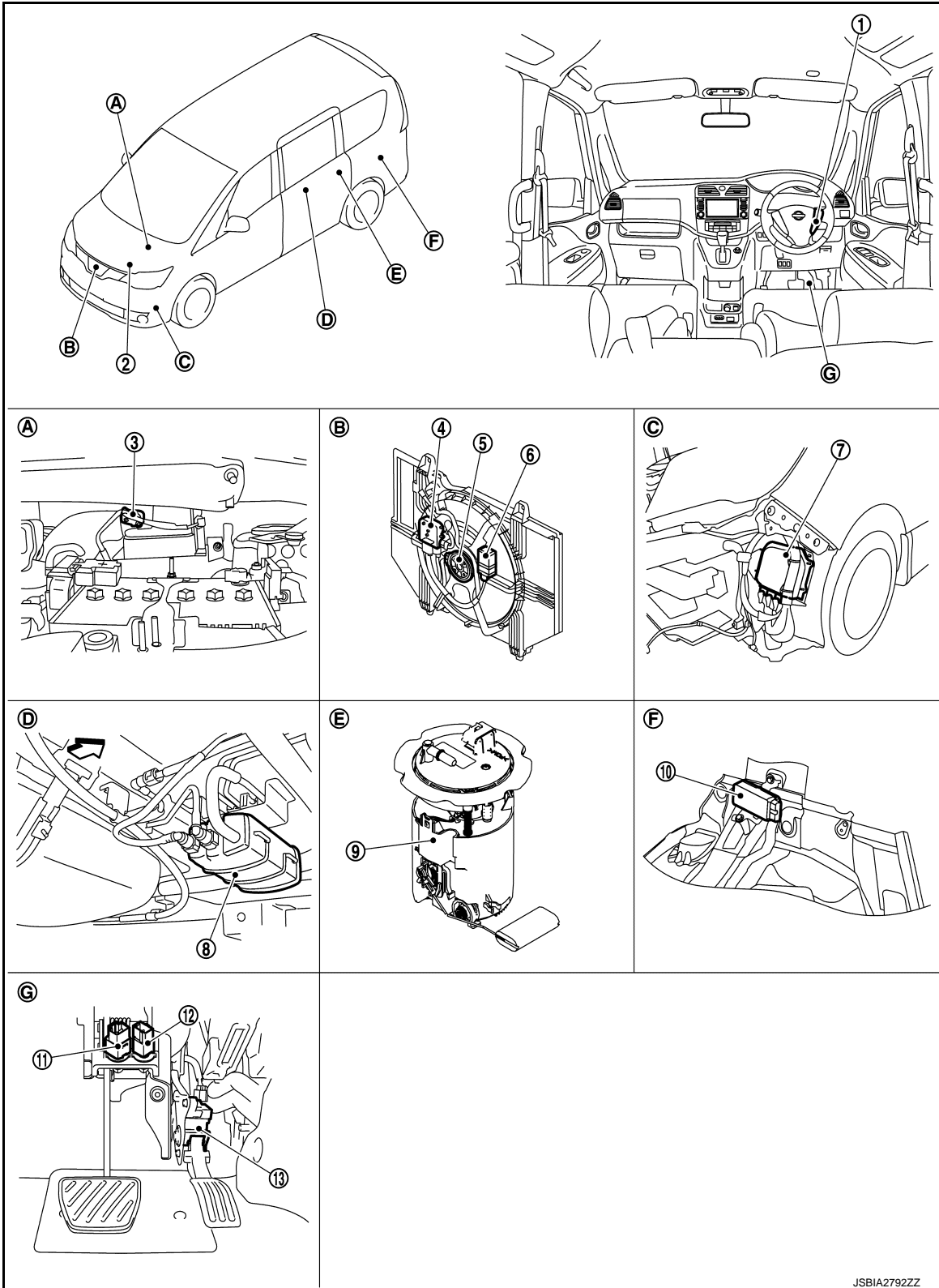
No.	Component	Function
①	Air fuel ratio (A/F) sensor 1	—
②	Heated oxygen sensor 2	—

## BODY COMPARTMENT

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]



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- A. Right side of air cleaner case (upper)
  - B. Behind the radiator
  - C. Behind the left side of front bumper
  - D. Fuel tank front
  - E. Under second seat
  - F. Behind the luggage side lower finisher LH
  - G. Periphery of pedals
- ↶ : Vehicle front

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]

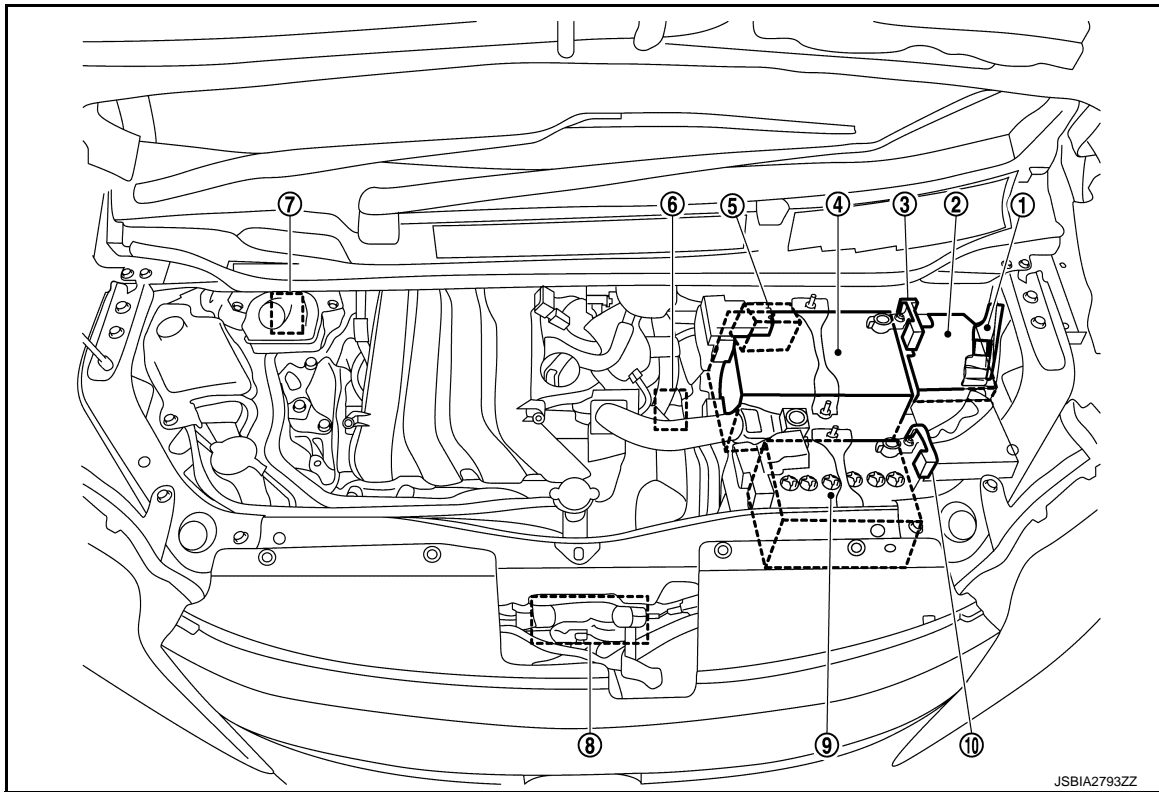
No.	Component	Function
①	ASC D steering switch	—
②	Refrigerant pressure sensor	—
③	Mass air flow sensor (with intake air temperature sensor)	—
④	Cooling fan control module	—
⑤	Cooling fan motor	—
⑥	Cooling fan relay	—
⑦	ECM	—
⑧	EVAP canister	—
⑨	Fuel level sensor unit, fuel filter and fuel pump assembly	—
⑩	Fuel pump control module (FPCM)	—
⑪	Stop lamp switch	—
⑫	ASC D brake switch	—
⑬	Accelerator pedal position sensor	—

## IDLING STOP SYSTEM

### IDLING STOP SYSTEM : Component Parts Location

INFOID:000000008758324

### ENGINE ROOM COMPARTMENT



JSBIA2793ZZ

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]

No.	Component	Function
①	TCM	<ul style="list-style-type: none"> <li>• TCM detects the following conditions and sends to ECM via CAN communication.                             <ul style="list-style-type: none"> <li>- Selector lever position</li> <li>- CVT fluid temperature</li> <li>- Stop/start system enable according to vehicle condition</li> </ul> </li> <li>• TCM controls electric oil pump according to the request from ECM (via CAN communication).</li> </ul>
②	IPDM E/R	<ul style="list-style-type: none"> <li>• Controls the integrated relay, and supplies voltage to the load according to the request from ECM (via CAN communication).</li> <li>• Transmits hood switch signal to ECM (via CAN communication).</li> </ul>
③	Main battery current sensor (with main battery temperature sensor)	—
④	Main battery	—
⑤	ABS actuator and electric unit (control unit)	<ul style="list-style-type: none"> <li>• ABS actuator and electric unit (control unit) detects the following conditions and sends to ECM via CAN communication.                             <ul style="list-style-type: none"> <li>- ABS system operation condition</li> <li>- VDC system operation condition</li> <li>- Brake fluid pressure</li> </ul> </li> <li>• ABS actuator and electric unit (control unit) activates the vehicle reverse prevention function (Brake holding function).</li> </ul>
⑥	Electric oil pump	Electric oil pump maintains oil pressure of CVT during the stop/start system operation.
⑦	EPS C/U	EPS control unit transmits EPS torque signal to ECM (via CAN communication).
⑧	Hood switch	—
⑨	Sub battery	—
⑩	Sub battery current sensor (with sub battery temperature sensor)	—

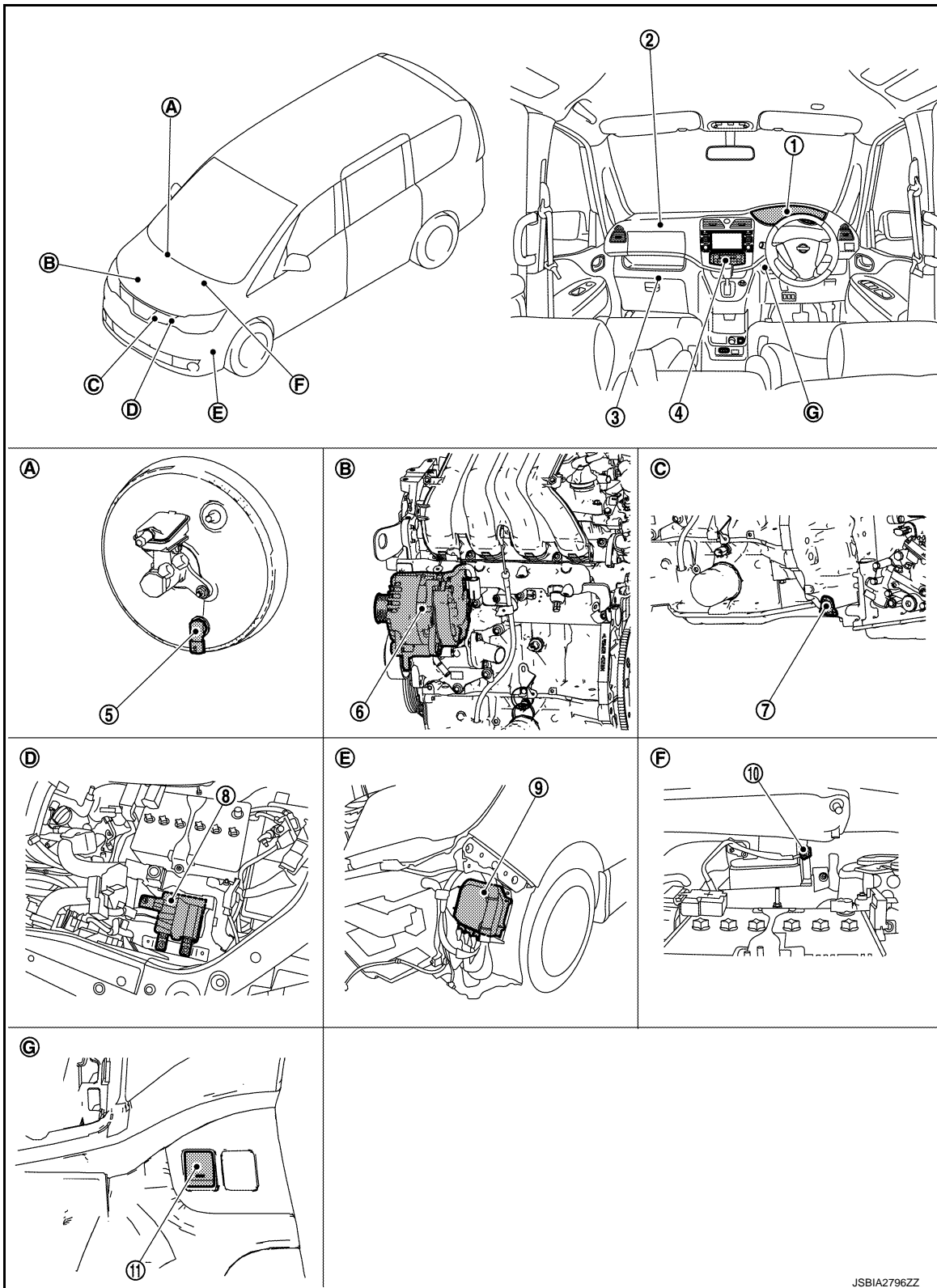
## BODY COMPARTMENT

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# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]



JSBIA2796ZZ

- A. Brake booster
- B. Engine room right side
- C. Engine left side (vehicle front)
- D. Under the sub battery
- E. Behind the luggage side lower finisher LH
- F. Left side of air cleaner case (upper)
- G. Instrument lower panel (driver side)

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR20DD]

No.	Component	Function
①	Combination meter (Idling stop indicator lamp)	<ul style="list-style-type: none"> <li>• Turns ON or blinks the stop/start indicator lamp according to the request from ECM (via CAN communication).</li> <li>• The combination meter sounds the warning buzzer when the driver's door is opened during stop/start system operation.</li> <li>• The combination meter displays stop/start system operating time and the amount of fuel saved during stop/start system operation.</li> </ul>
②	G sensor	The G sensor converts a detected tilt angle into an electric signal and transmits it to TCM.
③	BCM	BCM detects vehicle condition from each switch and transmits signals to ECM (via CAN communication).
④	A/C auto amp.	<ul style="list-style-type: none"> <li>• A/C auto amp. detects the air conditioner operation conditions and sends to ECM via CAN communication.</li> <li>• A/C auto amp. controls A/C compressor according to the request from ECM (via CAN communication).</li> </ul>
⑤	Brake booster pressure sensor	—
⑥	Sub starter & generator	—
⑦	Crankshaft position sensor 2	—
⑧	Sub battery relay	—
⑨	ECM	ECM detects vehicle condition from each sensor and each unit, and controls the engine stop/restart.
⑩	Atmospheric pressure sensor	—
⑪	Idling stop OFF switch	—

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**SYSTEM****IDLING STOP SYSTEM****IDLING STOP SYSTEM : System Description**

INFOID:000000008758325

**FUNCTION DESCRIPTION**

When the idling stop readiness conditions are satisfied while the vehicle is moving, the idling stop indicator lamp on the combination meter blinks to inform the driver that the system is ready.

When the idling stop system operation conditions are satisfied while the vehicle is in a stop condition, the engine is stopped. During idling stop system operation, stopping time and the amount of fuel saved by the idling stop system are indicated on the combination meter. In addition, the CVT electric oil pump is activated to supply oil pressure necessary for starting the engine to the clutch and the pulley.

When the engine restart conditions are satisfied at an engine start, the sub starter & generator is controlled to restart the engine. ECM turns OFF the sub battery relay to interrupt the connection between the main battery power supply circuit and the sub battery power supply circuit during sub starter & generator operation to protect the electrical equipment from low voltage.

The restart is completed, and restrains the retreat of the vehicle by cooperation control with ABS actuator and electric unit (control unit) while depress an accelerator pedal from a brake pedal.

The idling stop indicator lamp turns OFF after restarting the engine and turns ON when the operation readiness conditions of the idling stop system are satisfied again

**IDLING STOP READINESS CONDITION**

ECM judges idling stop system is ready and idling stop indicator lamp turn ON when the following conditions are satisfied.

# SYSTEM

< SYSTEM DESCRIPTION >

[MR20DD]

	Item	Condition		
Vehicle	Idling stop OFF switch	OFF (Switch indicator: OFF)	A	
	Idling stop indicator lamp	Not blink (Malfunction non-detection)	EC	
	Door (driver side)	Close		
	Seat belt (driver side)	Fastened		
	Driving history		Drive the vehicle at 20 km/h (12 MPH) or more after start the engine with ignition switch	C
			Passes 90 seconds after start the engine with ignition switch* <sup>1</sup>	D
			Drive the vehicle at 8 km/h (5 MPH) or more after re-start* <sup>2</sup>	E
			Passes 5 seconds or more after restart	F
	Hood	Close		
	Rear window defogger switch	OFF		
	ABS/VDC		System is normal	G
			ABS not activated* <sup>3</sup>	H
			VDC not activated	I
	EPS	System is normal	J	
	Main battery	Main battery voltage	Ignition switch ON: 11.5 V or more	K
			Start the engine with ignition switch: 7.2 V or more	L
		Main battery temperature	0°C (41°F) or more* <sup>4</sup>	M
		Charge condition	Charged enough	N
	Sub battery	Sub battery voltage	Ignition switch ON: 11.8 V or more* <sup>5</sup>	O
			Sub battery temperature	0°C (41°F) or more* <sup>4</sup>
		Charge condition	Charged enough	
Elevation		Less than 2,000 m		
Engine	Engine coolant temperature	37 - 100 °C		
CVT	CVT fluid temperature	21 - 100 °C		
	Selector lever position	Except for R position		
	Idling stop enable signal	OK		
Air conditioning	Temperature in the vehicle compartment	Approx. 20°C or more		
		Approx. 30°C or less (A/C switch: ON)		
	Idling stop enable signal	OK		

\*1: Changes the value according to the driving condition.

\*2: Shift the selector lever to D position from R position and drive the vehicle, readiness condition is 10 km/h (6 MPH) or more.

\*3: If ABS system is activated, drive the vehicle at 12 km/h (7.5 MPH) or more after stop the vehicle.

\*4: Because battery temperature varies with driving condition, if ambient temperature is more than 0°C, idling stop system might not be activated.

\*5: When ignition switch turned ON, output voltage varies with electrical load.

## IDLING STOP OPERATION CONDITION

ECM stops the engine approximately 1 second later when the following conditions are satisfied.

# SYSTEM

< SYSTEM DESCRIPTION >

[MR20DD]

Item		Condition	
Vehicle	Idling stop indicator lamp	Illuminated	
	Vehicle speed	0 km/h (0 MPH)	
	Steering wheel	No steer (Steering force does not occur)	
	Accelerator pedal	Released	
	Brake	Brake pedal	Depressed
		Brakes fluid pressure	0.8 Mp or more
		Brake booster pressure	Sufficient pressure for braking force
Vehicle angularity	Approx. 14 % or less		
Engine	Engine speed	1,200 rpm or less	
CVT	Selector lever position*	D, N or P position	

\*: Even if selector lever is shifted to the P position during the idling stop system operation, the engine continues stopping.

## RESTART CONDITION

ECM operates a sub starter & generator and restart an engine, and idling stop indicator lamp turn OFF when the following any conditions.

Item	Condition
Idling stop OFF switch	ON (switch indicator: ON)
Steering wheel	Steer (Steering force occurs)
Air conditioning	Cannot maintain comfort in the vehicle compartment
Rear window defogger switch	ON
Door (driver side)*	Open
Seat belt (driver side)*	Release
Brake pedal	Influenced by a selector lever position
Accelerator pedal	
Selector lever position	
Brake booster pressure	Insufficient pressure for braking force
Vehicle speed	2 km/h or more
Vehicle condition	Yawing occurs

\*: Selector lever is P position.

## RESTART CONDITION (EACH SELECTOR LEVER, THE BRAKE PEDAL AND THE ACCELERATOR PEDAL OPERATION)

### P Position

- Engine stop and restart condition when shift the selector lever from P position.

Selector lever position	P	→	R	→	N	→	D
Engine status	Stop	→	Restart	→	Stop	→	Restart

- Engine stop and restart condition by the brake pedal and accelerator pedal operation in the select lever P position.

Vehicle speed	0 km/h								
Brake pedal	ON				→	OFF			
Accelerator pedal	OFF	→	ON	→	OFF	→	ON*	→	OFF
Engine status	Stop	Restart			Stop	Restart			Stop

# SYSTEM

[MR20DD]

## < SYSTEM DESCRIPTION >

\*: The engine continues running when turn ON (depress) a brake pedal in an accelerator pedal ON (depressed).

### N Position

- Engine stop and restart condition when shift the selector lever from N position.

Selector lever position	P	←	R	←	N	→	D
Engine status	Stop	←	Restart	←	Stop	→	Restart

- Engine stop and restart condition by the brake pedal and accelerator pedal operation in the select lever N position.

Vehicle speed	0 km/h								
Brake pedal	ON				→	OFF		→	ON
Accelerator pedal	OFF	→	ON	→	OFF	→	ON*	→	OFF
Engine status	Stop	Restart		Stop	Restart	Run		Stop	

\*: The engine continues running when turn ON (depress) a brake pedal in an accelerator pedal ON (depressed).

### D Position

- Engine stop and restart condition when shift the selector lever from D position.

Selector lever position	P	←	R	←	N	←	D
Engine status	Stop	←	Restart	←	Stop	←	Stop

- Engine stop and restart condition by the brake pedal and accelerator pedal operation in the select lever D position.

When driving the vehicle at 8km/h or less after restart

Vehicle speed	0 km/h				8 km/h or less				0 km/h	
Brake pedal	ON				→	OFF		→	ON	
Accelerator pedal	OFF	→	ON	→	OFF	→	ON	→	OFF	
Engine status	Stop	Restart		Run						

When driving the vehicle at 8km/h or more after restart

Vehicle speed	0 km/h				8 km/h or more				0 km/h	
Brake pedal	ON				→	OFF		→	ON	
Accelerator pedal	OFF	→	ON	→	OFF	→	ON	→	OFF	
Engine status	Stop	Restart		Run						Stop

## SUB BATTERY RELAY CONTROL

### SUB BATTERY RELAY CONTROL : System Description

INFOID:000000008837702

#### DESCRIPTION

The idling stop system has a sub battery and sub battery relay to prevent a loss in supply voltage to each system due to a battery voltage loss during engine restart. ECM turns OFF the sub battery relay to interrupt the connection between the main battery power supply circuit and the sub battery power supply circuit during an engine restart by the starter motor or by the sub starter & generator and during torque assist. This protects the electric equipment connected to the sub battery power supply circuit from an impact (e.g. memory reset) of a loss in supply voltage.

#### OPERATION

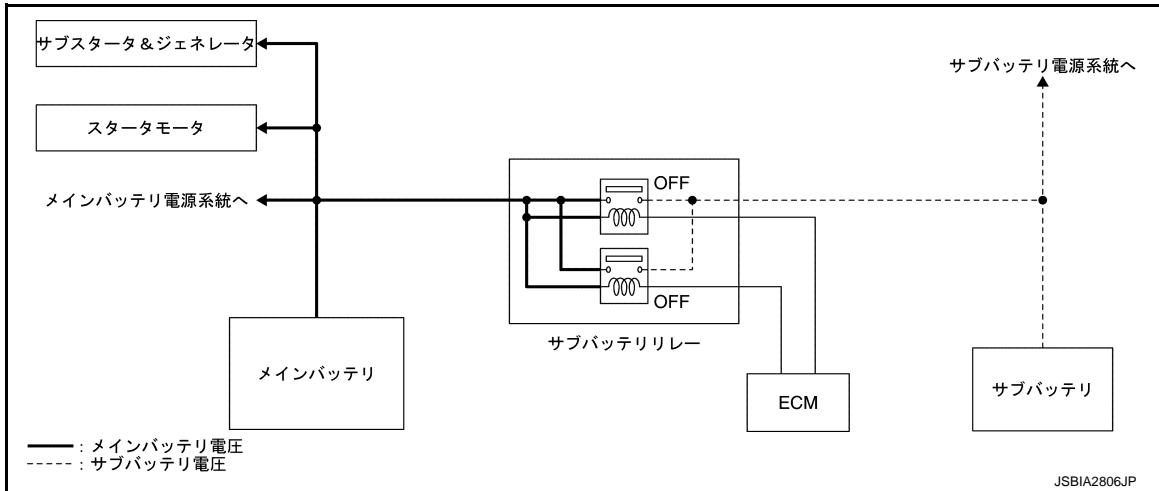
When turning OFF the ignition switch

# SYSTEM

[MR20DD]

## < SYSTEM DESCRIPTION >

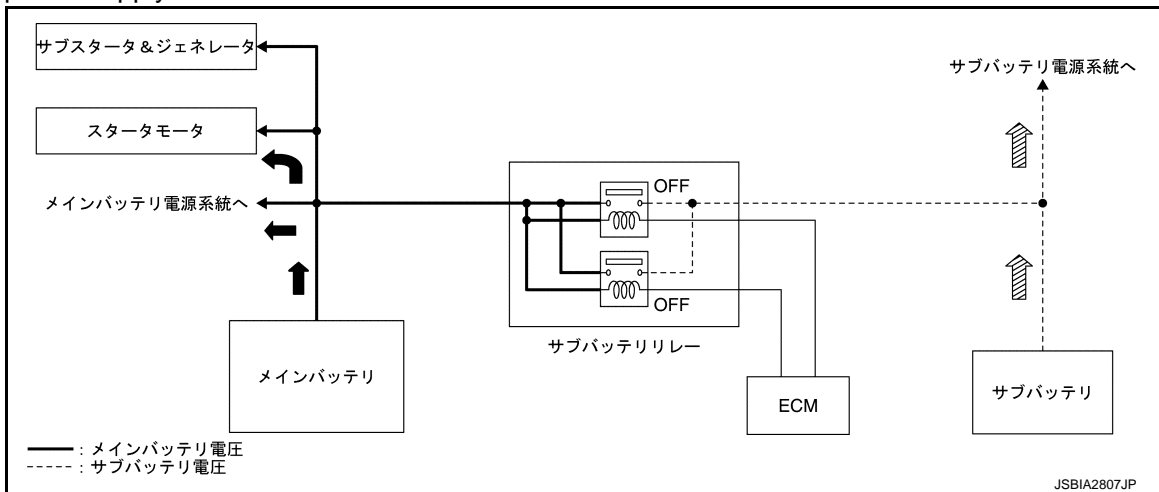
When turning OFF the ignition switch, the connection between the main battery power supply circuit and the sub battery power supply circuit is interrupted because the sub battery relay is in OFF state.



### During engine start

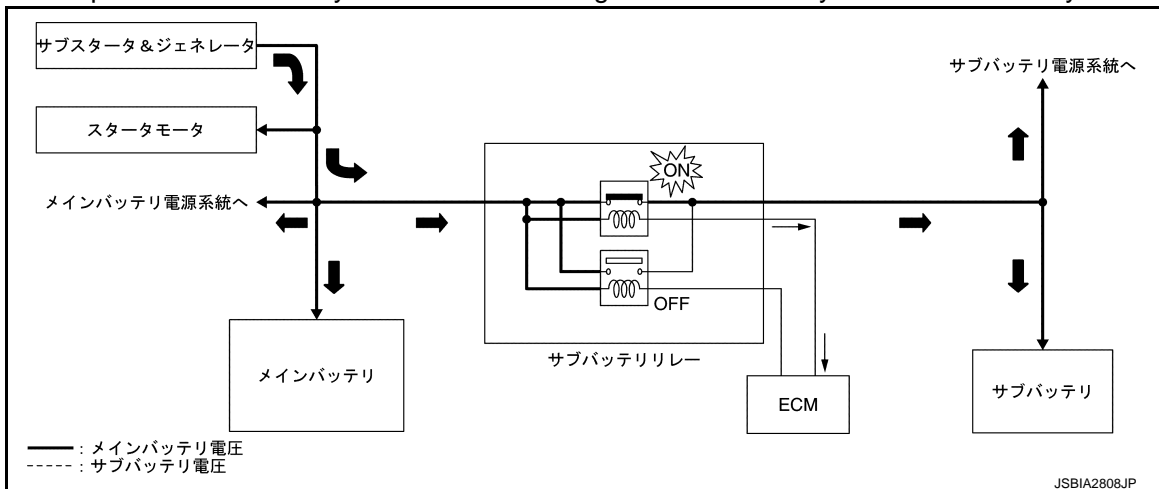
When starting the engine with the ignition switch in OFF state, power from the main battery is supplied to the starter motor.

The sub battery relay remains OFF. The connection between the main battery power supply circuit and the sub battery power supply circuit becomes interrupted and power is supplied from the sub battery to the sub battery power supply circuit.



### When diving under normal condition

When the engine is started normally, ECM turns ON one of the sub battery relays to connect the main battery power supply circuit and the sub battery power supply circuit. This allows the sub starter & generator to supply the generated power to all of the systems and to recharge the main battery and the sub battery.



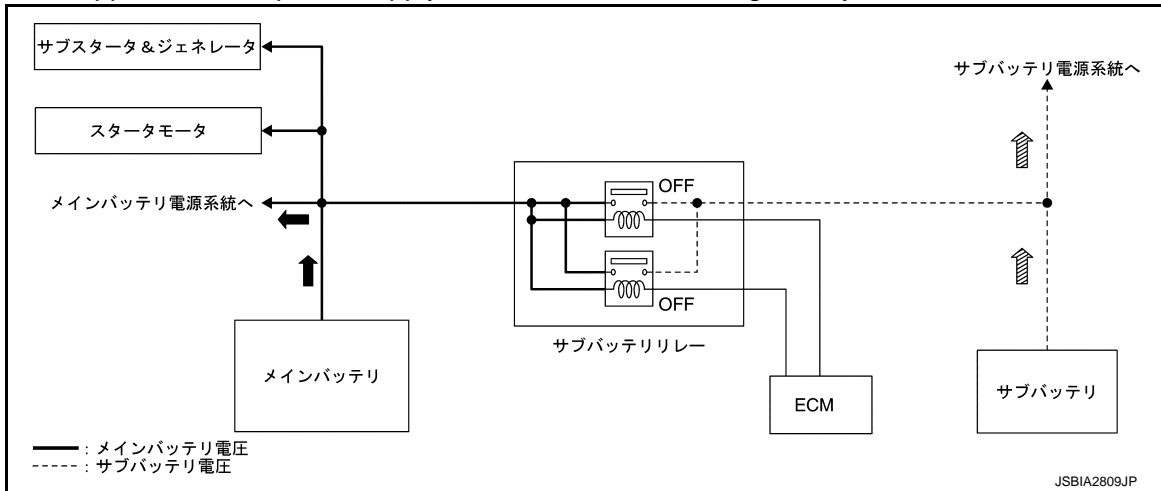
< SYSTEM DESCRIPTION >

**NOTE:**

When charging to each battery is not necessary, this system allows ECM to stop power generation (no power generation) to reduce engine load. During control, the power of the main battery is shared with the sub battery power supply circuit.

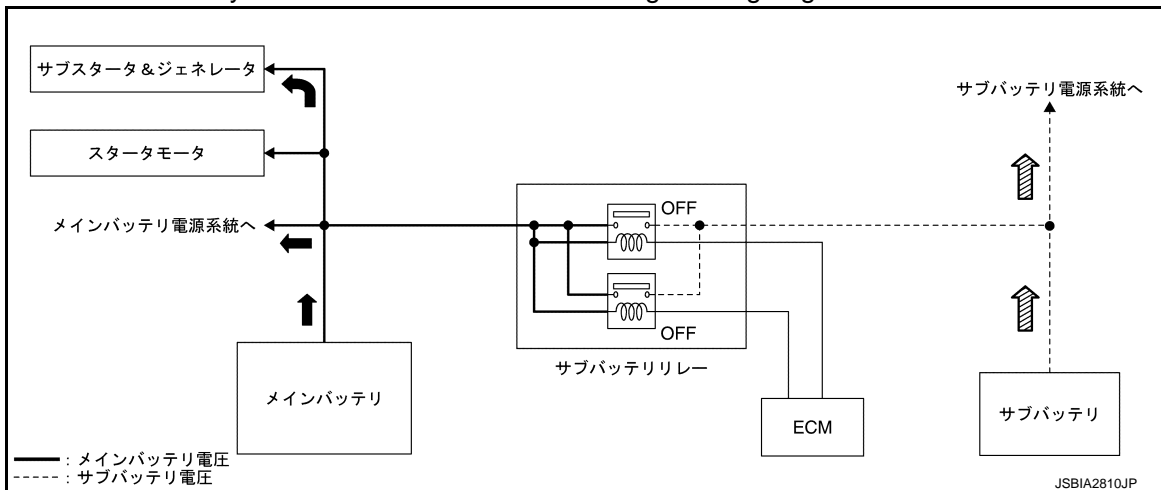
During idling stop activation

When the idling stop starts, ECM turns the sub battery relay from ON to OFF to interrupt the connection between the main battery power supply circuit and the sub battery power supply circuit. This allows electric power to be supplied to each power supply circuit from its connecting battery.



When restarting the engine from idling stop

When restarting the engine during idling stop, the sub battery relay remains OFF. As a result, electric power is supplied from the main battery to the sub starter & generator and the main battery power supply circuit. The sub battery power supply circuit becomes an independent power supply circuit and receives stable electric power from the sub battery without an influence of low voltage during engine restart.

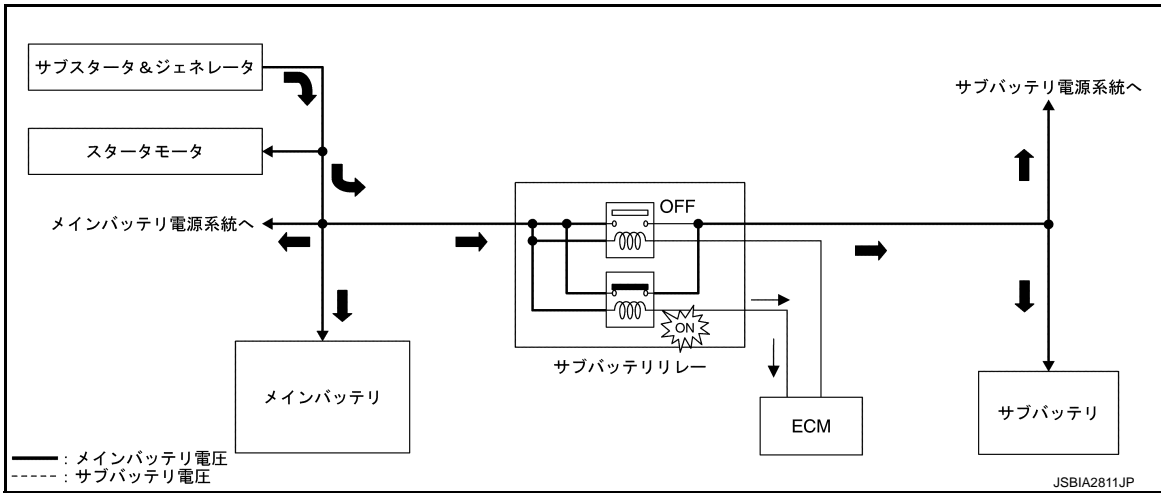


# SYSTEM

[MR20DD]

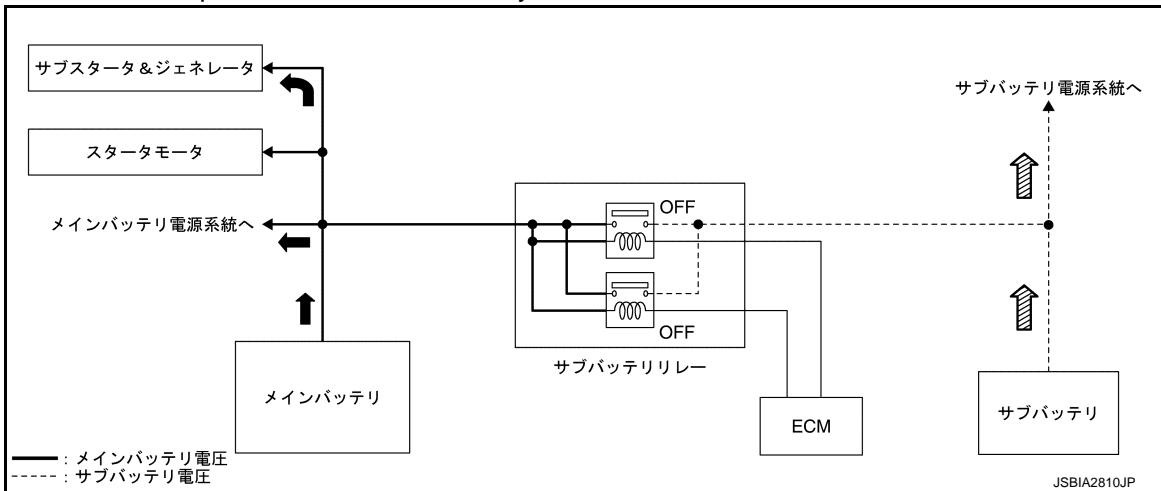
## < SYSTEM DESCRIPTION >

When the engine restart completes normally and the engine starts, ECM turns ON the sub battery relay (not turned ON last time) and connects the main battery power supply circuit and the sub battery power supply circuit.

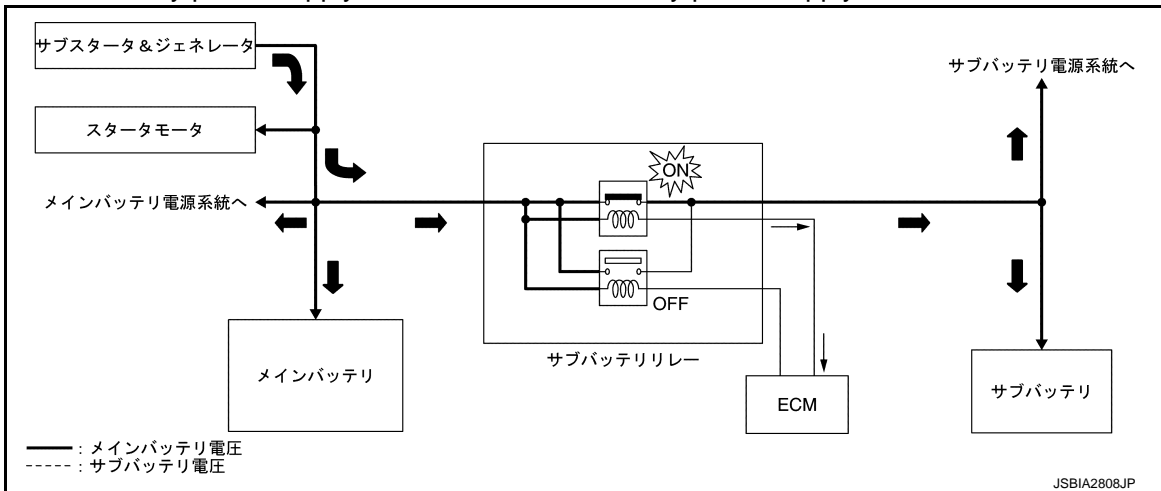


### When torque assist is activated

When torque assist operating conditions are satisfied, ECM turns OFF the sub battery relay to interrupt the connection between the main battery power supply circuit and the sub battery power supply circuit. This allows electric power to be supplied from the main battery to the sub starter & generator and the main battery power supply circuit. The sub battery power supply circuit becomes an independent power supply circuit and receives stable electric power from the sub battery.



When the torque assist completes, ECM turns ON the sub battery relay (not turned ON last time) and connects the main battery power supply circuit and the sub battery power supply circuit.



# ECU DIAGNOSIS INFORMATION

## ECM

### Reference Value

INFOID:000000008758326

#### VALUES ON THE DIAGNOSIS TOOL

##### NOTE:

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

● Numerical values in the following table are reference values.

● These values are input/output values that ECM receives/transmits and may differ from actual operations.

Example:

The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor. This occurs because the timing light shows a value calculated by ECM according to signals received from the cam shaft position sensor and other sensors related to ignition timing.

Monitor Item	Condition		Values/Status
S/STR & GENERTR STATUS	Ignition switch: ON		NTRL
	During idling stop activation		
	Engine speed: Idle		CHG
	Restarting the engine from idling stop	During cranking the engine.	START
		Immediately before restarting the engine (Immediately before the sub starter & generator is activated)	WAIT
	Starting the engine and accelerating the speed after restarting from idling stop	Torque assist is activated <b>NOTE:</b> For details of torque assist operation condition. Refer to <a href="#">HBC-12, "TORQUE ASSIST SYSTEM : System Description"</a> .	ASSIST
ASSIST PERMIT (EPS)	Engine speed: Idle	Steering wheel: Not being turned	PERMIT
		Steering wheel: Being turned	INHIBIT
ASSIST PERMIT (TM)	Starting the engine and accelerating the speed after restarting from idling stop	CVT rock-up ON	PERMIT
		Except above	INHIBIT
ASSIST PERMIT (PEDAL)	Ignition switch: ON	Accelerator pedal: Adjust the pedal angle to the range between 1/8 and 8/3	PERMIT
		Accelerator pedal: Except above	INHIBIT
ASSIST PERMIT (MAIN BAT)	Engine: Cranking by ignition switch.	Main battery: More than 7.0–8.0 V	PERMIT
		Main battery: Less than 7.0–8.0 V	INHIBIT
ASSIST PERMIT (SUB-BAT)	Ignition switch: ON	Sub battery: More than 12.0–12.5 V	PERMIT
		Sub battery: 12.0–12.5 V	INHIBIT
ASSIST PERMIT (SUB/B CHG)	Ignition switch: ON	Fully charged	PERMIT
		Except above	INHIBIT
ASSIST PERMIT (MAIN/B CHG)	Ignition switch: ON	Fully charged	PERMIT
		Except above	INHIBIT

# ECM

## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

Monitor Item	Condition		Values/Status
ASSIST STATUS	Starting the engine and accelerating the speed after restarting from idling stop	When torque assist is activated <b>NOTE:</b> For details of torque assist operation condition. Refer to <a href="#">HBC-12. "TORQUE ASSIST SYSTEM : System Description"</a> .	ASSIST
		Except above	NON
SUB-BATTERY STATUS	Engine speed: Idle	Sub battery output is normal	OK
		Sub battery output is abnormal	NG
SUB-BATTERY TEMP SENSOR	Engine: After warming up		Approx. 2.0 V
SUB-BATTERY VOLTAGE	Ignition switch: ON		11 – 14 V
CMLTV S/BAT DISCHG CRNT	Ignition switch: ON		Indicates cumulative sub battery discharge current.
S/STR&GENRTR OPER CNTR	Ignition switch: ON		Displays the total number of activations of sub starter & generator
SUB-BAT CURRENT SEN V	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• Sub battery: Fully charged*<sup>3</sup></li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>		Approx. 2,600 – 3,500 mV
ENG SPEED	Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See this item in "DATA MONITOR (SPEC)" mode with CONSULT.		
B/FUEL SCHDL	See this item in "DATA MONITOR (SPEC)" mode with CONSULT.		
A/F ALPHA-B1	See this item in "DATA MONITOR (SPEC)" mode with CONSULT.		
COOLANT TEMP/S	Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V
HO2S2 (B1)	<ul style="list-style-type: none"> <li>• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 MNTR(B1)	<ul style="list-style-type: none"> <li>• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		LEAN ↔ RICH
VHCL SPEED SE	Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 - 4.7 V
		Accelerator pedal: Fully depressed	1.95 - 2.4 V

# ECM

## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

Monitor Item	Condition		Values/Status
TP SEN 1-B1	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Selector lever: D</li> </ul>	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1*	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Selector lever: D</li> </ul>	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
START SIGNAL	Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	Engine: After warming up, idle the engine	A/C switch: OFF	OFF
		A/C switch: ON (Compressor operates.)	ON
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
IGN TIMING	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Selector lever: P or N</li> <li>A/C switch: OFF</li> <li>No load</li> </ul>	Idle	5° - 15° BTDC
		2,000 rpm	30° - 50° BTDC
COMBUSTION	—		These items are displayed but are not applicable to this model.
CAL/LD VALUE	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Selector lever: P or N</li> <li>A/C switch: OFF</li> <li>No load</li> </ul>	Idle	5 - 35%
		2,500 rpm	5 - 35%
MASS AIRFLOW	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Selector lever: P or N</li> <li>A/C switch: OFF</li> <li>No load</li> </ul>	Idle	1.0 – 5.0 g/s
		2,500 rpm	2.0 – 10.0 g/s
PURG VOL C/V	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Selector lever: P or N</li> <li>A/C switch: OFF</li> <li>No load</li> </ul>	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	1 %
		2,000 rpm	1 – 90 %

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# ECM

## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

Monitor Item	Condition		Values/Status
INT/V TIM(B1)	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	-5 - 5 °CA
		2,000 rpm	Approx. 0 - 20 °CA
EXH/V TIM B1	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	-5 - 5 °CA
		Around 2,500 rpm while the engine speed is rising	Approx. 0 - 30 °CA
INT/V SOL(B1)	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	0 %
		2,000 rpm	Approx. 0 - 90 %
SWRL CONT S/V*2	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	ON
		4,000 rpm	OFF
VTC DTY EX B1	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	0 - 2 %
		Around 2,000 rpm while the engine speed is rising	Approx. 0 - 90 %
AIR COND RLY	Engine: After warming up, idle the engine	A/C switch: OFF	OFF
		A/C switch: ON (Compressor operates)	ON
FUEL PUMP RLY	<ul style="list-style-type: none"> <li>• For 1 seconds after turning ignition switch: ON</li> <li>• Engine running or cranking</li> </ul>		ON
	Except above		OFF
THRTL RELAY	Ignition switch: ON		ON
HO2S2 HTR (B1)	<ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		ON
	Engine speed: Above 3,600 rpm		OFF
ALT DUTY SIG	Power generation voltage variable control: Operating		ON
	Power generation voltage variable control: Not operating		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 65,535 km (0 - 40,723 miles)
A/F LRN CNTR B1	<b>NOTE:</b> The item is indicated, but not used.		—
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F S1 HTR(B1)	Engine: After warming up, idle the engine (More than 260 seconds after starting engine)		4 - 100%
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication

# ECM

## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

Monitor Item	Condition		Values/Status
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (Brake pedal position switch)	Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	Ignition switch: ON		NON
LO SPEED CUT	Ignition switch: ON		NON
AT OD MONITOR	Ignition switch: ON		OFF
AT OD CANCEL	Ignition switch: ON		OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	<ul style="list-style-type: none"> <li>• MAIN switch: ON</li> <li>• When vehicle speed is between 40 km/h (25 MPH) and 194 km/h (120 MPH)</li> </ul>	ASCD: Operating	ON
		ASCD: Not operating	OFF
FAN DUTY	Engine: After warming up		0 - 100%
AC EVA TEMP	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• A/C switch: ON</li> </ul>	Indicates A/C evaporator temperature sent from "A/C auto amp."	
AC EVA TARGET	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• A/C switch: ON</li> </ul>	Indicates target A/C evaporator temperature sent from "A/C auto amp."	
ALT DUTY	Engine speed: Idle		0 - 80%
BAT CUR SEN	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• Battery: Fully charged*2</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>		Approx. 2,600 - 3,500 mV
A/F ADJ-B1	Engine: Running		-0.450 - 0.330
P/N POSI SW	Ignition switch: ON	Selector lever: P or N	ON
		Selector lever: Except above	OFF
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature
AC PRESS SEN	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• Both A/C switch and blower fan switch: ON (Compressor operates)</li> </ul>		1.0 - 4.0 V

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## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

Monitor Item	Condition		Values/Status
FUEL PRES SEN	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	Approx. 2.74 MPa
		2,000 rpm	Approx. 3.0 MPa
FUEL INJ TIM	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	Approx. 30 BTDC
		2,000 rpm	Approx. 30 BTDC
ATOM PRES SEN	Ignition switch: ON		3.15 - 4.60 V <sup>4</sup>
FUEL INJ B1	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	Approx. 0.8 msec
		2,000 rpm	Approx. 1.1 msec
BRAKE BST PRES SE	Constant values are always displayed.		
FPCM	Ignition switch: ON		OFF
	For 1 seconds after turning ignition switch: ON		LOW
	After warming up, idle the engine		MID
	Engine: cranking		HI
BAT TEMP SEN	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	Indicates the temperature around the battery.
FUEL PUMP DUTY	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	60 – 70
THRTL STK CNT B1	<b>NOTE:</b> The item is indicated, but not used.		—
H/P FUEL PUMP DEG	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	Approx. 255 - 275 deg
		2,000 rpm	Approx. 255 - 275 deg
FUEL PRES SEN V	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	Approx. 820 – 1,140 mV
		Revvng engine from idle to 4,000 rpm quickly	Approx. 820 – 2,900 mV
EOP SENSOR	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Selector lever: P or N</li> <li>• A/C switch: OFF</li> <li>• No load</li> </ul>	Idle	Approx. 1,450 mV
		2,000 rpm	Approx. 2,850 mV
ECM TEMP 1	<ul style="list-style-type: none"> <li>• Engine: After cooling</li> <li>• Ignition switch: ON</li> </ul>		Indicates the temperature around the ECM.
ECM TEMP 2	<ul style="list-style-type: none"> <li>• Engine: After cooling</li> <li>• Ignition switch: ON</li> </ul>		Indicates the temperature around the ECM.
ALT SPEED	Engine speed: Idle		More than 1,300 rpm
ALT TEMP	<b>NOTE:</b> The item is indicated, but not used.		—
TRGT ALT VLTG	Engine speed: Idle		Indicates sub starter & generator power generation target value corresponding to the electric load.
ALT OVRVLTG	Engine speed: Idle	Normal	NDTCT
		Detected malfunction	DTCT

# ECM

## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

Monitor Item	Condition	Values/Status	
OVRTM EXCT	<b>NOTE:</b> The item is indicated, but not used.	—	
STRT SSPND MODE	Engine speed: Idle	OFF	
GNRT SSPND MODE	Engine speed: Idle	OFF	
GNRT RSTRCT MODE	Engine speed: Idle	OFF	
AT STOP START SW	Ignition switch: ON	Idling OFF switch: ON (Indicator lamp: ON)	ON
		Idling OFF switch: OFF (Indicator lamp: OFF)	OFF
BATTERY STS	Engine speed: Idle	Main battery output is normal	OK
		Main battery output is abnormal	NG
CML B/DCHG CRNT	Ignition switch: ON	Indicates cumulative main battery discharge current.	
A/F SEN1 DIAG2(B1)	<b>NOTE:</b> The item is indicated, but not used.	—	

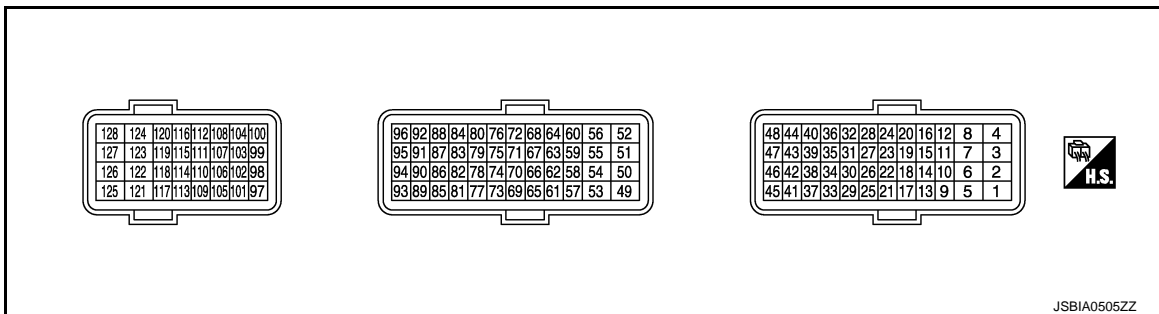
\*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

\*2: This item indicates the tumble control valve.

\*3: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-91, "How to Handle Battery"](#).

\*4: Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.

### TERMINAL LAYOUT

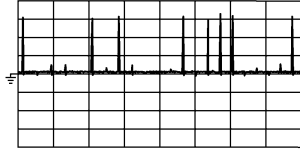
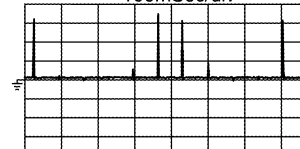
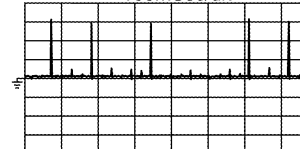
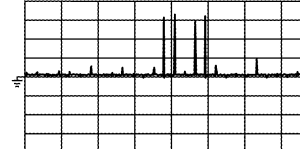


### PHYSICAL VALUES

**NOTE:**

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

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
1 (B)	—	ECM ground (Fuel injector)	—	—	—
2 (B)	—	ECM ground (Fuel injector)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
3 (G)	1 (B)	Fuel injector No. 1, 4 (HI)	Output	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 100mSec/div  20V/div JPBIA4719ZZ
		Fuel injector No. 2, 3 (HI)		[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 100mSec/div  20V/div JPBIA4719ZZ
5 (R)  6 (L)  7 (W)  8 (B)	1 (B)	Fuel injector No. 1 (LO)	Output	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 100mSec/div  20V/div JPBIA4720ZZ
		Fuel injector No. 2 (LO)			
		Fuel injector No. 3 (LO)		[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 100mSec/div  20V/div JPBIA4721ZZ
		Fuel injector No. 4 (LO)			
9 (LG)	—	Sensor ground (Mass air flow sensor, intake air temperature sensor)	—	—	—
10 (P)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
11 (BG)	—	Sensor ground (Engine oil temperature sensor)	—	—	—
12 (P)	—	Sensor ground (Refrigerant pressure sensor, brake booster pressure sensor)	—	—	—

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< ECU DIAGNOSIS INFORMATION >

[MR20DD]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
13 (SB)	9 (LG)	Mass air flow sensor	Input	[Ignition switch: ON] • Engine stopped	0.4 V
				[Engine is running] • Warm-up condition • Idle speed	0.7 - 1.2 V
				[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	0.7 - 1.2 to 2.4 V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
14 (BR)	10 (P)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
16 (Y)	12 (P)	Brake booster pressure sensor	Input	[Engine is running] • Idle speed • Brake pedal: Fully released	1.25 V
				[Engine is running] • Idle speed • Brake pedal: Slightly depressed	1.5 V
17 (V)	9 (LG)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
18 (G)	44 (R)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.82 - 1.14 V
				[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	0.82 - 2.9 V
19 (R)	12 (P)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0 V
20 (GR)	87 (W)	Sub battery current sensor	Input	[Engine is running] • Sub battery: Fully charged* • Idle speed	2.6 - 3.5 V
21 (B)	128 (B)	A/F sensor 1	Input	[Ignition switch: ON]	2.2 V
22 (G)	11 (BG)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
23 (BR)	12 (P)	Sensor power supply (Refrigerant pressure sensor, brake booster pressure sensor)	—	[Ignition switch: ON]	5.0 V
24 (B)	31 (R)	Sensor power supply (Crankshaft position sensor 2)	—	[Ignition switch: ON]	5.0 V
25 (W)	128 (B)	A/F sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
26 (LG)	87 (W)	Sub battery temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with sub battery temperature.

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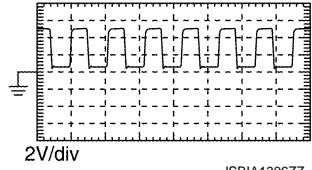
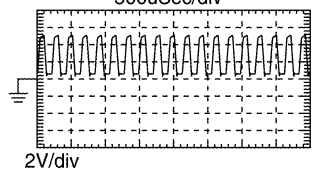
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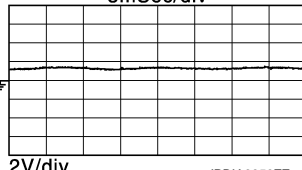
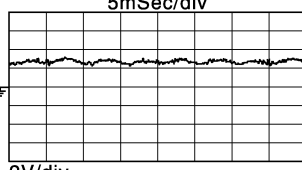
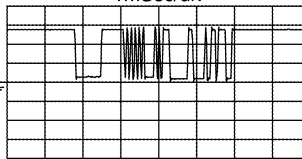
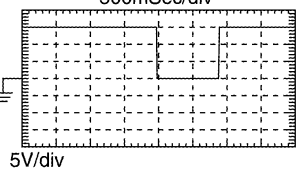
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
27 (W)	31 (R)	Crankshaft position sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	4.0 V★ 500uSec/div  2V/div JSBIA1306ZZ
				[Engine is running] • Engine speed is 2,000 rpm	4.0 V★ 500uSec/div  2V/div JSBIA1307ZZ
28 (SB)	128 (B)	Idling stop OFF switch	Input	[Engine is running] • Idling stop OFF switch: OFF	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Idling stop OFF switch: Press (ON)	BATTERY VOLTAGE (11 - 14 V) ↓ 0 V ↓ BATTERY VOLTAGE (11 - 14 V)
29 (Y)	33 (B)	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
31 (R)	—	Sensor ground (Crankshaft position sensor 2)	—	—	—
33 (B)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
35 (—)	—	Sensor ground (Knock sensor)	—	—	—
36 (W)	35 (—)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
38 (B)	—	Shield	—	—	—
39 (Y)	44 (SB)	Sensor power supply (Fuel rail pressure sensor, Atmospheric pressure sensor, engine oil pressure sensor, sub battery current sensor)	—	[Ignition switch: ON]	5.0 V
41 (BR)	128 (B)	Power supply for ECM 2	Input	[Ignition switch: ON]	SUB BATTERY VOLTAGE (11 - 14 V)


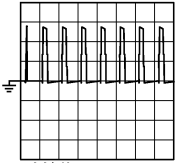
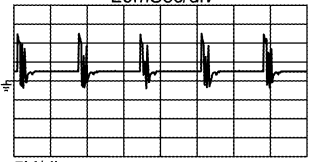

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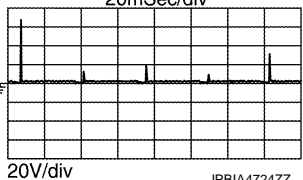
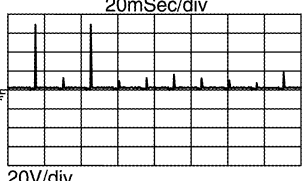
## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
42 (W)	44 (R)	Atmospheric pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V Output voltage varies with atmospheric pressure.
43 (GR)	44 (R)	Engine oil pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.3 V★ 5mSec/div 
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	2.7 V★ 5mSec/div 
44 (R)	—	Sensor ground (Fuel rail pressure sensor, atmospheric pressure sensor, engine oil pressure sensor)	—	—	—
46 (L)	128 (B)	Engine communication line	Input/ Output	[Ignition switch: ON]	12 V★ 1mSec/div 
48 (R)	128 (B)	Sub starter drive signal	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Idling stop operating] • When restart (During sub starter & generator operate)	0 V★ 500mSec/div  (Sub starter & generator operating)
49 (P)	1 (B)	Fuel injector driver power supply 1	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
50 (B)	—	ECM ground (High pressure fuel pump)	—	—	—

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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
51 (R)	128 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	3.2 V★ 1mSec/div  5V/div JMBIA0324GB
52 (L)	128 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	1.8 V★ 5mSec/div  5V/div JMBIA0326GB
53 (L)	1 (B)	Fuel injector driver power supply 2	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
54 (SB)	50 (B)	High pressure fuel pump driver power supply	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
55 (W)	50 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div  5V/div JPBIA4722ZZ
				[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div  5V/div JPBIA4723ZZ

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
56 (B)	128 (B)	High pressure fuel pump (LO)	Output	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div  20V/div JPBIA4724ZZ
				[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 20mSec/div  20V/div JPBIA4725ZZ
57 (G)	128 (B)	Tumble control valve (Close)	Output	[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • No load • Engine speed: When lowered engine for idol speed from 3,000 rpm (Accelerator pedal is Fully released)	0 V ↓ Battery voltage (11 - 14 V) ↓ 0 V
58 (W)	60 (B)	Sensor power supply [Crankshaft position sensor 1 (POS)]	—	[Ignition switch: ON]	5 V
59 (W)	—	Sensor ground [Camshaft position sensor (PHASE), exhaust valve timing control position sensor]	—	—	—
60 (B)	—	Sensor ground [Crankshaft position sensor 1 (POS)]	—	—	—
61 (Y)	128 (B)	Tumble control valve (Open)	Output	[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • No load • Engine speed: When revving engine up to 3,000rpm	0 V ↓ Battery voltage (11 - 14 V) ↓ 0 V
62 (R)	74 (B)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V

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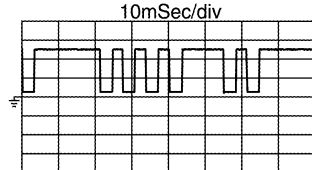
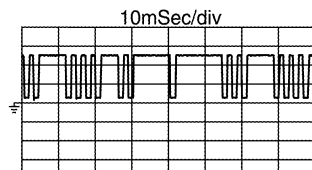

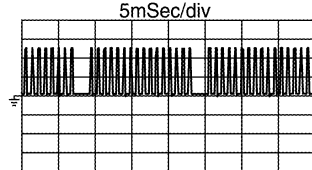
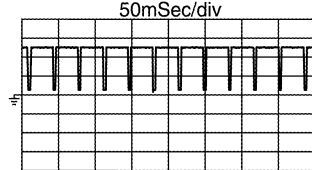
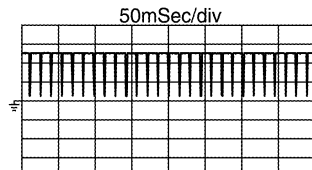
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## < ECU DIAGNOSIS INFORMATION >

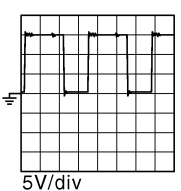
[MR20DD]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
63 (R)	59 (W)	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	1.0 - 2.0★ 10mSec/div  2V/div JPBIA4726ZZ
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div  2V/div JPBIA4727ZZ
64 (R)	60 (B)	Crankshaft position sensor 1 (POS)	Input	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	4.0 V★ 5mSec/div  2V/div JPBIA4728ZZ
				[Engine is running] • Engine speed: 2,000 rpm	4.0 V★ 5mSec/div  2V/div JPBIA4729ZZ
65 (BR)	128 (B)	Tumble control valve power supply	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
67 (L)	59 (W)	Exhaust valve timing control position sensor	Input	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	1.0 - 2.0★ 50mSec/div  2V/div JPBIA4730ZZ
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 50mSec/div  2V/div JPBIA4731ZZ
68 (LG)	87 (W)	Sensor power supply (Main battery current sensor)	—	[Ignition switch: ON]	5 V

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## < ECU DIAGNOSIS INFORMATION >

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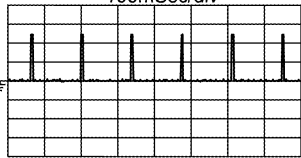
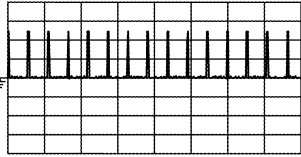
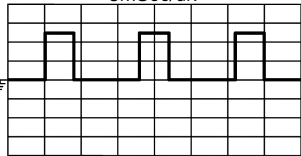
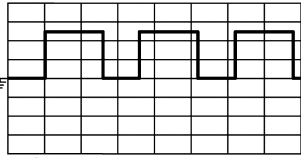
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
71 (Y)	128 (B)	Sub battery relay 1	Output	[Ignition switch: ON] • Engine stopped	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Idle speed	1.0 - 1.2 V <sup>2</sup>
72 (B)	59 (W)	Sensor power supply [Camshaft position sensor (PHASE), exhaust valve timing control position sensor]	—	[Ignition switch: ON]	5 V
74 (B)	—	Sensor ground (Throttle position sensor 1, 2)	—	—	—
75 (G)	74 (B)	Throttle position sensor 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 de- pressed	Less than 4.75 V
76 (W)	74 (B)	Throttle position sensor 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 de- pressed	More than 0.36 V
77 (V)	128 (B)	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON]	0 - 1.0 V
78 (BG)	128 (B)	Sub battery relay 2	Output	[Ignition switch: ON] • Engine stopped	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Idle speed	1.0 - 1.2 V <sup>2</sup>
79 (SB)	87 (W)	Main battery temperature sensor	Input	[Engine is running] • Battery temperature: 25°C (°F) • Idle speed	3.3 V
80 (P)	87 (W)	Main battery current sensor	Input	[Engine is running] • Battery: Fully charged* • Idle speed	2.6 - 3.5 V
81 (G)	128 (B)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • When revving engine up to 2,000rpm Quickly	BATTERY VOLTAGE (11 - 14 V) ★  

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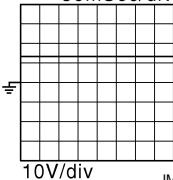
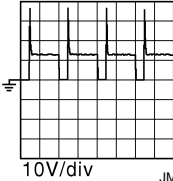
[MR20DD]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)	
+	-	Signal name	Input/ Output			
82 (P)	128 (B)	Ignition signal No. 1	Output	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	0 - 0.3 V★ 100mSec/div  2V/div JPBIA4733ZZ	
86 (LG)		Ignition signal No. 2			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.2 - 0.5 V★ 100mSec/div  2V/div JPBIA4734ZZ
90 (Y)		Ignition signal No. 3				
94 (SB)		Ignition signal No. 4				
85 (GR)	128 (B)	Exhaust valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0 V	
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)	
87 (BW)	—	Sensor ground (Main battery current sensor, main battery temperature sensor, sub battery current sensor, sub battery temperature sensor)	—	—	—	
91 (L)	128 (B)	FPCM	Output	[Ignition switch: ON] For 1 second after turning ignition switch ON	1.6 V★ 5mSec/div  2V/div JPBIA4951ZZ	
				[When cranking engine]	5 V	
				[Engine is running] • Warm-up condition • Idle speed	3.3 V★ 5mSec/div  2V/div JPBIA4950ZZ	

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## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
95 (BG)	128 (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) ★ 50mSec/div  10V/div JMBIA0327GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	10 V ★ 50mSec/div  10V/div JMBIA0328GB
96 (GR)	128 (B)	FPCM check	Input	[Engine is running] • Warm-up condition • Idle speed	8 - 13.5 V
99 (P)	—	CAN communication line (CAN-L)	Input/ Output	—	—
100 (L)	—	CAN communication line (CAN-H)	Input/ Output	—	—
101 (V)	105 (B)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
102 (W)	105 (B)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
103 (V)	128 (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
104 (Y)	128 (B)	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT or GST: Disconnected	10.5 V
105 (B)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
106 (BR)	128 (B)	Power supply for ECM (Backup)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
109 (LG)	128 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

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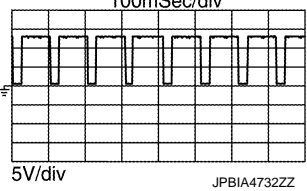
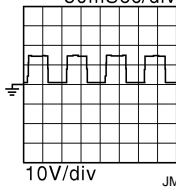
[MR20DD]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
110 (GR)	111 (B)	ASCSD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4.0 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1.0 V
				[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3.0 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2.0 V
111 (B)	—	Sensor ground (ASCSD steering switch)	—	—	—
112 (P)	128 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning igni- tion switch OFF	0 - 1.0 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
115 (V)	128 (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)
116 (GR)	128 (B)	ASCSD brake switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
117 (R)	128 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
118 (SB)	120 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
119 (Y)	120 (B)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully de- pressed	1.95 - 2.4 V
120 (B)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
121 (G)	128 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
122 (W)	128 (B)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
123 (B)	—	ECM ground	—	—	—

# ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
124 (B)	—	ECM ground	—	—	—
125 (Y)	128 (B)	A/F sensor 1 heater	Input	[Engine is running] <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed (More than 260 seconds after starting engine)</li> </ul>	2.9 - 8.8 V★ 
126 (SB)	33 (B)	Heated oxygen sensor 2 heater	Output	[Engine is running] <ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>- Engine: after warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	10 V★ 
				[Ignition switch: ON] <ul style="list-style-type: none"> <li>• Engine stopped</li> <li>[Engine is running]</li> <li>• Engine speed: Above 3,600 rpm</li> </ul>	BATTERY VOLTAGE (11 - 14 V)
127 (B)	—	ECM ground	—	—	—
128 (B)	—	ECM ground	—	—	—

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

\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [PG-91. "How to Handle Battery"](#).

## Fail-safe

INFOID:000000008758327

## NON DTC RELATED ITEM

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

## DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.	
P0014	Exhaust valve timing control	The signal is not energized to the exhaust valve timing control magnet retarder and the magnet retarder control does not function.	
P0087 P0090	FRP control system	Engine torque is limited or engine speed is limited.	
P0088		Engine speed is limited.	
P0101 P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following conditions. CONSULT displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		Approx. 4 minutes or more after engine starting	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P0190	FRP sensor	<ul style="list-style-type: none"> <li>Engine speed is limited.</li> <li>High pressure fuel pump is activated at maximum discharge pressure.</li> </ul>	
P0197 P0198	Engine oil temperature sensor	Exhaust valve timing control does not function.	
P0201 P0202 P0203 P0204	Injector	<ul style="list-style-type: none"> <li>Engine torque is limited.</li> <li>Fuel injection shut-off of malfunction cylinder.</li> <li>Mixture ratio feedback control does not function.</li> <li>Idle engine speed is increased.</li> </ul>	
P0500	Vehicle speed sensor	The cooling fan operates (Highest) while engine is running.	
P0524	Engine oil pressure	<ul style="list-style-type: none"> <li>ECM illuminates oil pressure warning lamp on the combination meter.</li> <li>Engine speed will not rise more than 4,000rpm due to the fuel cut.</li> <li>Fail-safe is canceled when ignition switch OFF → ON.</li> </ul>	
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P0607		Engine speed will not rise more than 3,500 rpm due to the fuel cut.	
P062B		<ul style="list-style-type: none"> <li>Engine torque is limited.</li> <li>Idle engine speed is increased.</li> <li>Fuel injector power supply shut-off.</li> <li>High fuel pressure limitation.</li> </ul>	
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1197	Out of gas	Engine torque is limited.	

# ECM

## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

DTC No.	Detected items	Engine operating condition in fail-safe mode	
		Vehicle condition	Driving condition
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
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2118	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	
		(When throttle valve opening angle in fail safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.	
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in the Neutral position, and engine speed will not exceed 1,000 rpm or more.	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	

## IDLING STOP SYSTEM

DTC No.	Detected items	Idling stop system operating condition in fail-safe mode		
		Idling or driving the vehicle	Idling stop system operating	
			Stop	Restart
B1910 B1911	Sub battery relay	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P0011	Intake valve timing control	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P0014	Exhaust valve timing control	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P0037 P0038	Heated oxygen sensor 2 heater control	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0075	Intake valve timing control solenoid valve	Prohibit the idling stop system operation	Restart the engine	—
P0078	Exhaust valve timing control solenoid valve	Prohibit the idling stop system operation	Restart the engine	—
P0087 P0088 P0090	Fuel rail pressure control system	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time

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< ECU DIAGNOSIS INFORMATION >

[MR20DD]

DTC No.	Detected items	Idling stop system operating condition in fail-safe mode		
		Idling or driving the vehicle	Idling stop system operating	
			Stop	Restart
P0101 P0102 P0103	Mass air flow sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0107 P0108	Atmospheric pressure sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0112 P0113	Intake air temperature sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0117 P0118	Engine coolant temperature sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0171 P0172	Fuel injection system	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P0190	Fuel rail pressure sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0201 P0202 P0203 P0204	Fuel injector	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0300 P0301 P0302 P0303	Misfire	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P0335	Crankshaft position sensor 1	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P0340	Camshaft position sensor	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P0385 P0386	Crankshaft position sensor 2	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0500	Vehicle speed	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0555	Brake booster pressure sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0603	ECM	Prohibit the idling stop system operation	—	—
P0605			Restart the engine	Prohibit the idling stop system operation from the next time
P0607			—	Prohibit the idling stop system operation from the next time

DTC No.	Detected items	Idling stop system operating condition in fail-safe mode		
		Idling or driving the vehicle	Idling stop system operating	
			Stop	Restart
P0620 P065B P0A1E P0A8F	Sub starter & generator	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0643	Sensor power supply	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P0850	Transmission range switch	Prohibit the idling stop system operation	—	—
P1078	Exhaust valve timing control position sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P1217	Engine over temperature	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P1513	Sub starter & generator operation count	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P1540 P1543 P1544	Sub battery current sensor	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P1541 P1542			Restart the engine	
P1546 P1547	Sub battery temperature sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P1550 P1553 P1554	Main battery current sensor	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P1551 P1552			Restart the engine	
P1556 P1557	Main battery temperature sensor	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P1575 P1805	Brake switch	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P2100	Throttle control motor relay	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P2103			Restart the engine	Prohibit the idling stop system operation from the next time
P2101 P2119	Electric throttle control function	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
P2118	Throttle control motor	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	Prohibit the idling stop system operation	—	Prohibit the idling stop system operation from the next time

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DTC No.	Detected items	Idling stop system operating condition in fail-safe mode		
		Idling or driving the vehicle	Idling stop system operating	
			Stop	Restart
U0120	Engine communication line	Prohibit the idling stop system operation	Restart the engine	—
U1040 U1044		Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time
U1041				Prohibit the idling stop system operation from the next time
U1001	CAN communication line	Prohibit the idling stop system operation	Restart the engine	Prohibit the idling stop system operation from the next time

## DTC Inspection Priority Chart

INFOID:000000008758328

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

Priority	Detected items (DTC)	
1	U0101, U1001	CAN communication line
	P0101, P0102, P0103	Mas air flow sensor
	P0107, P0108	Atmospheric pressure sensor
	P0112, P0113	Intake air temperature sensor
	P0117, P0118	Engine coolant temperature sensor
	P0122, P0123, P0222, P0223, P1225, P1226, P2135	Throttle position sensor
	P0197, P0198	Engine oil temperature sensor
	P0327, P0328	Knock sensor
	P0335	Crankshaft position sensor 1
	P0340	Camshaft position sensor
	P0500	Vehicle speed sensor
	P0520	Engine oil pressure sensor
	P0605, P0607, P0611, P062B	ECM
	P0620, P065B, P0A1E, P0A8F	Sub starter & generator
	P0643	Sensor power supply
	P0850	Park/neutral position (PNP) switch
	P1197	Out of gas*
	P1220	Fuel pump control module (FPCM)
	P1540, P1541, P1542, P1543, P1544	Sub battery current sensor
	P1546, P1547	Sub battery temperature sensor
P1550, P1551, P1552, P1553, P1554	Main battery current sensor	
P1556, P1557	Main battery temperature sensor	
P1610 - P1615	Immobilizer	
P2122, P2123, P2127, P2128, P2138	Accelerator pedal position sensor	

Priority	Detected items (DTC)	
2	B1910, B1911	Sub battery relay
	P0031, P0032	Air fuel ratio (A/F) sensor 1 heater
	P0037, P0038	Heated oxygen sensor 2 heater
	P0075	Intake valve timing control solenoid valve
	P0078	Exhaust valve timing control solenoid valve
	P0130, P0131, P0132, P0133	Air fuel ratio (A/F) sensor 1
	P0137, P0138	Heated oxygen sensor 2
	P0385, P0386	Crankshaft position sensor 2
	P0444	EVAP canister purge volume control solenoid valve
	P0555	Brake booster pressure sensor
	P0603	ECM power supply
	P1078	Exhaust valve timing control position sensor
	P1217	Engine over temperature (Overheat)
	P1575, P1805	Brake switch
	P2008	Tumble control valve
	P2100, P2103	Throttle control motor relay
	P2101	Electric throttle control function
	P2118	Throttle control motor
3	P0011	Intake valve timing control
	P0014	Exhaust valve timing control
	P0087, P0088, P0090	Fuel rail pressure control
	P0171, P0172	Fuel injection system function
	P0201 - P0204	Fuel injector
	P0300 - P0304	Misfire
	P0420	Three way catalyst function
	P0506, P0507	Idle speed control system
	P0524	Engine oil pressure
	P1212	TCS communication line
	P1513	Sub starter & generator
	P1564	ASCD steering switch
	P1572	ASCD brake switch
	P1574	ASCD vehicle speed
	P2119	Electric throttle control actuator

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

## DTC Index

INFOID:0000000008758329

×: Applicable —: Not applicable

DTC <sup>*1</sup>		Items (CONSULT screen items)	Trip	MIL	Idling stop indicator lamp <sup>*4</sup>	SRT code	Reference
CONSULT <sup>*2</sup>	ECM <sup>*3</sup>						
U0101	0101 <sup>*5</sup>	LOST COMM (TCM)	2	—	×	—	<a href="#">EC-85</a>
U0120	0120 <sup>*5</sup>	STR/GEN C/M	2	—	×	—	<a href="#">EC-86</a>
U1001	1001 <sup>*5</sup>	CAN COMM CIRCUIT	2	—	×	—	<a href="#">EC-87</a>
U1040	1040 <sup>*5</sup>	ENG COMM CIRCUIT	2	—	×	—	<a href="#">EC-88</a>

## ECM

&lt; ECU DIAGNOSIS INFORMATION &gt;

[MR20DD]

DTC*1		Items (CONSULT screen items)	Trip	MIL	Idling stop indicator lamp*4	SRT code	Reference
CONSULT*2	ECM*3						
U1041	1041*5	STR/GEN C/M	2	—	×	—	<a href="#">EC-89</a>
U1044	1044*5	ENG COMM CIRCUIT	2	—	×	—	<a href="#">EC-90</a>
B1910	1910	SUB BATTERY RELAY	2	—	×	—	<a href="#">EC-91</a>
B1911	1911	SUB BATTERY RELAY	2	—	×	—	<a href="#">EC-92</a>
<b>P0000</b>	<b>0000</b>	<b>NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.</b>	—	Flashing	—	—	—
P0011	0011	INT/V TIM CONT-B1	2	×	×	×	<a href="#">EC-93</a>
P0014	0014	EXH/V TIM CONT-B1	2	×	×	—	<a href="#">EC-94</a>
P0031	0031	A/F SEN1 HTR (B1)	2	×	—	—	<a href="#">EC-95</a>
P0032	0032	A/F SEN1 HTR (B1)	2	×	—	—	<a href="#">EC-95</a>
P0037	0037	HO2 HTR (B1)	2	×	×	—	<a href="#">EC-96</a>
P0038	0038	HO2 HTR (B1)	2	×	×	—	<a href="#">EC-96</a>
P0075	0075	INT/V TIM V/CIR-B1	2	×	×	—	<a href="#">EC-97</a>
P0078	0078	EX V/T ACT/CIRC-B1	2	×	×	—	<a href="#">EC-98</a>
P0087	0087	LOW FUEL PRES	2	×	×	—	<a href="#">EC-99</a>
P0088	0088	HIGH FUEL PRES	2	×	×	—	<a href="#">EC-99</a>
P0090	0090	FUEL PUMP	2	×	×	—	<a href="#">EC-99</a>
P0101	0101	MAF SEN/CIRCUIT-B1	1	—	×	—	<a href="#">EC-100</a>
P0102	0102	MAF SEN/CIRCUIT-B1	1	×	×	—	<a href="#">EC-101</a>
P0103	0103	MAF SEN/CIRCUIT-B1	1	×	×	—	<a href="#">EC-101</a>
P0107	0107	ABSL PRES SEN/CIRC	2	×	×	—	<a href="#">EC-102</a>
P0108	0108	ABSL PRES SEN/CIRC	2	×	×	—	<a href="#">EC-102</a>
P0112	0112	IAT SEN/CIRCUIT-B1	2	×	×	—	<a href="#">EC-103</a>
P0113	0113	IAT SEN/CIRCUIT-B1	2	×	×	—	<a href="#">EC-103</a>
P0117	0117	ECT SEN/CIRC	2	×	×	—	<a href="#">EC-104</a>
P0118	0118	ECT SEN/CIRC	2	×	×	—	<a href="#">EC-104</a>
P0122	0122	TP SEN 2/CIRC-B1	1	×	×	—	<a href="#">EC-105</a>
P0123	0123	TP SEN 2/CIRC-B1	1	×	×	—	<a href="#">EC-105</a>
P0130	0130	A/F SENSOR1 (B1)	2	×	—	×	<a href="#">EC-106</a>
P0131	0131	A/F SENSOR1 (B1)	2	×	—	—	<a href="#">EC-107</a>
P0132	0132	A/F SENSOR1 (B1)	2	×	—	—	<a href="#">EC-108</a>
P0133	0133	A/F SENSOR1 (B1)	2	×	—	×	<a href="#">EC-109</a>
P0137	0137	HO2S2 (B1)	2	×	—	×	<a href="#">EC-110</a>
P0138	0138	HO2S2 (B1)	2	×	—	×	<a href="#">EC-111</a>
P0171	0171	FUEL SYS-LEAN-B1	2	×	×	—	<a href="#">EC-112</a>
P0172	0172	FUEL SYS-RICH-B1	2	×	×	—	<a href="#">EC-113</a>
P0190	0190	FUEL PRES SEN/CIRC	1	×	×	—	<a href="#">EC-114</a>
P0197	0197	EOT SEN/CIRC	2	×	—	—	<a href="#">EC-115</a>
P0198	0198	EOT SEN/CIRC	2	×	—	—	<a href="#">EC-115</a>
P0201	0201	INJECTOR CIRC-CYL1	2	×	×	—	<a href="#">EC-116</a>
P0202	0202	INJECTOR CIRC-CYL2	2	×	×	—	<a href="#">EC-116</a>
P0203	0203	INJECTOR CIRC-CYL3	2	×	×	—	<a href="#">EC-116</a>

# ECM

< ECU DIAGNOSIS INFORMATION >

[MR20DD]

DTC*1		Items (CONSULT screen items)	Trip	MIL	Idling stop indicator lamp*4	SRT code	Reference
CONSULT*2	ECM*3						
P0204	0204	INJECTOR CIRC-CYL4	2	×	×	—	<a href="#">EC-116</a>
P0222	0222	TP SEN 1/CIRC-B1	1	×	×	—	<a href="#">EC-117</a>
P0223	0223	TP SEN 1/CIRC-B1	1	×	×	—	<a href="#">EC-117</a>
P0300	0300	MULTI CYL MISFIRE	1 or 2	×	×	—	<a href="#">EC-118</a>
P0301	0301	CYL 1 MISFIRE	1 or 2	×	×	—	<a href="#">EC-118</a>
P0302	0302	CYL 2 MISFIRE	1 or 2	×	×	—	<a href="#">EC-118</a>
P0303	0303	CYL 3 MISFIRE	1 or 2	×	×	—	<a href="#">EC-118</a>
P0304	0304	CYL 4 MISFIRE	1 or 2	×	×	—	<a href="#">EC-118</a>
P0327	0327	KNOCK SEN/CIRC-B1	2	—	—	—	<a href="#">EC-119</a>
P0328	0328	KNOCK SEN/CIRC-B1	2	—	—	—	<a href="#">EC-119</a>
P0335	0335	CKP SEN/CIRCUIT	2	×	×	—	<a href="#">EC-120</a>
P0340	0340	CMP SEN/CIRC-B1	2	×	×	—	<a href="#">EC-121</a>
P0385	0385	CKP SEN/CIRCUIT B	2	—	×	—	<a href="#">EC-122</a>
P0386	0386	CKP SEN/CIRCUIT B	2	—	×	—	<a href="#">EC-123</a>
P0420	0420	TW CATALYST SYS-B1	2	×	—	×	<a href="#">EC-124</a>
P0444	0444	PURG VOLUME CONT/V	2	×	—	—	<a href="#">EC-125</a>
P0500*5	0500	VEHICLE SPEED SEN A	2	×	×	—	<a href="#">EC-126</a>
P0506	0506	ISC SYSTEM	2	—	—	—	<a href="#">EC-127</a>
P0507	0507	ISC SYSTEM	2	—	—	—	<a href="#">EC-128</a>
P0520	0520	EOP SENSOR/SWITCH	2	—	—	—	<a href="#">EC-129</a>
P0524	0524	ENGINE OIL PRESSURE	1	—	—	—	<a href="#">EC-130</a>
P0555	0555	BRAKE BSTR PRES SEN/CIRC	2	×	×	—	<a href="#">EC-131</a>
P0603	0603	ECM BACK UP/CIRCUIT	2	×	×	—	<a href="#">EC-132</a>
P0605	0605	ECM	1 or 2	×	×	—	<a href="#">EC-133</a>
P0607	0607	ECM	2	—	×	—	<a href="#">EC-134</a>
P0611	0611	FIC MODULE	2	—	—	—	<a href="#">EC-135</a>
P0620	0620	GENERATOR	2	—	×	—	<a href="#">EC-136</a>
P062B	062B	ECM	2	×	—	—	<a href="#">EC-137</a>
P0643	0643	SENSOR POWER/CIRC	1	×	×	—	<a href="#">EC-138</a>
P065B	065B	GENERATOR	2	—	×	—	<a href="#">EC-139</a>
P0850	0850	P-N POS SW/CIRCUIT	2	×	×	—	<a href="#">EC-140</a>
P0A1E	0A1E	STR/GEN C/M	2	—	×	—	<a href="#">EC-141</a>
P0A8F	0A8F	14V PWR MDL SYS	2	—	×	—	<a href="#">EC-142</a>
P1078	1078	EXH TIM SEN/CIRC-B1	2	×	×	—	<a href="#">EC-143</a>
P1197	1197	FUEL RUN OUT	2	—	—	—	<a href="#">EC-144</a>
P1212	1212	TCS/CIRC	2	—	—	—	<a href="#">EC-145</a>
P1217	1217	ENG OVER TEMP	1	×	×	—	<a href="#">EC-146</a>
P1225	1225	CTP LEARNING-B1	2	—	—	—	<a href="#">EC-147</a>
P1226	1226	CTP LEARNING-B1	2	—	—	—	<a href="#">EC-148</a>
P1513	1513	S/STR & GENERTR OPER COUN- TR	2	—	×	—	<a href="#">EC-149</a>
P1540	1540	BATTERY CURRENT SENSOR B	2	—	×	—	<a href="#">EC-150</a>
P1541	1541	BATTERY CURRENT SENSOR B	2	—	×	—	<a href="#">EC-151</a>

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## < ECU DIAGNOSIS INFORMATION >

[MR20DD]

DTC*1		Items (CONSULT screen items)	Trip	MIL	Idling stop indicator lamp*4	SRT code	Reference
CONSULT*2	ECM*3						
P1542	1542	BATTERY CURRENT SENSOR B	2	—	×	—	<a href="#">EC-151</a>
P1543	1543	BATTERY CURRENT SENSOR B	2	—	×	—	<a href="#">EC-152</a>
P1544	1544	BATTERY CURRENT SENSOR B	2	—	×	—	<a href="#">EC-153</a>
P1546	1546	BATTERY TEMPERATURE SENSOR B	2	—	×	—	<a href="#">EC-154</a>
P1547	1547	BATTERY TEMPERATURE SENSOR B	2	—	×	—	<a href="#">EC-154</a>
P1550	1550	BAT CURRENT SENSOR	2	—	×	—	<a href="#">EC-155</a>
P1551	1551	BAT CURRENT SENSOR	2	—	×	—	<a href="#">EC-156</a>
P1552	1552	BAT CURRENT SENSOR	2	—	×	—	<a href="#">EC-156</a>
P1553	1553	BAT CURRENT SENSOR	2	—	×	—	<a href="#">EC-157</a>
P1554	1554	BAT CURRENT SENSOR	2	—	×	—	<a href="#">EC-158</a>
P1556	1556	BAT TMP SEN/CIRC	2	—	×	—	<a href="#">EC-159</a>
P1557	1557	BAT TMP SEN/CIRC	2	—	×	—	<a href="#">EC-159</a>
P1564	1564	ASCD SW	1	—	—	—	<a href="#">EC-160</a>
P1572	1572	ASCD BRAKE SW	1	—	—	—	<a href="#">EC-161</a>
P1574	1574	ASCD VHL SPD SEN	1	—	—	—	<a href="#">EC-162</a>
P1575	1575	BRAKE SW	2	—	×	—	<a href="#">EC-163</a>
P1610	1610	LOCK MODE*7	2	—	—	—	—
P1611	1611	ID DISCORD, IMMU-ECM*7	2	—	—	—	—
P1612	1612	CHAIN OF ECM-IMMU*7	2	—	—	—	—
P1614	1614	CHAIN OF IMMU-KEY*7	2	—	—	—	—
P1615	1615	DIFFERENCE OF KEY*7	2	—	—	—	—
P1805	1805	BRAKE SW/CIRCUIT	1	×	×	—	<a href="#">EC-164</a>
P2008	2008	TUMBLE CONT/V	1	—	—	—	<a href="#">EC-165</a>
P2100	2100	ETC MOT PWR-B1	1	×	×	—	<a href="#">EC-166</a>
P2101	2101	ETC FNCTN/CIRC-B1	1	×	×	—	<a href="#">EC-167</a>
P2103	2103	ETC MOT PWR	1	×	×	—	<a href="#">EC-166</a>
P2118	2118	ETC MOT-B1	1	×	×	—	<a href="#">EC-168</a>
P2119	2119	ETC ACTR-B1	1	×	×	—	<a href="#">EC-169</a>
P2122	2122	APP SEN 1/CIRC	1	×	×	—	<a href="#">EC-170</a>
P2123	2123	APP SEN 1/CIRC	1	×	×	—	<a href="#">EC-170</a>
P2127	2127	APP SEN 2/CIRC	1	×	×	—	<a href="#">EC-171</a>
P2128	2128	APP SEN 2/CIRC	1	×	×	—	<a href="#">EC-171</a>
P2135	2135	TP SENSOR-B1	1	×	×	—	<a href="#">EC-172</a>
P2138	2138	APP SENSOR	1	×	×	—	<a href="#">EC-173</a>

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

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

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

\*4: The idling stop indicator lamp blinks in low speed when malfunction is detected.

\*5: The troubleshooting for this DTC needs CONSULT.

\*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

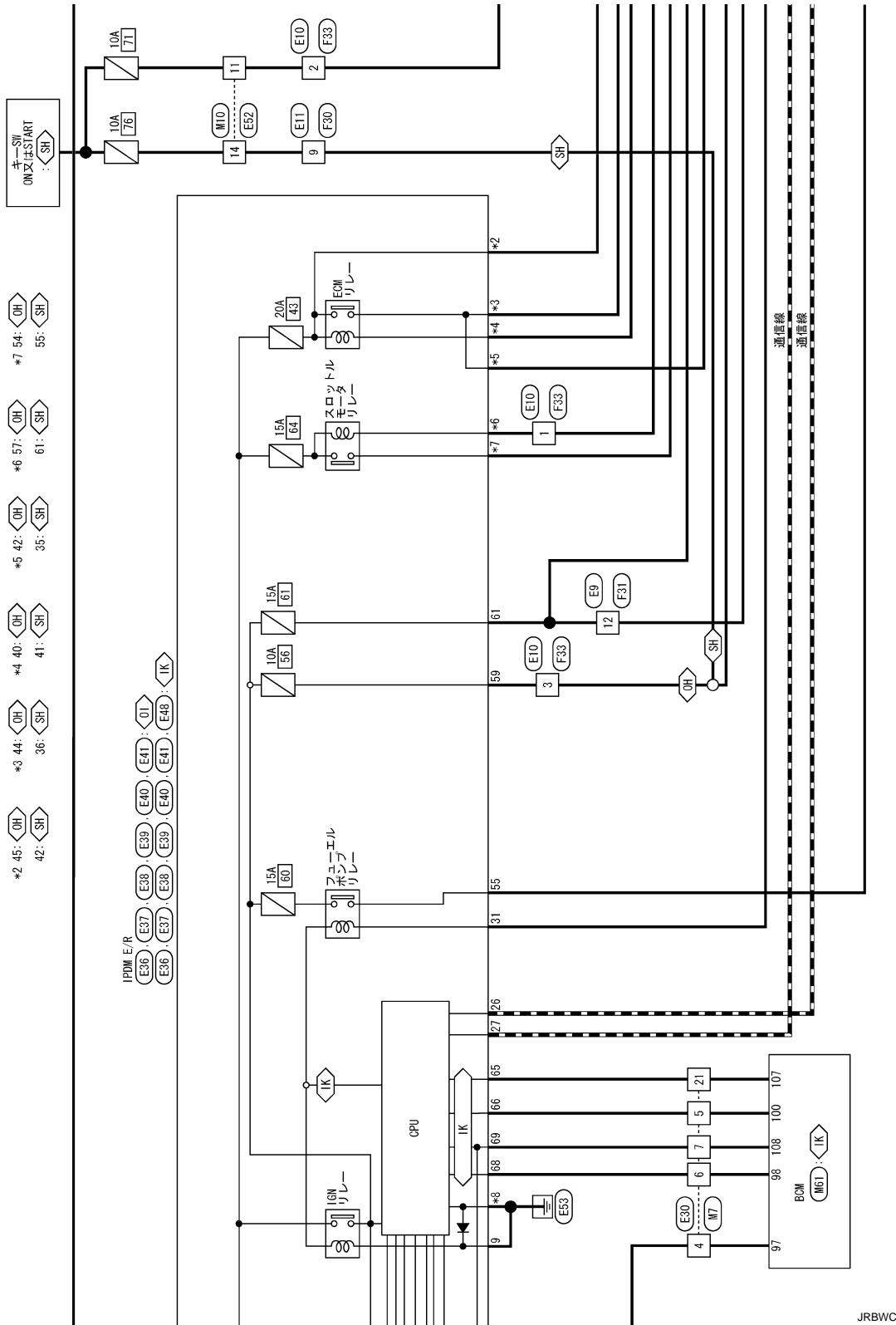
\*7: These DTC is DTC related to the immobilizer.



# ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[MR20DD]

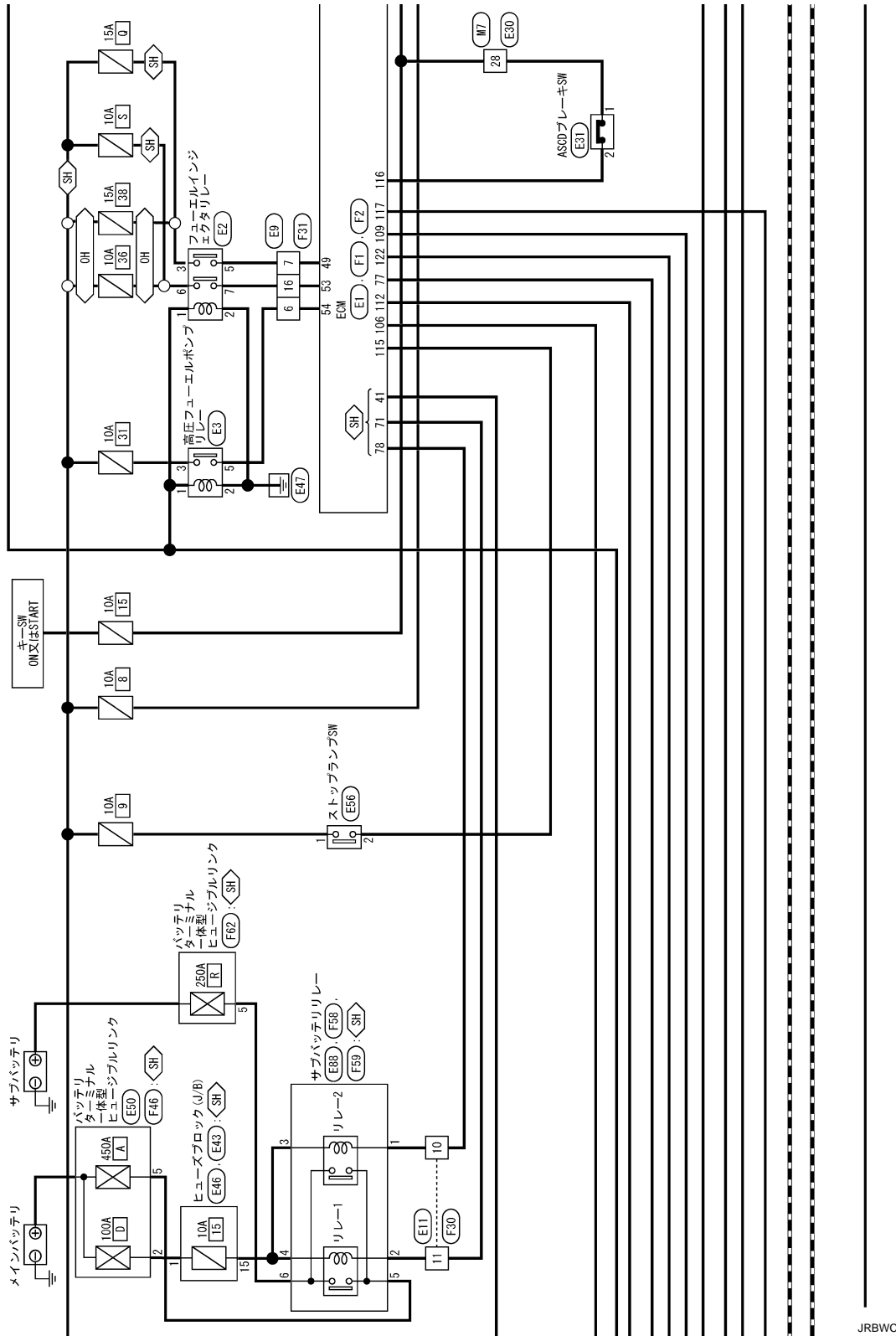


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# ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[MR20DD]



JRBWC1717JP

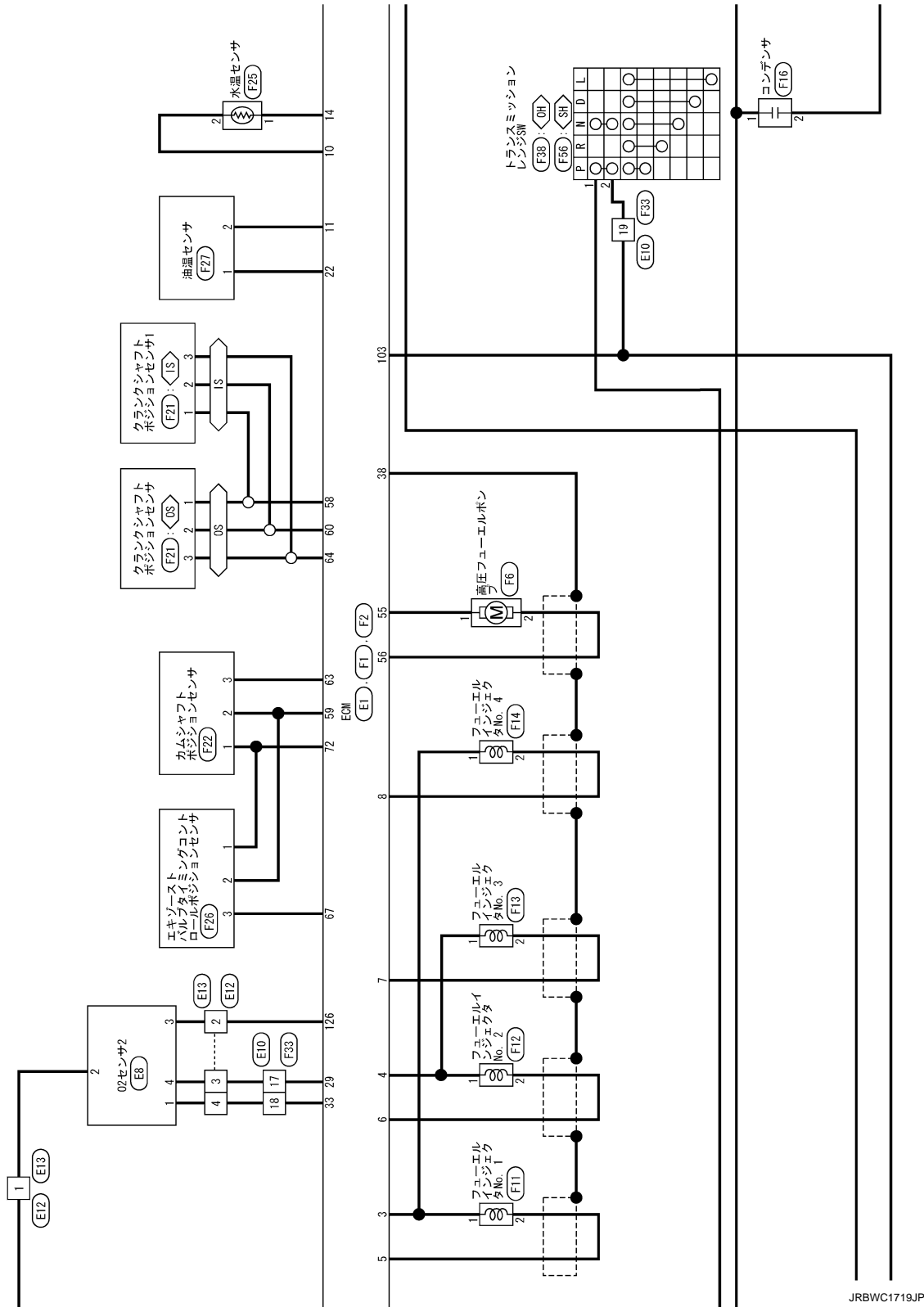
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# ENGINE CONTROL SYSTEM

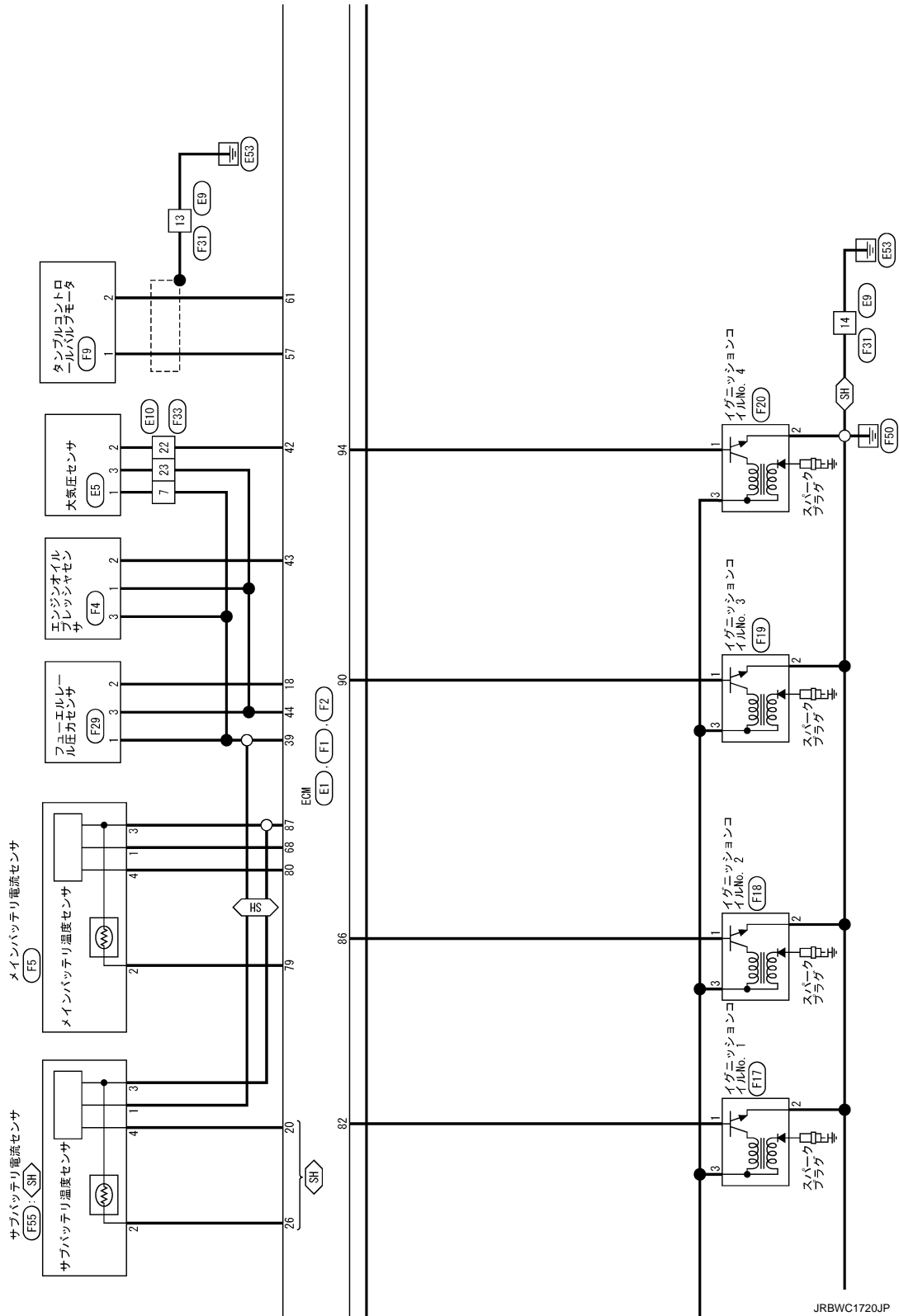
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[MR20DD]



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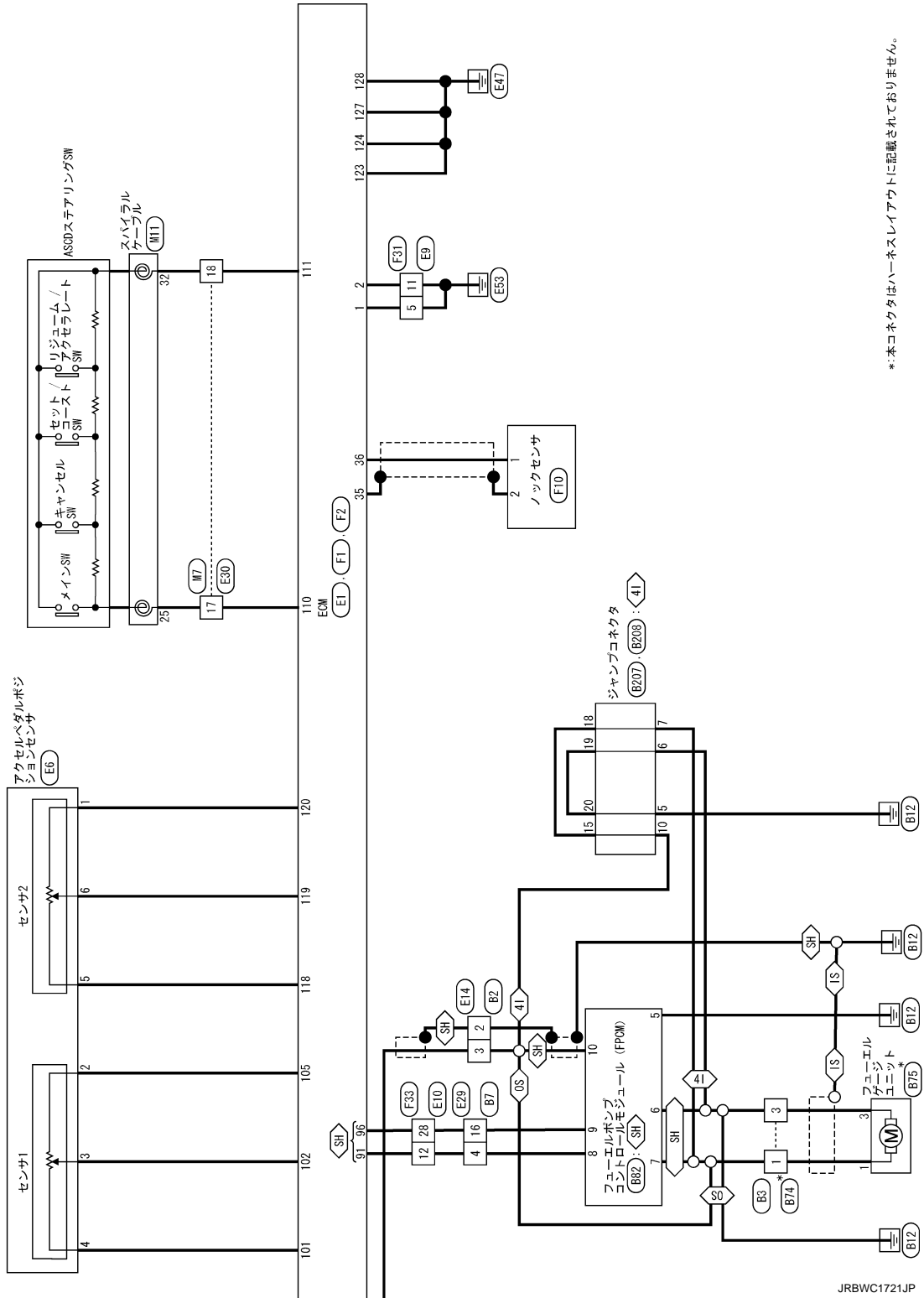
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# ENGINE CONTROL SYSTEM

< WIRING DIAGRAM >

[MR20DD]



JRBWC1721JP


\*:本コネクタはハーネスレイアウトに記載されておりません。

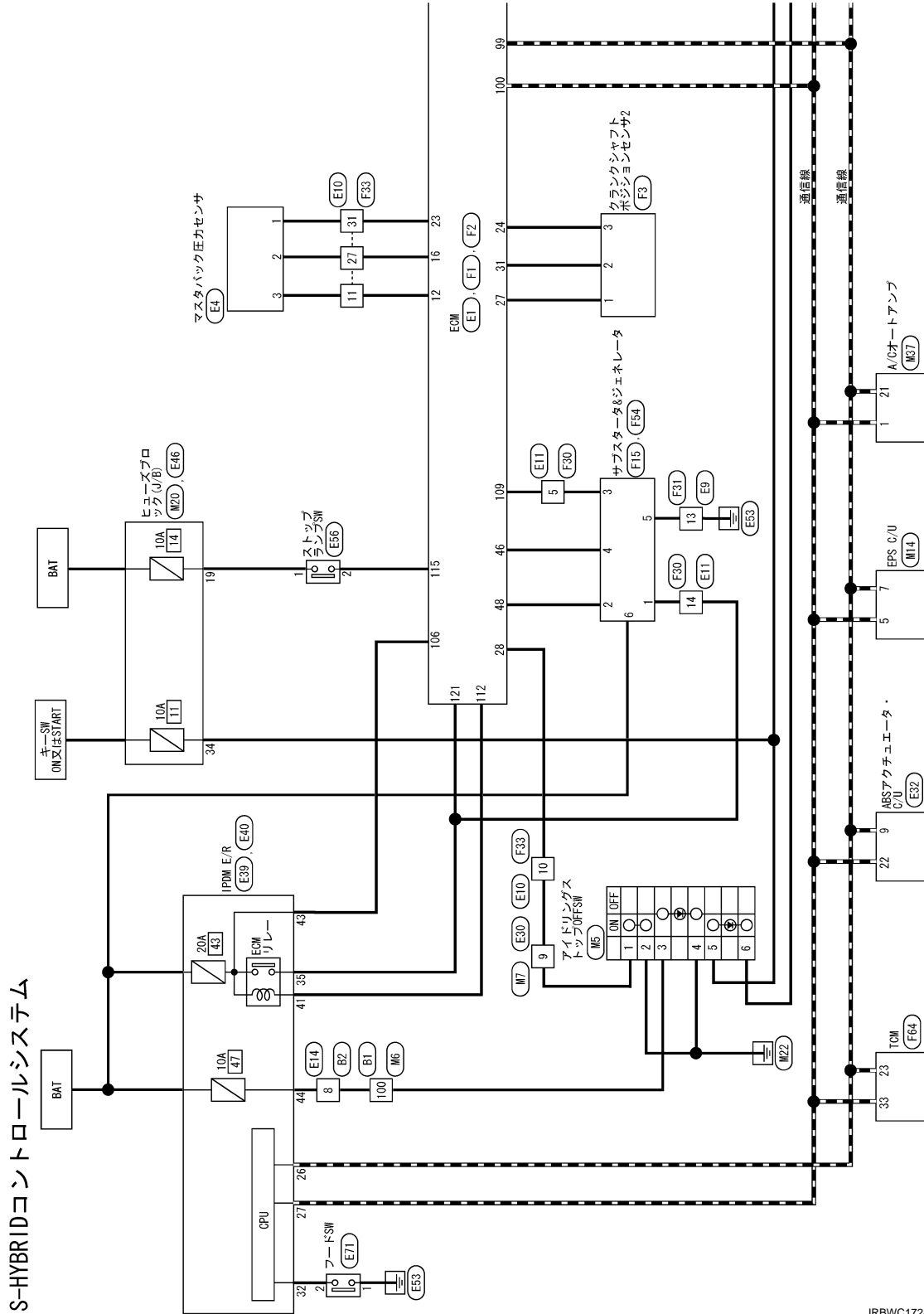
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## S-HYBRID CONTROL SYSTEM

### Wiring Diagram

INFOID:000000008758332

For connector terminal arrangements, harness layouts, and alphabets in a  (option abbreviation; if not described in wiring diagram), refer to [GI-5, "Connector Information/Explanation of Option Abbreviation"](#).



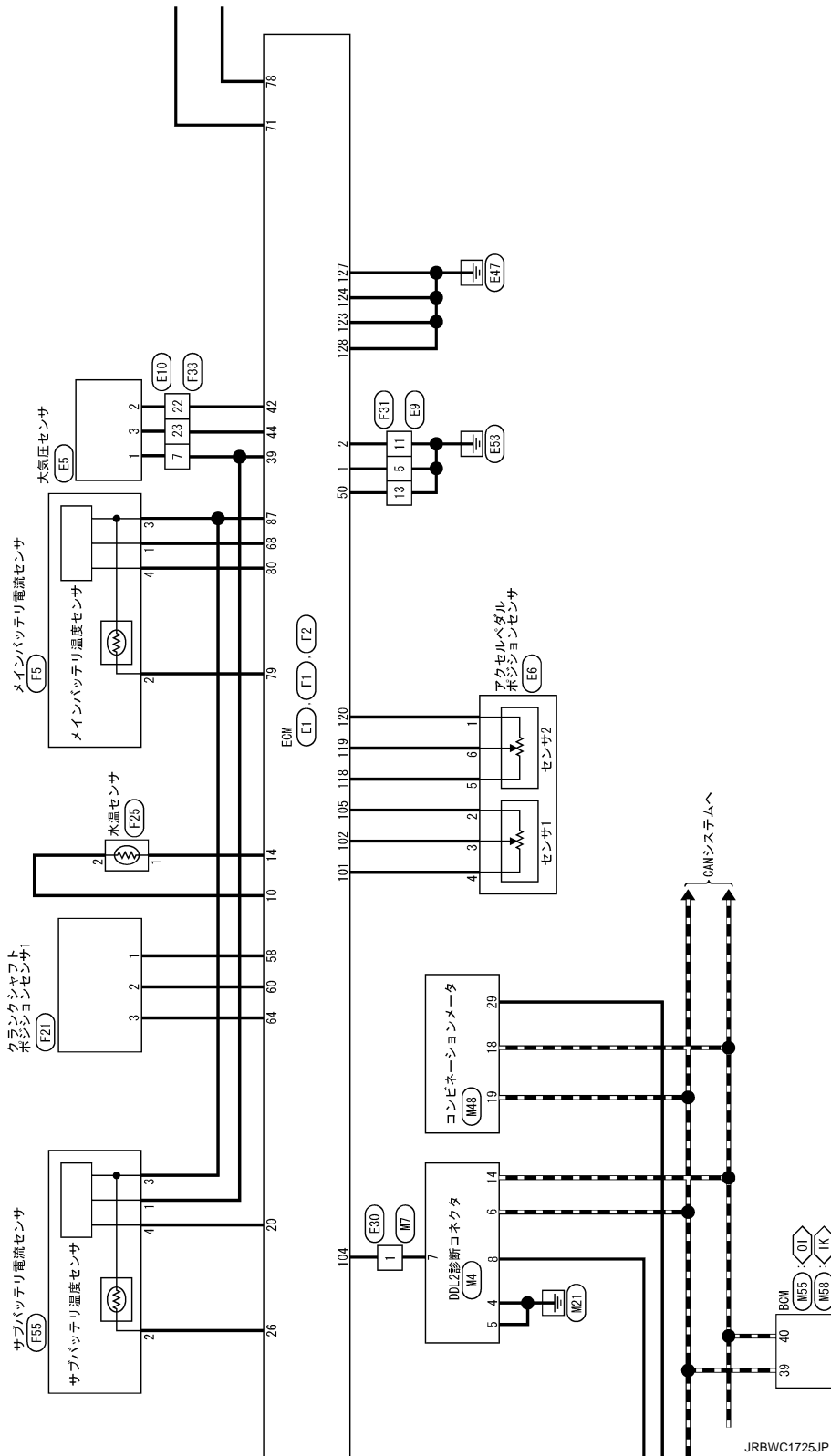
2012/06/22

JRBWC1724JP

# S-HYBRID CONTROL SYSTEM

< WIRING DIAGRAM >

[MR20DD]



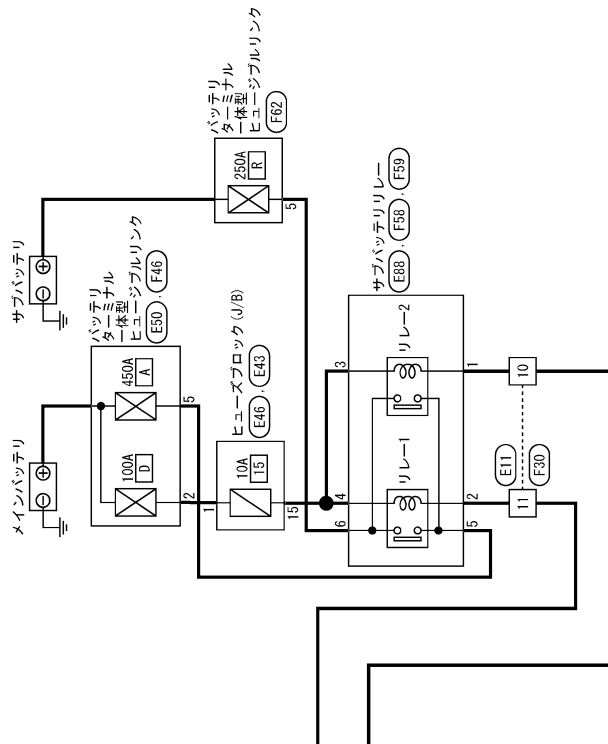
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# S-HYBRID CONTROL SYSTEM

< WIRING DIAGRAM >

[MR20DD]



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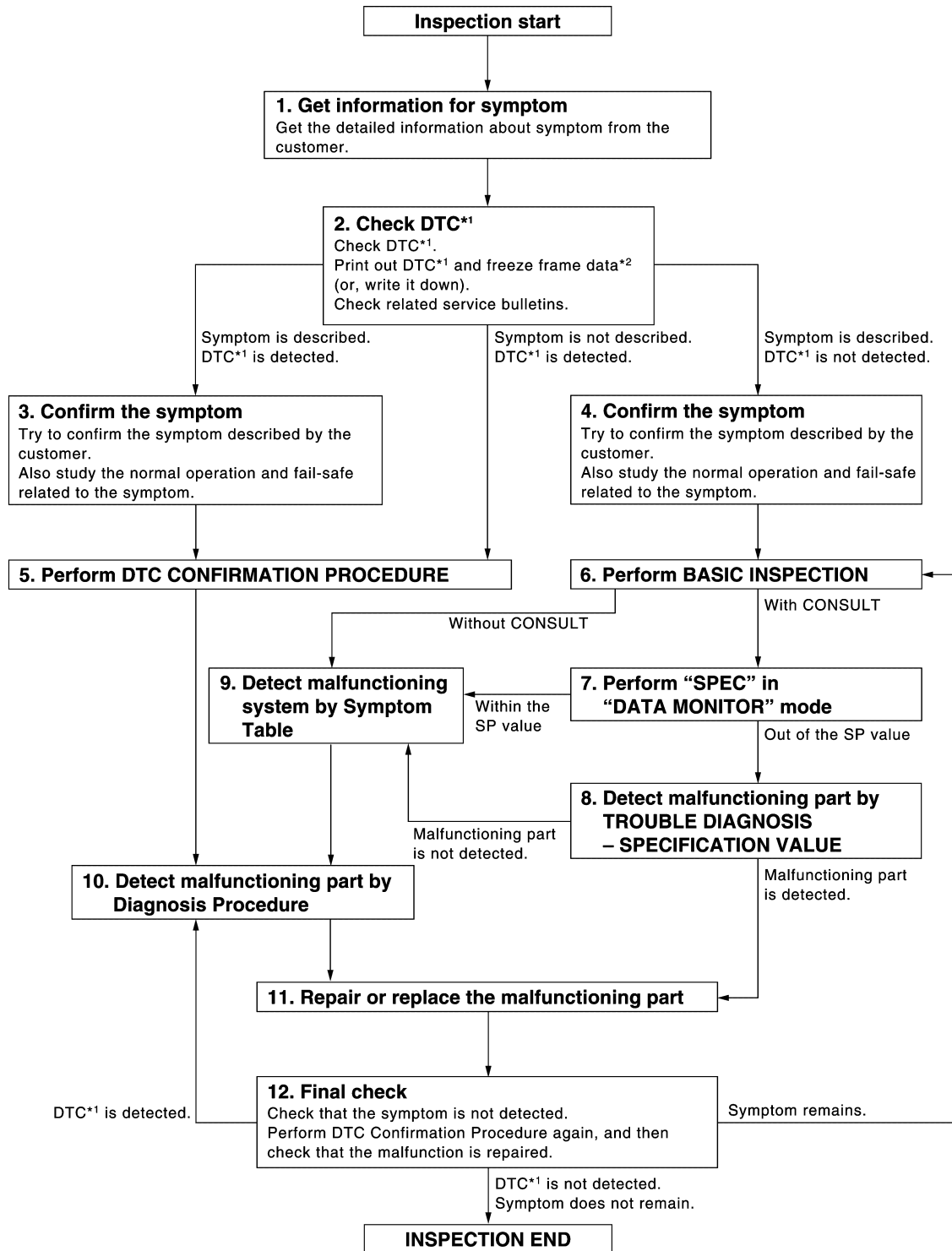
## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORK FLOW

#### Work Flow

INFOID:000000008758333

#### OVERALL SEQUENCE



\*1: Include 1st trip DTC.

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

JSBIA1228GB

#### DETAILED FLOW

# DIAGNOSIS AND REPAIR WORK FLOW

[MR20DD]

< BASIC INSPECTION >

## 1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred).

>> GO TO 2.

## 2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.
  - Record DTC and freeze frame data. (Print them out using CONSULT.)
  - Erase DTC.
  - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to [EC-174. "Symptom Table"](#).)
3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

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

## 3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).  
Also study the normal operation and fail safe related to the symptom. Refer to [EC-45. "Fail-safe"](#).  
Diagnosis Work Sheet is useful to verify the incident.  
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

## 4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.  
Also study the normal operation and fail safe related to the symptom. Refer to [EC-45. "Fail-safe"](#).  
Diagnosis Work Sheet is useful to verify the incident.  
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

## 5.PERFORM DTC CONFIRMATION PROCEDURE

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

If two or more DTCs are detected, refer to [EC-50. "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

### NOTE:

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

Is DTC detected?

- YES >> GO TO 10.
- NO >> Check according to [EC-51. "DTC Index"](#).

## 6.PERFORM BASIC INSPECTION

Perform [EC-80. "Work Procedure"](#).

Do you have CONSULT?

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

# DIAGNOSIS AND REPAIR WORK FLOW

[MR20DD]

< BASIC INSPECTION >

## 7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT

Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL" and "A/F ALPHA-B1" are within the SP value using CONSULT in "SPEC" of "DATA MONITOR" mode.

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.

Is malfunctioning part detected?

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

## 9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-174, "Symptom Table"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

## 10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

### NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure.

Is malfunctioning part detected?

- YES >> GO TO 11.
- NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT. Refer to [EC-27, "Reference Value"](#).

## 11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it.

>> GO TO 12.

## 12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

- YES-1 >> DTC is detected: GO TO 10.
- YES-2 >> Symptom remains: GO TO 6.
- NO-1 >>  With CONSULT: Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM.
- NO-2 >>  Without CONSULT: Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM.

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# ADDITIONAL SERVICE WHEN REPLACING ECM

[MR20DD]

< BASIC INSPECTION >

## ADDITIONAL SERVICE WHEN REPLACING ECM

### Description

INFOID:000000008758334

#### BEFORE REPLACEMENT

When replacing ECM, save current ECM data with "SAVING DATA FOR REPLC CPU" of "WORK SUPPORT" mode using CONSULT before replacement.

#### AFTER REPLACEMENT

When replacing ECM, must perform following:

- Write data after replace CPU
- Accelerator pedal released position learning
- Throttle valve closed position learning
- Idle air volume learning
- Air fuel ratio initial learning

### Work Procedure

INFOID:000000008758335

#### 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 2.

#### 2. REPLACE ECM

Replace ECM. Refer to [EC-179, "Removal and Installation"](#).

>> GO TO 3.

#### 3. 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 4.

#### 4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Perform Accelerator Pedal Released Position Learning. Refer to [EC-70, "Work Procedure"](#).

>> GO TO 5.

#### 5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform Throttle Valve Closed Position Learning. Refer to [EC-71, "Work Procedure"](#).

>> GO TO 6.

#### 6. PERFORM IDLE AIR VOLUME LEARNING

Perform Idle Air Volume Learning. Refer to [EC-72, "Work Procedure"](#).

# ADDITIONAL SERVICE WHEN REPLACING ECM

[MR20DD]

< BASIC INSPECTION >

>> GO TO 7.

## 7. PERFORM AIR FUEL RATIO INITIAL LEARNING

Perform Air Fuel Ratio Initial Learning. Refer to [EC-74, "Work Procedure"](#).

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# ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

[MR20DD]

---

## ACCELERATOR PEDAL RELEASED POSITION LEARNING

### Description

INFOID:000000008758336

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

### Work Procedure

INFOID:000000008758337

#### 1. START

---

1. Check that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Repeat step 2 and 3 for 3 times.

>> END

# THROTTLE VALVE CLOSED POSITION LEARNING

< BASIC INSPECTION >

[MR20DD]

## THROTTLE VALVE CLOSED POSITION LEARNING

### Description

INFOID:000000008758338

Throttle Valve Closed Position Learning is 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 disconnected.

### Work Procedure

INFOID:000000008758339

#### 1. START

1. Check that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.  
Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

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## IDLE AIR VOLUME LEARNING

### Description

INFOID:000000008758340

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

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

### Work Procedure

INFOID:000000008758341

#### 1. PRECONDITIONING

Check that all of the following conditions are satisfied.

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

- Battery voltage: More than 12.5 V (At idle)
- Engine coolant temperature: 70 - 100°C
- Selector lever: P or N
- Electric load switch: OFF  
(Air conditioner, headlamp, rear window defogger)
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: 0 km/h
- Transmission: CVT fluid 60°C or more (Drive for about 10minutes after engine warm-up)

Is CONSULT used?

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

#### 2. PERFORM IDLE AIR VOLUME LEARNING

With CONSULT

1. Perform Accelerator Pedal Position Learning. (Refer to [EC-70, "Work Procedure".](#))
2. Perform Throttle Valve Closed Position Learning. (Refer to [EC-71, "Work Procedure".](#))
3. Start the engine and warm it up to normal operating temperature.
4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode of "ENGINE".
5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

- YES >> GO TO 4.
- NO >> GO TO 6.

#### 3. PERFORM IDLE AIR VOLUME LEARNING

Without CONSULT

**NOTE:**

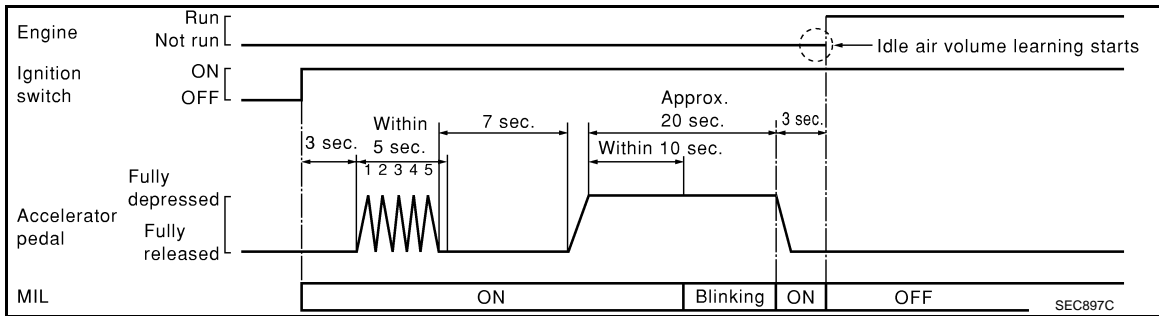
- It is better to count the time accurately with a clock.
  - It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
1. Perform Accelerator Pedal Position Learning. (Refer to [EC-70, "Work Procedure".](#))
  2. Perform Throttle Valve Closed Position Learning. (Refer to [EC-71, "Work Procedure".](#))
  3. Start the engine and warm it up to normal operating temperature.
  4. Turn ignition switch OFF and wait at least 10 seconds.
  5. Check that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
  6. Repeat fully depress to fully release cycle of accelerator pedal quickly 5 times within 5 seconds.
  7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approximately 20 seconds until the MIL stops blinking and turned ON.
  8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
  9. Start the engine and let it idle.

# IDLE AIR VOLUME LEARNING

[MR20DD]

< BASIC INSPECTION >

10. Wait 20 seconds.



>> GO TO 5.

## 4.PERFORM AIR FUEL RATIO INITIAL LEARNING

Perform Air Fuel Ratio Initial Learning. (Refer to [EC-74, "Work Procedure"](#).)

>> GO TO 5.

## 5.CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine 2 or 3 times and check that idle speed and ignition timing are within the specifications. For specification, refer to [EC-180, "Idle Speed"](#) and [EC-180, "Ignition Timing"](#).

Is the inspection result normal?

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

## 6.DETECT MALFUNCTIONING PART-1

Check the following.

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

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair or replace malfunctioning part.

## 7.DETECT MALFUNCTIONING PART-2

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".

If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:

- Engine stalls
- Erroneous idle

>> END

## AIR FUEL RATIO INITIAL LEARNING

### Description

INFOID:000000008758342

Air Fuel Ratio Initial Learning of ECM to learn the air fuel ratio that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:

- When ECM is replaced\*
- When electric throttle control actuator is replaced\*
- When mass air flow sensor is replaced
- When fuel injector is replaced
- When air fuel ratio (A/F) sensor is replaced

**CAUTION:**

\*: **Must be performed IDLE AIR VOLUME LEARNING** when electric throttle control actuator or ECM is replaced.

Refer to [EC-72, "Work Procedure"](#).

### Work Procedure

INFOID:000000008758343

#### 1. PRECONDITIONING

Check that all of the following conditions are satisfied.

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

- Battery temperature: 5°C or more
- Engine coolant temperature: 70°C or more
- Selector lever: P or N
- Electric load switch: OFF  
(Air conditioner, headlamp, rear window defogger)
- Vehicle speed: 0 km/h
- Transmission: CVT fluid 15°C or more (Drive for about 10minutes after engine warm-up)

Is CONSULT used?

YES >> GO TO 2.

NO >> GO TO 3.

#### 2. PERFORM AIR FUEL RATIO INITIAL LEARNING

With CONSULT

1. Perform Accelerator Pedal Position Learning. (Refer to [EC-70, "Work Procedure"](#).)
2. Perform Throttle Valve Closed Position Learning. (Refer to [EC-71, "Work Procedure"](#).)
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start the engine and warm it up to normal operating temperature.
5. Select "A/F INITIAL LEARNING" in "WORK SUPPORT" mode of "ENGINE".
6. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

YES >> END

NO >> GO TO 4.

#### 3. PERFORM AIR FUEL RATIO INITIAL LEARNING

Without CONSULT

**NOTE:**

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

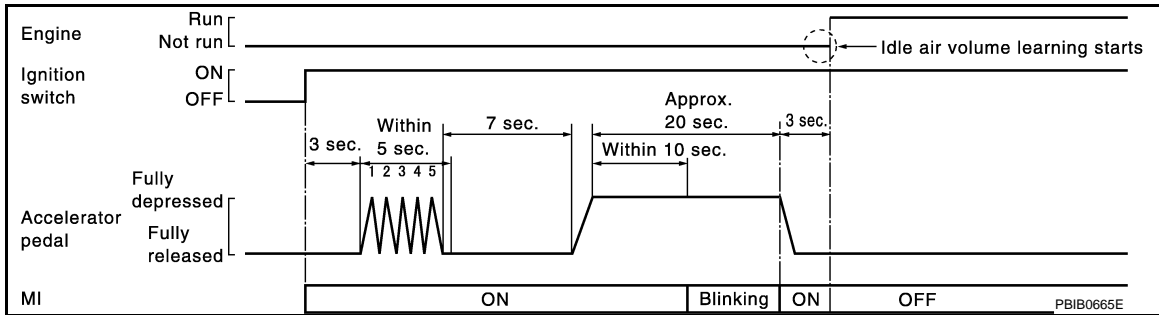
1. Perform Accelerator Pedal Position Learning. (Refer to [EC-70, "Work Procedure"](#).)
2. Perform Throttle Valve Closed Position Learning. (Refer to [EC-71, "Work Procedure"](#).)
3. Start the engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Check that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat fully depress to fully release cycle of accelerator pedal quickly 5 times within 5 seconds.
7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approximately 20 seconds until the MIL stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.

# AIR FUEL RATIO INITIAL LEARNING

[MR20DD]

< BASIC INSPECTION >

9. Start the engine and let it idle.
10. Wait 20 seconds.



>> END

## 4. DETECT MALFUNCTIONING PART

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

It is useful to perform "TROUBLE DIAGNOSIS-SPECIFICATION VALUE".

If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:

- Engine stalls
- Erroneous idle

>> END

# MIXTURE RATIO SELF-LEARNING VALUE CLEAR

< BASIC INSPECTION >

[MR20DD]

## MIXTURE RATIO SELF-LEARNING VALUE CLEAR

### Description

INFOID:000000008758344

This describes how to erase the Mixture Ratio Self-Learning Value. For the actual procedure, follow the instructions in "Diagnosis Procedure".

### Work Procedure

INFOID:000000008758345

#### 1. START

##### With CONSULT

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

##### Without CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart the engine and let it idle for at 5 seconds.
5. Stop the engine and reconnect mass air flow sensor harness connector.
6. Perform diagnosis test mode II (self-diagnosis result) for ECM.
7. Check that DTC 0102 is displayed.
8. Erase DTC memory.
9. Check that DTC 0000 is displayed.

>> END

# SUB STARTER & GENERATOR OPERATION COUNT CLEAR

< BASIC INSPECTION >

[MR20DD]

## SUB STARTER & GENERATOR OPERATION COUNT CLEAR

### Description

INFOID:000000008837703

Sub Starter & Generator Operation Count Clear is a function of ECM to erase the sub starter & generator operation count clear. It must be performed when sub starter & generator is replaced.

#### **CAUTION:**

**Proceed only when sub starter & generator is replaced.**

### Work Procedure

INFOID:000000008837704

#### 1. ERASE SUB STARTER & GENERATOR OPERATION COUNT

④ With CONSULT

1. Turn ignition switch ON.
2. Select "SUB-STARTER & GENERATOR OPER COUNT CLEAR" in "WORK SUPPORT" mode of "ENGINE".
3. Touch "CLEAR" and erase sub starter & generator operation count.

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# CUMULATIVE BATTERY DISCHARGE CURRENT CLEAR

< BASIC INSPECTION >

[MR20DD]

---

## CUMULATIVE BATTERY DISCHARGE CURRENT CLEAR

### Description

INFOID:000000008758346

Cumulative Battery Discharge Current Clear is a function of ECM to erase the cumulative main battery discharge current. It must be performed when main battery is replaced.

### Work Procedure

INFOID:000000008758347

#### 1. ERASE CUMULATIVE BATTERY DISCHARGE CURRENT

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Ⓟ With CONSULT

1. Turn ignition switch ON.
2. Select "CML B/D CHRG CRNT CLEAR" in "WORK SUPPORT" mode of "ENGINE".
3. Touch "CLEAR" and erase cumulative main battery discharge current.

>> END

# CUMULATIVE SUB-BATTERY DISCHARGE CURRENT CLEAR

< BASIC INSPECTION >

[MR20DD]

## CUMULATIVE SUB-BATTERY DISCHARGE CURRENT CLEAR

### Description

INFOID:000000008837705

Cumulative Sub-Battery Discharge Current Clear is a function of ECM to erase the cumulative sub battery discharge current. It must be performed when sub battery is replaced.

### Work Procedure

INFOID:000000008837706

#### 1. ERASE CUMULATIVE SUB BATTERY DISCHARGE CURRENT

Ⓜ With CONSULT

1. Turn ignition switch ON.
2. Select "CUMULATIVE SUB-BATTERY DISCHG CURRENT CLEAR" in "WORK SUPPORT" mode of "ENGINE".
3. Touch "CLEAR" and erase cumulative sub battery discharge current.

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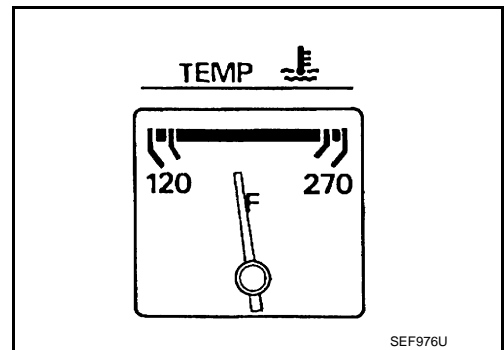
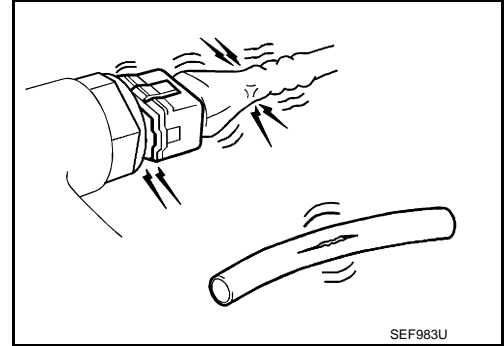
## BASIC INSPECTION

### Work Procedure

INFOID:000000008758348

#### 1.INSPECTION START

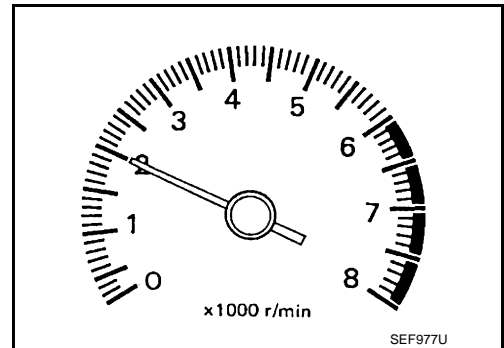
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
  - Harness connectors for improper connections
  - Wiring harness for improper connections, pinches and cut
  - Vacuum hoses 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.

Is any DTC detected?

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



#### 2.REPAIR OR REPLACE

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

>> GO TO 3.

#### 3.CHECK TARGET IDLE SPEED

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

# BASIC INSPECTION

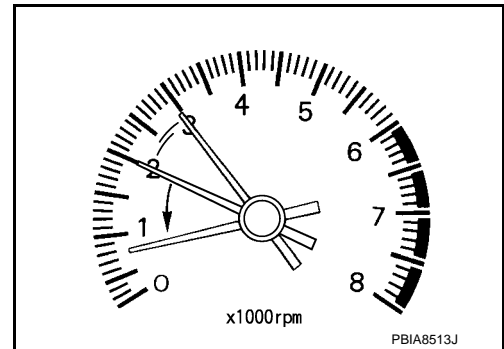
[MR20DD]

## < 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.

Is the inspection result normal?

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



## 4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC-70. "Work Procedure"](#).

>> GO TO 5.

## 5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-71. "Work Procedure"](#).

>> GO TO 6.

## 6.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-72. "Work Procedure"](#).

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 7.  
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

## 7.CHECK TARGET IDLE SPEED AGAIN

- Start engine and warm it up to normal operating temperature.
- Check 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.
- Check crankshaft position sensor (POS) and circuit.

Is the inspection result normal?

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

## 9.CHECK ECM FUNCTION

- Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- Perform initialization of NATS system and registration of all NATS ignition key IDs.

>> GO TO 4.

## 10.CHECK IGNITION TIMING

- Run engine at idle.
- Check ignition timing with a timing light.

Is the inspection result normal?

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

# BASIC INSPECTION

[MR20DD]

< BASIC INSPECTION >

---

## 11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

---

1. Stop engine.
2. Perform [EC-70, "Work Procedure"](#).

>> GO TO 12.

---

## 12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

---

Perform [EC-71, "Work Procedure"](#).

>> GO TO 13.

---

## 13. PERFORM IDLE AIR VOLUME LEARNING

---

Perform [EC-72, "Work Procedure"](#).

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 14.  
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

---

## 14. CHECK TARGET IDLE SPEED AGAIN

---

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

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.

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-44, "Exploded View"](#).

Is the inspection result normal?

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

---

## 17. DETECT MALFUNCTIONING PART

---

Check the following.

- Check camshaft position sensor (PHASE) and circuit.
- Check crankshaft position sensor (POS) and circuit.

Is the inspection result normal?

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

---

## 18. CHECK ECM FUNCTION

---

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs.

>> GO TO 4.

---

## 19. INSPECTION END

---

If ECM is replaced during this basic Inspection procedure, Perform [EC-65, "Work Flow"](#).

>> INSPECTION END

## FUEL PRESSURE

### Work Procedure

INFOID:000000008758349

### FUEL PRESSURE RELEASE

#### 1. FUEL PRESSURE RELEASE

##### ☑ With CONSULT

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

##### ☒ Without CONSULT

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

>> END

### FUEL PRESSURE CHECK

#### 1. FUEL PRESSURE CHECK

##### CAUTION:

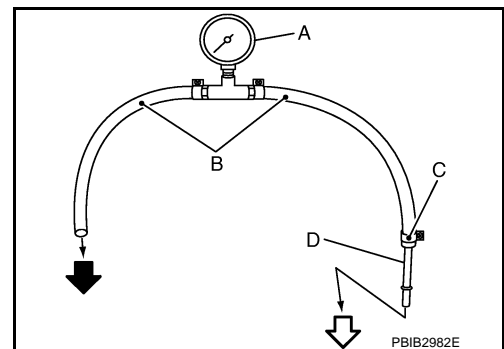
- Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector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

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 high pressure fuel pump  
 C : Clamp



##### CAUTION:

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

##### CAUTION:

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

# FUEL PRESSURE

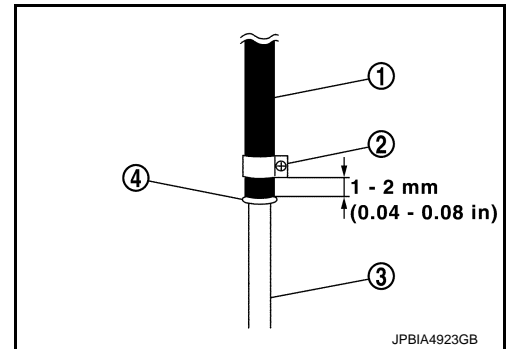
[MR20DD]

## < BASIC INSPECTION >

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

**CAUTION:**

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



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

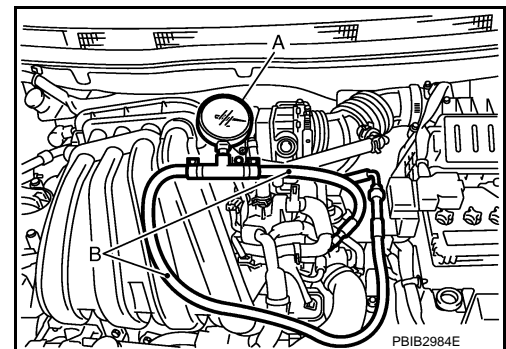
- Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).
- Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.

A :Fuel pressure gauge

B :Fuel hose for fuel pressure check

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



**CAUTION:**

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

At idling : Approximately 500 kPa (5.0 bar, 5.1 kg/cm<sup>2</sup>, 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
- Fuel pump
- Fuel pressure regulator for clogging

### Is the inspection result normal?

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

## DTC/CIRCUIT DIAGNOSIS

### U0101 CAN COMM CIRCUIT

#### Description

INFOID:000000008758350

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

#### DTC Logic

INFOID:000000008758351

#### DTC DETECTION LOGIC

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

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# U0120 STARTER/GENERATOR CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## U0120 STARTER/GENERATOR CONTROL MODULE

### DTC Logic

INFOID:000000008758352

### DTC DETECTION LOGIC

**NOTE:**

If DTC U0120 is displayed with DTC U1040 or U1044, perform the trouble diagnosis for DTC U1040 or U1044. Refer to [EC-88. "DTC Logic"](#) or [EC-90. "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0120	STR/GEN C/M (Engine communication line circuit)	When ECM is not receiving engine communication signal from sub starter & generator.	<ul style="list-style-type: none"><li>• Harness or connectors (Engine communication line is open or shorted.)</li><li>• Sub starter &amp; generator</li></ul>

# U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## U1001 CAN COMM CIRCUIT

### Description

INFOID:000000008758354

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

### DTC Logic

INFOID:000000008758355

### DTC DETECTION LOGIC

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

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# U1040 ENG COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## U1040 ENG COMM CIRCUIT

### DTC Logic

INFOID:000000008758356

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1040	ENG COMM CIRCUIT [Engine communication circuit]	When ECM is not transmitting engine communication signal to sub starter & generator.	<ul style="list-style-type: none"><li>• Harness or connectors (Engine communication line is open or shorted.)</li><li>• ECM</li></ul>

# U1041 SUB STARTER&GENERATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## U1041 SUB STARTER&GENERATOR

### DTC Logic

INFOID:000000008758357

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1041	STR/GEN C/M (Engine communication circuit)	When ECM detects engine communication signal is abnormality from sub starter & generator.	<ul style="list-style-type: none"><li>• Harness or connectors (Engine communication line circuit is open or shorted.)</li><li>• Electric noise</li><li>• Sub starter &amp; generator</li></ul>

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# U1044 ENG COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## U1044 ENG COMM CIRCUIT

### DTC Logic

INFOID:000000008758360

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1044	ENG COMM CIRCUIT [Engine communication circuit]	When ECM detects transmit or receive engine communication signal is high or low voltage for 4 seconds or more.	<ul style="list-style-type: none"><li>• Harness or connectors (Engine communication line is open or shorted.)</li><li>• Sub starter &amp; generator</li></ul>

# B1910 SUB BATTERY RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## B1910 SUB BATTERY RELAY

### DTC Logic

INFOID:000000008837707

### DTC DETECTION LOGIC

**NOTE:**

If DTC B1910 is displayed with DTC P1540, P1541, P1542, P1543 or P1544 first perform the trouble diagnosis for DTC P1540, P1541, P1542, P1543 or P1544.

Refer to [EC-51. "DTC Index"](#).

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1910	SUB BATTERY RELAY (SUB BATTERY RELAY)	Sub battery relay is stuck ON	<ul style="list-style-type: none"><li>• Harness or connectors (Between sub battery harness connector and ECM harness connector is shorted to ground.) (Sub battery harness is shorted to main battery harness.)</li><li>• Sub battery relay</li><li>• Sub battery current sensor</li></ul>

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# B1911 SUB BATTERY RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## B1911 SUB BATTERY RELAY

### DTC Logic

INFOID:000000008837710

### DTC DETECTION LOGIC

**NOTE:**

If DTC B1911 is displayed with DTC P1540, P1541, P1542, P1543 or P1544 first perform the trouble diagnosis for DTC P1540, P1541, P1542, P1543 or P1544.

Refer to [EC-51, "DTC Index"](#).

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
B1911	SUB BATTERY RELAY (SUB BATTERY RELAY)	When ECM detects that sub battery relay is OFF at the time of ON control.	<ul style="list-style-type: none"><li>• Harness or connectors (Sub battery relay circuit is open or shorted.) (Sub battery voltage signal circuit is open or shorted.)</li><li>• Sub battery relay</li><li>• Sub battery current sensor</li></ul>

# P0011 IVT CONTROL

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P0011 IVT CONTROL

### DTC Logic

INFOID:000000008758366

### DTC DETECTION LOGIC

#### NOTE:

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for [EC-138. "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0011	INT/V TIM CONT-B1 (Intake valve timing control performance)	There is a gap between angle of target and phase-control angle degree.	<ul style="list-style-type: none"><li>• Crankshaft position sensor 1 (POS)</li><li>• Camshaft position sensor (PHASE)</li><li>• Intake valve control solenoid valve</li><li>• Accumulation of debris to the signal pick-up portion of the camshaft</li><li>• Timing chain installation</li><li>• Foreign matter caught in the oil groove for intake valve timing control</li></ul>

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# P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0014 EVT CONTROL

### DTC Logic

INFOID:000000008758367

### DTC DETECTION LOGIC

#### NOTE:

- If DTC P0014 is displayed with DTC P0078, first perform trouble diagnosis for DTC P0078. Refer to [EC-98, "DTC Logic"](#).
- If DTC P0014 is displayed with P1078, first perform trouble diagnosis for P1078. Refer to [EC-143, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0014	EXH/V TIM CONT-B1 (Exhaust valve timing control performance)	There is a gap between angle of target and phase-control angle degree.	<ul style="list-style-type: none"><li>• Crankshaft position sensor 1 (POS)</li><li>• Camshaft position sensor (PHASE)</li><li>• Exhaust valve timing control position sensor</li><li>• Exhaust valve control solenoid valve</li><li>• Accumulation of debris to the signal pick-up portion of the camshaft</li><li>• Timing chain installation</li><li>• Foreign matter caught in the oil groove for exhaust valve timing control</li></ul>

# P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0031, P0032 A/F SENSOR 1 HEATER

### DTC Logic

INFOID:000000008758368

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0031	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit low)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	<ul style="list-style-type: none"> <li>• Harness or connectors (A/F sensor 1 heater circuit is open or shorted.)</li> <li>• A/F sensor 1 heater</li> </ul>
P0032	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit high)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	<ul style="list-style-type: none"> <li>• Harness or connectors (A/F sensor 1 heater circuit is shorted.)</li> <li>• A/F sensor 1 heater</li> </ul>

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# P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0037, P0038 HO2S2 HEATER

### DTC Logic

INFOID:000000008758369

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0037	HO2 HTR (B1) (Heated oxygen sensor 2 heater control circuit low)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul style="list-style-type: none"><li>• Harness or connectors (Heated oxygen sensor 2 heater circuit is open or shorted.)</li><li>• Heated oxygen sensor 2 heater</li></ul>
P0038	HO2 HTR (B1) (Heated oxygen sensor 2 heater control circuit high)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul style="list-style-type: none"><li>• Harness or connectors (Heated oxygen sensor 2 heater circuit is shorted.)</li><li>• Heated oxygen sensor 2 heater</li></ul>

# P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0075 IVT CONTROL SOLENOID VALVE

### DTC Logic

INFOID:000000008758370

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0075	INT/V TIM V/CIR-B1 (Intake valve timing control solenoid valve circuit)	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	<ul style="list-style-type: none"><li>• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)</li><li>• Intake valve timing control solenoid valve</li></ul>

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# P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0078 EVT CONTROL SOLENOID VALVE

### DTC Logic

INFOID:000000008758371

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve timing control solenoid valve circuit)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.	<ul style="list-style-type: none"><li>• Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.)</li><li>• Exhaust valve timing control solenoid valve</li></ul>

# P0087, P0088, P0090 FRP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0087, P0088, P0090 FRP CONTROL SYSTEM

### DTC Logic

INFOID:000000008758372

### DTC DETECTION LOGIC

**NOTE:**

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

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0087	LOW FUEL PRES (High fuel pressure too low)	The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Target fuel pressure – Actual fuel pressure $\geq$ 2.7 MPa	<ul style="list-style-type: none"> <li>• Harness or connectors (The fuel pump circuit is open or shorted.)</li> <li>• High pressure fuel pump</li> <li>• High pressure fuel pump system</li> <li>• Low pressure fuel pump</li> <li>• Low pressure fuel pump system</li> <li>• Fuel pressure regulator</li> <li>• Fuel rail pressure sensor</li> <li>• Out of gas</li> <li>• Disconnection of the fuel hose</li> </ul>
P0088	HIGH FUEL PRES (High fuel pressure too high)	The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Actual fuel pressure – Target fuel pressure $\geq$ 2.7 MPa	
P0090	FUEL PUMP (High pressure fuel pump performance)	<ul style="list-style-type: none"> <li>• Fuel rail pressure remains at 1.1 MPa or less for 5 seconds or more during engine rev.</li> <li>• Fuel rail pressure remains at 18.5MPa or more for 0.3 seconds or more during engine rev.</li> </ul>	

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# P0101 MAF SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P0101 MAF SENSOR

### DTC Logic

INFOID:000000008758373

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0101	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit range/performance)	<ul style="list-style-type: none"><li>• A high voltage from the sensor is sent to ECM under light load driving condition.</li><li>• A low voltage from the sensor is sent to ECM under heavy load driving condition.</li></ul>	<ul style="list-style-type: none"><li>• Harness or connectors (Mass air flow sensor circuit is open or shorted.)</li><li>• Intake air leaks</li><li>• Mass air flow sensor</li><li>• Intake air temperature sensor</li></ul>

# P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0102, P0103 MAF SENSOR

### DTC Logic

INFOID:000000008758374

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0102	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit low input)	An excessively low voltage from the mass air flow sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Mass air flow sensor circuit is open or shorted.)</li> <li>• Intake air leaks</li> <li>• Mass air flow sensor</li> </ul>
P0103	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit high input)	An excessively high voltage from the mass air flow sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Mass air flow sensor circuit is open or shorted.)</li> <li>• Mass air flow sensor</li> </ul>

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# P0107, P0108 ATMOSPHERIC PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0107, P0108 ATMOSPHERIC PRESSURE SENSOR

### DTC Logic

INFOID:000000008758375

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0107	ABSL PRES SEN/CIRC (Atmospheric pressure sensor circuit low input)	An excessively low voltage from the atmospheric pressure sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Atmospheric pressure sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Atmospheric pressure sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Engine oil pressure sensor</li> </ul>
P0108	ABSL PRES SEN/CIRC (Atmospheric pressure sensor circuit high input)	An excessively high voltage from the atmospheric pressure sensor is sent to ECM.	

# P0112, P0113 IAT SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0112, P0113 IAT SENSOR 1

### DTC Logic

INFOID:000000008758376

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0112	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor circuit low input)	An excessively low voltage from the intake air temperature sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Intake air temperature sensor circuit is open or shorted.)</li> <li>• Intake air temperature sensor</li> </ul>
P0113	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor circuit high input)	An excessively high voltage from the intake air temperature sensor is sent to ECM.	

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# P0117, P0118 ECT SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P0117, P0118 ECT SENSOR

### DTC Logic

INFOID:000000008758377

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0117	ECT SEN/CIRC (Engine coolant temperature sensor circuit low input)	An excessively low voltage from the engine coolant temperature sensor is sent to ECM.	<ul style="list-style-type: none"><li>• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.)</li><li>• Engine coolant temperature sensor</li></ul>
P0118	ECT SEN/CIRC (Engine coolant temperature sensor circuit high input)	An excessively high voltage from the engine coolant temperature sensor is sent to ECM.	

# P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0122, P0123 TP SENSOR

### DTC Logic

INFOID:000000008758378

### DTC DETECTION LOGIC

**NOTE:**

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-138, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0122	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit low input)	An excessively low voltage from the TP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (TP sensor 2 circuit is open or shorted.)</li> <li>• Electric throttle control actuator (TP sensor 2)</li> </ul>
P0123	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit high input)	An excessively high voltage from the TP sensor 2 is sent to ECM.	

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# P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0130 A/F SENSOR 1

### DTC Logic

INFOID:000000008758379

#### DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0130	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly fixed.	<ul style="list-style-type: none"><li>• Harness or connectors (A/F sensor 1 circuit is open or shorted.)</li><li>• A/F sensor 1</li></ul>

# P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0131 A/F SENSOR 1

### DTC Logic

INFOID:000000008758380

### DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0131	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit low voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly low voltage.	<ul style="list-style-type: none"><li>• Harness or connectors (A/F sensor 1 circuit is open or shorted.)</li><li>• A/F sensor 1</li></ul>

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# P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0132 A/F SENSOR 1

### DTC Logic

INFOID:000000008758381

#### DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit high voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly high voltage.	<ul style="list-style-type: none"><li>• Harness or connectors (A/F sensor 1 circuit is open or short- ed.)</li><li>• A/F sensor 1</li></ul>

# P0133 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0133 A/F SENSOR 1

### DTC Logic

INFOID:000000008758382

#### DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit slow response]	The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	<ul style="list-style-type: none"><li>• Harness or connectors (A/F sensor 1 circuit is open or shorted.)</li><li>• A/F sensor 1</li><li>• A/F sensor 1 heater</li><li>• Fuel pressure</li><li>• Fuel injector</li><li>• Intake air leaks</li><li>• Exhaust gas leaks</li><li>• PCV</li><li>• Mass air flow sensor</li></ul>

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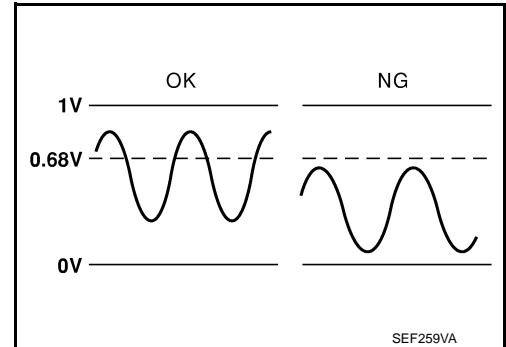
P0137 HO2S2

DTC Logic

INFOID:000000008758383

DTC DETECTION LOGIC

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



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0137	HO2S2 (B1) (Heated oxygen sensor 2 circuit low voltage)	The maximum voltage from the heated oxygen sensor 2 is not reached to the specified voltage.	<ul style="list-style-type: none"> <li>• Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted)</li> <li>• Heated oxygen sensor 2</li> <li>• Fuel pressure</li> <li>• Fuel injector</li> <li>• Intake air leaks</li> </ul>

P0138 HO2S2

DTC Logic

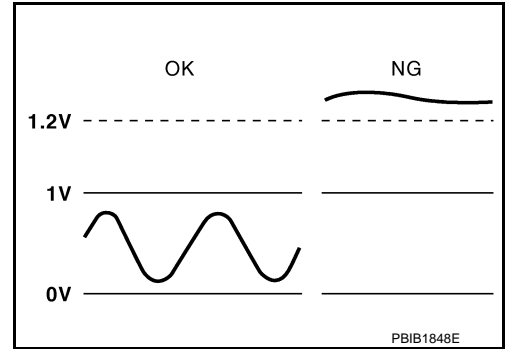
INFOID:000000008758384

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

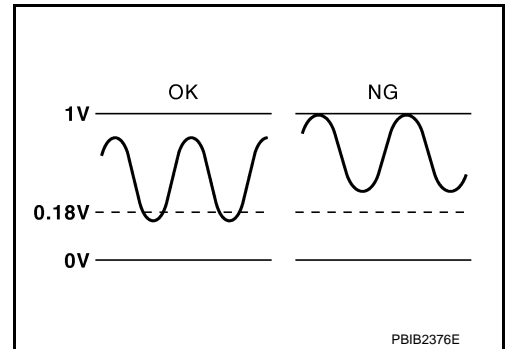
**MALFUNCTION A**

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



**MALFUNCTION B**

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0138	HO2S2 (B1) (Heated oxygen sensor 2 circuit high voltage)	A)	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Heated oxygen sensor 2</li> </ul>
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Heated oxygen sensor 2</li> <li>• Fuel pressure</li> <li>• Fuel injector</li> </ul>

# P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0171 FUEL INJECTION SYSTEM FUNCTION

### DTC Logic

INFOID:000000008758385

#### DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0171	FUEL SYS-LEAN-B1 (Fuel injection system too lean)	<ul style="list-style-type: none"><li>Fuel injection system does not operate properly.</li><li>The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)</li></ul>	<ul style="list-style-type: none"><li>Intake air leaks</li><li>A/F sensor 1</li><li>Fuel injector</li><li>Exhaust gas leaks</li><li>Incorrect fuel pressure</li><li>Lack of fuel</li><li>Mass air flow sensor</li><li>Incorrect PCV hose connection</li></ul>

# P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0172 FUEL INJECTION SYSTEM FUNCTION

### DTC Logic

INFOID:000000008758386

#### DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0172	FUEL SYS-RICH-B1 (Fuel injection system too rich)	<ul style="list-style-type: none"><li>Fuel injection system does not operate properly.</li><li>The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)</li></ul>	<ul style="list-style-type: none"><li>A/F sensor 1</li><li>Fuel injector</li><li>Exhaust gas leaks</li><li>Incorrect fuel pressure</li><li>Mass air flow sensor</li></ul>

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# P0190 FRP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0190 FRP SENSOR

### DTC Logic

INFOID:000000008758387

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0190	FUEL PRES SEN/CIRC (Fuel rail pressure sensor circuit low input and high in- put)	Signal voltage from the fuel rail pressure sensor remains at more than 4.84 V / less than 0.2 V for 5 seconds or more.	<ul style="list-style-type: none"><li>• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or short- ed.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li><li>• Fuel rail pressure sensor</li><li>• Battery current sensor</li><li>• Camshaft position sensor</li><li>• Exhaust valve timing control position sensor</li><li>• Accelerator pedal position sensor 2</li><li>• Atmospheric pressure sensor</li><li>• Engine oil pressure sensor</li></ul>

# P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0197, P0198 EOT SENSOR

### DTC Logic

INFOID:000000008758388

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low input)	An excessively low voltage from the engine oil temperature sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (EOT sensor circuit is open or shorted.)</li> <li>• Engine oil temperature sensor</li> </ul>
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high input)	An excessively high voltage from the engine oil temperature sensor is sent to ECM.	

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# P0201, P0202, P0203, P0204 FUEL INJECTOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P0201, P0202, P0203, P0204 FUEL INJECTOR

### DTC Logic

INFOID:000000008758389

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0201	INJECTOR CIRC-CYL1 (No.1 fuel injector circuit)	ECM detects No. 1 injector circuit is open or shorted.	<ul style="list-style-type: none"><li>• The fuel injector circuit is open or shorted</li><li>• Fuel injector</li><li>• ECM</li></ul>
P0202	INJECTOR CIRC-CYL2 (No. 2 fuel injector circuit)	ECM detects No. 2 injector circuit is open or shorted.	
P0203	INJECTOR CIRC-CYL3 (No. 3 fuel injector circuit)	ECM detects No. 3 injector circuit is open or shorted.	
P0204	INJECTOR CIRC-CYL4 (No. 4 fuel injector circuit)	ECM detects No. 4 injector circuit is open or shorted.	

# P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0222, P0223 TP SENSOR

### DTC Logic

INFOID:000000008758390

### DTC DETECTION LOGIC

**NOTE:**

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-121, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0222	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit low input)	An excessively low voltage from the TP sensor 1 is sent to ECM.	<ul style="list-style-type: none"><li>• Harness or connectors (TP sensor 1 circuit is open or shorted.)</li><li>• Electric throttle control actuator (TP sensor 1)</li></ul>
P0223	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit high input)	An excessively high voltage from the TP sensor 1 is sent to ECM.	

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# P0300, P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0300, P0301, P0302, P0303, P0304 MISFIRE

### DTC Logic

INFOID:000000008758391

#### DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor 1 (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor 1 (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 1 signal every 200 engine revolutions for a change.  
When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn OFF.  
If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.  
When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain ON.  
If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
- Two Trip Detection Logic (Exhaust quality deterioration)**  
For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor 1 signal every 1,000 engine revolutions.  
A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0300	MULTI CYL MISFIRE (Multiple cylinder misfire detected)	Multiple cylinder misfire.	<ul style="list-style-type: none"><li>• Improper spark plug</li><li>• Insufficient compression</li><li>• Incorrect fuel pressure</li><li>• Fuel Injector circuit is open or shorted</li><li>• Fuel injector</li><li>• Intake air leak</li><li>• Ignition signal circuit is open or shorted</li><li>• Lack of fuel</li><li>• Signal plate</li><li>• A/F sensor 1</li><li>• Incorrect PCV hose connection</li></ul>
P0301	CYL 1 MISFIRE (No.1 cylinder misfire detected)	No. 1 cylinder misfires.	
P0302	CYL 2 MISFIRE (No. 2 cylinder misfire detected)	No. 2 cylinder misfires.	
P0303	CYL 3 MISFIRE (No. 3 cylinder misfire detected)	No. 3 cylinder misfires.	
P0304	CYL 4 MISFIRE (No. 4 cylinder misfire detected)	No. 4 cylinder misfires.	

P0327, P0328 KS

DTC Logic

INFOID:000000008758392

DTC DETECTION LOGIC

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DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detected condition	Possible cause
P0327	KNOCK SEN/CIRC-B1 (Knock sensor circuit low input)	An excessively low voltage from the knock sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Knock sensor circuit is open or shorted.)</li> <li>• Knock sensor</li> </ul>
P0328	KNOCK SEN/CIRC-B1 (Knock sensor circuit high input)	An excessively high voltage from the knock sensor is sent to ECM.	

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# P0335 CKP SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0335 CKP SENSOR 1

### DTC Logic

INFOID:000000008758393

### DTC DETECTION LOGIC

**NOTE:**

If DTC P0335 is displayed with DTC P0643, perform the trouble diagnosis for DTC P0643.

Refer to [EC-138, "DTC Logic"](#).

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor 1 circuit)	<ul style="list-style-type: none"><li>• Crankshaft position sensor 1 (POS) signal is not transmitted to ECM during engine cranking.</li><li>• Crankshaft position sensor 1 (POS) signal is not transmitted to ECM during engine running.</li></ul>	<ul style="list-style-type: none"><li>• Harness or connectors (Crankshaft position sensor 1 circuit is open or shorted.)</li><li>• Crankshaft position sensor 1</li><li>• Signal plate</li></ul>

# P0340 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0340 CMP SENSOR (PHASE)

### DTC Logic

INFOID:000000008758394

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0340	CMP SEN/CIRC-B1 [Camshaft position sensor (PHASE) circuit]	<ul style="list-style-type: none"> <li>• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.</li> <li>• The cylinder No. signal is not sent to ECM during engine running.</li> <li>• The cylinder No. signal is not in the normal pattern during engine running.</li> </ul>	<ul style="list-style-type: none"> <li>• Harness or connectors (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Camshaft position sensor</li> <li>• Camshaft (Intake)</li> <li>• Starter motor</li> <li>• Starting system circuit</li> <li>• Dead (Weak) battery</li> <li>• Fuel rail pressure sensor</li> <li>• Battery current sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Engine oil pressure sensor</li> </ul>

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## P0385 CKP SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

### P0385 CKP SENSOR 2

#### DTC Logic

INFOID:000000008758395

#### DTC DETECTION LOGIC

**NOTE:**

If DTC P0385 is displayed with DTC P0643, perform the trouble diagnosis for DTC P0643.

Refer to [EC-138, "DTC Logic"](#).

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0385	CKP SEN/CIRCUIT B (Crankshaft position sensor 2 circuit)	<ul style="list-style-type: none"><li>• Crankshaft position sensor 2 signal is not transmitted to ECM during engine cranking.</li><li>• Crankshaft position sensor 2 signal is not transmitted to ECM during engine running.</li></ul>	<ul style="list-style-type: none"><li>• Harness or connectors (Crankshaft position sensor 2 circuit is open or shorted.)</li><li>• Crankshaft position sensor 2</li></ul>

# P0386 CKP SENSOR 2

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0386 CKP SENSOR 2

### DTC Logic

INFOID:000000008758396

### DTC DETECTION LOGIC

**NOTE:**

- If DTC P0386 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-138, "DTC Logic"](#).
- If DTC P0386 is displayed with DTC P0385, first perform the trouble diagnosis for DTC P0385. Refer to [EC-122, "DTC Logic"](#).

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0386	CKP SEN/CIRCUIT B (Crankshaft position sensor 2 performance)	The pulse signal transmitted from the crankshaft position sensor 2 to ECM is not normal at immediately before engine stop of idling stop or restart.	<ul style="list-style-type: none"><li>• Harness or connectors (Crankshaft position sensor 2 circuit is open or shorted.)</li><li>• Crankshaft position sensor 2</li><li>• Drive plate (Ring gear)</li></ul>

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# P0420 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0420 THREE WAY CATALYST FUNCTION

### DTC Logic

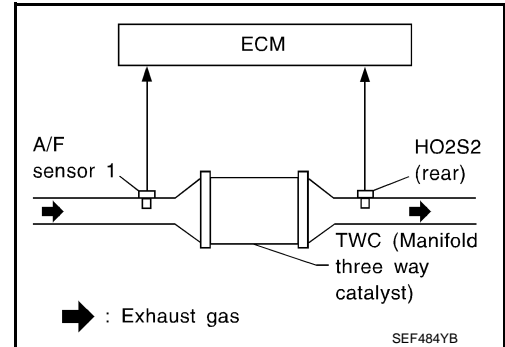
INFOID:000000008758397

#### DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold)	<ul style="list-style-type: none"> <li>• Three way catalyst (manifold) does not operate properly.</li> <li>• Three way catalyst (manifold) does not have enough oxygen storage capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• Three way catalyst (manifold)</li> <li>• Exhaust tube</li> <li>• Intake air leaks</li> <li>• Exhaust gas leaks</li> <li>• Fuel injector</li> <li>• Fuel injector leaks</li> <li>• Spark plug</li> <li>• Improper ignition timing</li> </ul>

# P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### DTC Logic

INFOID:000000008758398

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0444	PURG VOLUME CONT/V (EVAP canister purge volume control solenoid valve circuit open)	An excessively low voltage signal is sent to ECM through the EVAP canister purge volume control solenoid valve.	<ul style="list-style-type: none"><li>• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.)</li><li>• EVAP canister purge volume control solenoid valve</li></ul>

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P0500 VSS

Description

INFOID:000000008758399

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 Logic

INFOID:000000008758400

DTC DETECTION LOGIC

**NOTE:**

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-134, "DTC Logic"](#).

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h, 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.	<ul style="list-style-type: none"> <li>• Combination meter</li> <li>• ABS actuator and electric unit (control unit)</li> <li>• Wheel sensor</li> <li>• TCM</li> <li>• Output speed sensor</li> </ul>

P0506 ISC SYSTEM

Description

INFOID:000000008758401

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 1 (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000008758402

DTC DETECTION LOGIC

**NOTE:**

**If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0506	ISC SYSTEM (Idle speed control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.	<ul style="list-style-type: none"> <li>• Electric throttle control actuator</li> <li>• Intake air leak</li> </ul>

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P0507 ISC SYSTEM

Description

INFOID:000000008758403

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 1 (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000008758404

DTC DETECTION LOGIC

**NOTE:**

**If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0507	ISC SYSTEM (Idle speed control system RPM higher than expected)	The idle speed is more than the target idle speed by 200 rpm or more.	<ul style="list-style-type: none"> <li>• Electric throttle control actuator</li> <li>• Intake air leak</li> <li>• PCV system</li> </ul>

# P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0520 EOP SENSOR

### DTC Logic

INFOID:000000008758405

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	Detecting condition	Possible cause
P0520	EOP SENSOR/SWITCH [Engine oil pressure (EOP) sensor circuit]	<ul style="list-style-type: none"> <li>• Signal voltage from the EOP sensor remains at 0.3 V or less for 5 seconds or more.</li> <li>• Signal voltage from the EOP sensor remains at more than 5.02 V for 5 seconds or more.</li> </ul>	<ul style="list-style-type: none"> <li>• Harness or connectors (EOP sensor circuit is open or shorted.)</li> <li>(Camshaft position sensor circuit is open or shorted)</li> <li>(Fuel rail pressure sensor circuit is open or shorted.)</li> <li>(Battery current sensor circuit is open or shorted.)</li> <li>(Exhaust valve timing control position sensor circuit is open or shorted.)</li> <li>(Accelerator pedal position sensor 2 circuit is open or shorted.)</li> <li>(Atmospheric pressure sensor circuit is open or shorted.)</li> <li>• Engine oil level abnormality</li> <li>• EOP sensor</li> <li>• Camshaft position sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Battery current sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> </ul>

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# P0524 ENGINE OIL PRESSURE

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P0524 ENGINE OIL PRESSURE

### DTC Logic

INFOID:000000008758406

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	The signal transmitted from the EOP sensor to ECM is less than specification value when engine speed is 1,000 rpm or more for 10 seconds or more.	<ul style="list-style-type: none"><li>• Engine oil pressure or level too low</li><li>• Engine oil condition</li><li>• Engine oil pressure sensor</li><li>• Engine</li></ul>

# P0555 BRAKE BOOSTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0555 BRAKE BOOSTER PRESSURE SENSOR

### DTC Logic

INFOID:000000008758407

### DTC DETECTION LOGIC

**NOTE:**

If DTC P0555 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Refer to [EC-138](#). "DTC Logic".

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0555	BRAKE BSTR PRES SEN/ CIRC (Brake booster pressure sensor circuit)	<ul style="list-style-type: none"><li>• An excessively low voltage from the brake booster pressure sensor is sent to ECM.</li><li>• An excessively high voltage from the brake booster pressure sensor is sent to ECM.</li></ul>	<ul style="list-style-type: none"><li>• Harness or connectors (Brake booster pressure sensor circuit is open or shorted.)</li><li>• Brake booster pressure sensor</li></ul>

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# P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0603 ECM POWER SUPPLY

### DTC Logic

INFOID:000000008758408

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0603	ECM BACK UP/CIRCUIT (ECM power supply circuit)	ECM back up RAM system does not function properly.	<ul style="list-style-type: none"><li>• Harness or connectors [ECM power supply (back up) circuit is open or shorted.]</li><li>• ECM</li></ul>

# P0605 ECM

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0605 ECM

### DTC Logic

INFOID:000000008758409

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0605	ECM (Engine control module)	A)	ECM calculation function is malfunctioning.	ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	
		D)	ECM temperature sensor is malfunctioning.	

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# P0607 ECM

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P0607 ECM

### DTC Logic

INFOID:000000008758410

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0607	ECM (CAN communication bus)	When detecting error during the initial diagnosis of CAN controller of ECM.	ECM

# P0611 ECM PROTECTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0611 ECM PROTECTION

### Description

INFOID:000000008758411

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.

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### DTC Logic

INFOID:000000008758412

### DTC DETECTION LOGIC

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DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0611	FIC MODULE (ECM protection)	ECM overheat protection control is activated.	ECM overheated

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# P0620 SUB STARTER & GENERATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0620 SUB STARTER & GENERATOR

### DTC Logic

INFOID:000000008758413

### DTC DETECTION LOGIC

**NOTE:**

If DTC P0620 is displayed with DTC U0120, U1040, U1041, U1042, U1043 or U1044, perform the trouble diagnosis for DTC U0120, U1040, U1041, U1042, U1043 or U1044.

Refer to [EC-51, "DTC Index"](#).

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0620	GENERATOR (Sub starter & generator control circuit)	When sub starter & generator cannot normally receive the sub starter drive signal when the engine starts with starter motor first time.	<ul style="list-style-type: none"><li>• Harness or connectors (Sub starter drive circuit is open or shorted)</li><li>• Sub starter &amp; generator</li><li>• ECM</li></ul>

P062B ECM

Description

INFOID:000000008758414

This DTC is detected when the ECM-integrated injector driver unit has a malfunction. For injector driver unit.

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EC

DTC Logic

INFOID:000000008758415

DTC DETECTION LOGIC

C

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062B	ECM (Internal control module fuel injector control performance)	Injector driver unit is malfunctioning.	<ul style="list-style-type: none"> <li>• Harness or connectors (Injector circuit is open or shorted)</li> <li>• Battery power supply</li> <li>• ECM (injector driver unit)</li> </ul>

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# P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0643 SENSOR POWER SUPPLY

### DTC Logic

INFOID:000000008758416

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0643	SENSOR POWER/ CIRC (Sensor power supply circuit short)	ECM detects a voltage of power source for sensor is excessively low or high.	<ul style="list-style-type: none"><li>• Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) (Crankshaft position sensor 1 circuit is open or shorted) (Crankshaft position sensor 2 circuit is open or shorted) (Brake booster pressure sensor circuit is open or shorted) (Accelerator pedal position sensor 1 circuit is open or shorted.) (Throttle position sensor circuit is open or shorted.)</li><li>• Refrigerant pressure sensor</li><li>• Crankshaft position sensor 1</li><li>• Crankshaft position sensor 2</li><li>• Brake booster pressure sensor</li><li>• Accelerator pedal position sensor 1</li><li>• Throttle position sensor</li></ul>

# P065B SUB STARTER & GENERATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P065B SUB STARTER & GENERATOR

### DTC Logic

INFOID:000000008758417

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P065B	GENERATOR (Sub starter & generator control range/performance)	When sub starter & generator does a ignition switch (ON) signal more than 4 seconds and cannot receive it.	<ul style="list-style-type: none"><li>• Harness or connectors [ignition switch (ON) signal circuit is open]</li><li>• Sub starter &amp; generator</li></ul>

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# P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0850 PNP SWITCH

### Description

INFOID:000000008758418

Transmission range switch is turn ON when the selector lever is P or N.  
ECM detects the position because the continuity of the line (the ON) exists.

### DTC Logic

INFOID:000000008758419

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0850	P-N POS SW/CIRCUIT (Park/neutral position switch)	The signal of transmission range switch is not changed in the process of engine starting and driving.	<ul style="list-style-type: none"><li>• Harness or connectors (The transmission range switch circuit is open or shorted.)</li><li>• Transmission range switch</li></ul>

# P0A1E SUB STARTER & GENERATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0A1E SUB STARTER & GENERATOR

### DTC Logic

INFOID:000000008758420

### DTC DETECTION LOGIC

#### NOTE:

- If DTC P0A1E is displayed with DTC U0120, U1040, U1041, U1042, U1043 or U1044, first perform the trouble diagnosis for DTC U0120, U1040, U1041, U1042, U1043 or U1044.  
Refer to [EC-51. "DTC Index"](#).
- If DTC P0A1E is displayed with DTC P0620, first perform the trouble diagnosis for DTC P0620.  
Refer to [EC-136. "DTC Logic"](#).

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A1E	STR/GEN C/M (Sub starter & generator control module)	When ECM continuously detects the abnormal signal of sub starter & generator internal circuit for 2 seconds or more.	Sub starter & generator (Internal circuit is open or shorted.)

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# P0A8F SUB STARTER & GENERATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P0A8F SUB STARTER & GENERATOR

### DTC Logic

INFOID:000000008758421

### DTC DETECTION LOGIC

**NOTE:**

- If DTC P0A8F is displayed with DTC U0120, U1040, U1041, U1042, U1043 or U1044, first perform the trouble diagnosis for DTC U0120, U1040, U1041, U1042, U1043 or U1044.  
Refer to [EC-51. "DTC Index"](#).
- If DTC P0A8F is displayed with DTC P0620, P065B or P0A1E, first perform the trouble diagnosis for DTC P0620, P065B or P0A1E.  
Refer to [EC-51. "DTC Index"](#).

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A8F	14V PWR MDL SYS (14V power-module system malfunction )	When the rotor of the generator doesn't rotate or the reverse-rotation detected during cranking for 0.2 seconds or more.	<ul style="list-style-type: none"> <li>• Friction of each pulley is large</li> <li>• Sub starter &amp; generator internal circuit is open</li> </ul>
		When ECM detects the generator speed does not rise up for 0.2 seconds or more.	<ul style="list-style-type: none"> <li>• Battery</li> <li>• Resistance of the electrical system is large</li> <li>• Friction of each pulley is large</li> <li>• Sub starter &amp; generator state temperature is rise</li> </ul>

# P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1078 EVT CONTROL POSITION SENSOR

DTC Logic

INFOID:000000008758422

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1078	EXH TIM SEN/CIRC-B1 (Exhaust valve timing control position sensor circuit)	An excessively high or low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Exhaust valve timing control position sensor circuit is open or shorted)</li> <li>(Camshaft position sensor circuit is open or shorted)</li> <li>(Fuel rail pressure sensor circuit is open or shorted.)</li> <li>(Battery current sensor circuit is open or shorted.)</li> <li>(Accelerator pedal position sensor 2 circuit is open or shorted.)</li> <li>(Atmospheric pressure sensor circuit is open or shorted.)</li> <li>(Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Accumulation of debris to the signal pick-up portion of the camshaft</li> <li>• Exhaust valve timing control position sensor</li> <li>• Crankshaft position sensor 1</li> <li>• Camshaft position sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Battery current sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Engine oil pressure sensor</li> </ul>

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# P1197 OUT OF GAS

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1197 OUT OF GAS

### Description

INFOID:000000008758423

This diagnosis result is detected when the fuel level of the fuel tank is extremely low and the engine does not run normally.

### DTC Logic

INFOID:000000008758424

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1197	FUEL RUN OUT (Out of gas)	<ul style="list-style-type: none"><li>Fuel rail pressure remains at 1.1 MPa or less for 5 seconds or more with the fuel level too low.</li><li>Fuel rail pressure remains 2.7 MPa lower than a target fuel pressure for 5 seconds or more with the fuel level too low.</li></ul>	<ul style="list-style-type: none"><li>Out of gas</li><li>Harness or connectors (Low pressure fuel pump circuit is open or shorted.)</li><li>Low pressure fuel pump</li><li>Fuel pressure regulator</li><li>Low pressure fuel system</li><li>Harness or connectors (High pressure fuel pump circuit is shorted.)</li><li>High pressure fuel pump</li><li>High pressure fuel system</li><li>Fuel rail pressure sensor</li><li>Disconnection of the fuel hose</li></ul>

# P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1212 TCS COMMUNICATION LINE

### Description

INFOID:000000008758425

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.

**Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.**

### DTC Logic

INFOID:000000008758426

### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to [EC-87, "DTC Logic"](#).
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-134, "DTC Logic"](#).

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1212	TCS/CIRC (TCS communication line)	ECM cannot receive the information from “ABS actuator and electric unit (control unit)” continuously.	<ul style="list-style-type: none"><li>• Harness or connectors (CAN communication line is open or shorted.)</li><li>• ABS actuator and electric unit (control unit)</li><li>• Dead (Weak) battery</li></ul>

# P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1217 ENGINE OVER TEMPERATURE

### DTC Logic

INFOID:000000008758427

#### DTC DETECTION LOGIC

##### NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to [EC-51, "DTC Index"](#).
- If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-134, "DTC Logic"](#).

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1217	ENG OVER TEMP [Engine over temperature (Overheat)]	<ul style="list-style-type: none"><li>• Cooling fan does not operate properly (Overheat).</li><li>• Cooling fan system does not operate properly (Overheat).</li><li>• Engine coolant was not added to the system using the proper filling method.</li><li>• Engine coolant is not within the specified range.</li></ul>	<ul style="list-style-type: none"><li>• Harness or connectors (Cooling fan circuit is open or shorted.)</li><li>• IPDM E/R</li><li>• Cooling fan relay</li><li>• Cooling fan motor</li><li>• Cooling fan</li><li>• Radiator hose</li><li>• Radiator</li><li>• Radiator cap</li><li>• Water pump</li><li>• Thermostat</li><li>• Water control valve</li><li>• Engine coolant level</li></ul>

##### CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Also, replace the engine oil.

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio.
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

# P1225 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1225 TP SENSOR

### DTC Logic

INFOID:000000008758428

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1225	CTP LEARNING-B1 [Closed throttle position learning performance]	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

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# P1226 TP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P1226 TP SENSOR

### DTC Logic

INFOID:000000008758429

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1226	CTP LEARNING-B1 (Closed throttle position learning performance)	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

# P1513 SUB STARTER & GENERATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1513 SUB STARTER & GENERATOR

### Description

INFOID:000000008837713

ECM memorizes the operating count of sub starter & generator when restarting the engine from idling stop and activating torque assist.

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### DTC Logic

INFOID:000000008837714

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1513	S/STR & GENERTR OPER COUNTR (S/STR & GENERTR OPER COUNTR)	When ECM detects the more than 600,000 times of sub starter & generator operation count.	When operation count of sub starter & generator exceeds a specified value.

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# P1540 SUB BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1540 SUB BATTERY CURRENT SENSOR

### DTC Logic

INFOID:000000008837716

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1540	BATTERY CURRENT SENSOR B (Sub battery current sensor circuit range/performance)	The output voltage of the sub battery current sensor remains within the specified range.	<ul style="list-style-type: none"><li>• Harness or connectors (Main battery current sensor circuit is open or shorted.) (Sub battery current circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li><li>• Main battery current sensor</li><li>• Sub battery current sensor</li><li>• Camshaft position sensor</li><li>• Fuel rail pressure sensor</li><li>• Exhaust valve timing control position sensor</li><li>• Accelerator pedal position sensor 2</li><li>• Atmospheric pressure sensor</li><li>• Engine oil pressure sensor</li></ul>

# P1541, P1542 SUB BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1541, P1542 SUB BATTERY CURRENT SENSOR

### DTC Logic

INFOID:000000008837719

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1541	BATTERY CURRENT SENSOR B (Sub battery current sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Main battery current sensor circuit is open or shorted.) (Sub battery current circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Main battery current sensor</li> <li>• Sub battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Engine oil pressure sensor</li> </ul>
P1542	BATTERY CURRENT SENSOR B (Sub battery current sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

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# P1543 SUB BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1543 SUB BATTERY CURRENT SENSOR

### DTC Logic

INFOID:000000008837722

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1543	BAT CURRENT SENSOR B (Sub battery current sensor performance 1)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	<ul style="list-style-type: none"> <li>• Harness or connectors (Main battery current sensor circuit is open or shorted.) (Sub battery current circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Main battery current sensor</li> <li>• Sub battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Engine oil pressure sensor</li> </ul>

# P1544 SUB BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1544 SUB BATTERY CURRENT SENSOR

### DTC Logic

INFOID:000000008837725

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1544	BAT CURRENT SENSOR B (Sub battery current sensor performance 2)	The output voltage of the sub battery current sensor is lower than the specified value while the battery voltage is high enough.	<ul style="list-style-type: none"> <li>• Harness or connectors (Main battery current sensor circuit is open or shorted.) (Sub battery current circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or short-ed.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Main battery current sensor</li> <li>• Sub battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Engine oil pressure sensor</li> </ul>

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# P1546, P1547 SUB BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1546, P1547 SUB BATTERY TEMPERATURE SENSOR

### DTC Logic

INFOID:000000008837729

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1546	BATTERY TEMPERATURE SENSOR B (Sub battery temperature sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"><li>• Harness or connectors [Sub battery current sensor (Sub battery temperature sensor) circuit is shorted.]</li><li>• Sub battery current sensor (Sub battery temperature sensor)</li></ul>
P1547	BATTERY TEMPERATURE SENSOR B (Sub battery temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

# P1550 MAIN BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1550 MAIN BATTERY CURRENT SENSOR

### DTC Logic

INFOID:000000008758430

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1550	BAT CURRENT SENSOR (Main battery current sensor circuit range/performance)	The output voltage of the main battery current sensor remains within the specified range.	<ul style="list-style-type: none"> <li>• Harness or connectors (Main battery current sensor circuit is open or shorted.) (Sub battery current circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Main battery current sensor</li> <li>• Sub battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Engine oil pressure sensor</li> </ul>

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# P1551, P1552 MAIN BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1551, P1552 MAIN BATTERY CURRENT SENSOR

### DTC Logic

INFOID:000000008758431

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1551	BAT CURRENT SENSOR (Main battery current sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Main battery current sensor circuit is open or shorted.) (Sub battery current circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Main battery current sensor</li> <li>• Sub battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Engine oil pressure sensor</li> </ul>
P1552	BAT CURRENT SENSOR (Main battery current sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

# P1553 MAIN BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1553 MAIN BATTERY CURRENT SENSOR

### DTC Logic

INFOID:000000008758432

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1553	BAT CURRENT SENSOR (Main battery current sensor performance)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	<ul style="list-style-type: none"> <li>• Harness or connectors (Main battery current sensor circuit is open or shorted.) (Sub battery current circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Main battery current sensor</li> <li>• Sub battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Engine oil pressure sensor</li> </ul>

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# P1554 MAIN BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1554 MAIN BATTERY CURRENT SENSOR

### DTC Logic

INFOID:000000008758433

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1554	BAT CURRENT SENSOR (Main battery current sensor performance)	The output voltage of the main battery current sensor is lower than the specified value while the battery voltage is high enough.	<ul style="list-style-type: none"><li>• Harness or connectors (Main battery current sensor circuit is open or shorted.) (Sub battery current circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li><li>• Main battery current sensor</li><li>• Sub battery current sensor</li><li>• Camshaft position sensor</li><li>• Fuel rail pressure sensor</li><li>• Exhaust valve timing control position sensor</li><li>• Accelerator pedal position sensor 2</li><li>• Atmospheric pressure sensor</li><li>• Engine oil pressure sensor</li></ul>

# P1556, P1557 MAIN BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1556, P1557 MAIN BATTERY TEMPERATURE SENSOR

### DTC Logic

INFOID:000000008758434

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1556	BAT TMP SEN/CIRC (Main battery temperature sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors [Main battery current sensor (Main battery temperature sensor) circuit is shorted.]</li> <li>• Main battery current sensor (Main battery temperature sensor)</li> </ul>
P1557	BAT TMP SEN/CIRC (Main battery temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

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# P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1564 ASCD STEERING SWITCH

### DTC Logic

INFOID:000000008758435

### DTC DETECTION LOGIC

**NOTE:**

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-133, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SW (ASCD steering switch)	ECM detects that input signal from the ASCD steering switch is out of the specified range.	<ul style="list-style-type: none"><li>• Harness or connectors (ASCD steering switch circuit is open or shorted.)</li><li>• ASCD steering switch</li><li>• ECM</li></ul>

# P1572 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1572 ASCD BRAKE SWITCH

### DTC Logic

INFOID:000000008758436

### DTC DETECTION LOGIC

**NOTE:**

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-133, "DTC Logic"](#).
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P1572	ASC D BRAKE SW (ASC D brake switch)	A)	When the vehicle speed is above 30 km/h, ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	<ul style="list-style-type: none"> <li>• Harness or connectors (Stop lamp switch circuit is shorted.) (ASC D brake switch circuit is shorted.)</li> <li>• Stop lamp switch</li> <li>• ASCD brake switch</li> <li>• Incorrect stop lamp switch installation</li> <li>• Incorrect ASCD brake switch installation</li> <li>• ECM</li> </ul>
		B)	ASC D brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

# P1574 ASCD VEHICLE SPEED SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P1574 ASCD VEHICLE SPEED SENSOR

### Description

INFOID:000000008758437

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control.

### DTC Logic

INFOID:000000008758438

#### DTC DETECTION LOGIC

##### NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to [EC-87, "DTC Logic"](#).
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to [EC-126, "DTC Logic"](#).
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-133, "DTC Logic"](#).
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to [EC-134, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1574	ASCD VHL SPD SEN (ASCD vehicle speed sensor)	ECM detects a difference between two vehicle speed signals is out of the specified range.	<ul style="list-style-type: none"><li>• Harness or connectors (CAN communication line is open or shorted.)</li><li>• Combination meter</li><li>• Wheel sensor</li><li>• ABS actuator and electric unit (control unit)</li><li>• ECM</li><li>• TCM</li></ul>

# P1575 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P1575 BRAKE SWITCH

### DTC Logic

INFOID:000000008758439

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1575	BRAKE SW (Stop lamp switch circuit)	Stop lamp switch signal is sent to ECM for extremely long time while the vehicle is being driven.	<ul style="list-style-type: none"><li>• Harness or connectors (Stop lamp switch circuit is shorted.)</li><li>• Stop lamp switch</li></ul>

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# P1805 BRAKE SWITCH

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P1805 BRAKE SWITCH

### DTC Logic

INFOID:000000008758440

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1805	BRAKE SW/CIRCUIT (Brake switch)	A stop lamp switch signal is not sent to ECM for extremely long time while the vehicle is driving.	<ul style="list-style-type: none"><li>• Harness or connectors (Stop lamp switch circuit is open or shorted.)</li><li>• Stop lamp switch</li></ul>

# P2008 TUMBLE CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P2008 TUMBLE CONTROL VALVE

### DTC Logic

INFOID:000000008758441

### DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2008	TUMBLE CONT/V (Tumble control valve circuit open)	Tumble control valve motor signal circuit is open.	<ul style="list-style-type: none"><li>• Harness or connectors (Tumble control valve motor signal circuit is open.)</li><li>• Tumble control valve motor</li></ul>

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# P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P2100, P2103 THROTTLE CONTROL MOTOR RELAY

### DTC Logic

INFOID:000000008758442

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2100	ETC MOT PWR-B1 (Throttle control motor relay circuit open)	ECM detects a voltage of power source for throttle control motor is excessively low.	<ul style="list-style-type: none"><li>• Harness or connectors (Throttle control motor relay circuit is open)</li><li>• Throttle control motor relay</li></ul>
P2103	ETC MOT PWR (Throttle control motor relay circuit short)	ECM detect the throttle control motor relay is stuck ON.	<ul style="list-style-type: none"><li>• Harness or connectors (Throttle control motor relay circuit is shorted)</li><li>• Throttle control motor relay</li></ul>

# P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P2101 ELECTRIC THROTTLE CONTROL FUNCTION

### DTC Logic

INFOID:000000008758443

### DTC DETECTION LOGIC

#### NOTE:

- If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to [EC-166, "DTC Logic"](#).
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to [EC-169, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2101	ETC FNCTN/CIRC-B1 (Electric throttle control performance)	Electric throttle control function does not operate properly.	<ul style="list-style-type: none"><li>• Harness or connectors (Throttle control motor circuit is open or shorted)</li><li>• Electric throttle control actuator</li></ul>

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# P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P2118 THROTTLE CONTROL MOTOR

### DTC Logic

INFOID:000000008758444

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2118	ETC MOT-B1 (Throttle control motor circuit short)	ECM detects short in both circuits between ECM and throttle control motor.	<ul style="list-style-type: none"><li>• Harness or connectors (Throttle control motor circuit is shorted.)</li><li>• Electric throttle control actuator (Throttle control motor)</li></ul>

# P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:000000008758445

DTC DETECTION LOGIC

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DTC No.	Trouble diagnosis name (Trouble diagnosis content)		DTC detecting condition	Possible cause
P2119	ETC ACTR-B1 (Electric throttle control actuator)	A	Electric throttle control actuator does not function properly due to the return spring malfunction.	Electric throttle control actuator
		B	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C	ECM detect the throttle valve is stuck open.	

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# P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P2122, P2123 APP SENSOR

### DTC Logic

INFOID:000000008758446

### DTC DETECTION LOGIC

**NOTE:**

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-138, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2122	APP SEN 1/CIRC (Accelerator pedal position sensor 1 circuit low input)	An excessively low voltage from the APP sensor 1 is sent to ECM.	<ul style="list-style-type: none"><li>• Harness or connectors (APP sensor 1 circuit is open or shorted.)</li><li>• Accelerator pedal position sensor (APP sensor 1)</li></ul>
P2123	APP SEN 1/CIRC (Accelerator pedal position sensor 1 circuit high input)	An excessively high voltage from the APP sensor 1 is sent to ECM.	

# P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P2127, P2128 APP SENSOR

### DTC Logic

INFOID:000000008758447

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2127	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit low input)	An excessively low voltage from the APP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> <li>• (Accelerator pedal position sensor 2 circuit is open or shorted.) Harness or connectors (Atmospheric pressure sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> </ul>
P2128	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit high input)	An excessively high voltage from the APP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor 2</li> <li>• Atmospheric pressure sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Engine oil pressure sensor</li> </ul>

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# P2135 TP SENSOR

[MR20DD]

< DTC/CIRCUIT DIAGNOSIS >

## P2135 TP SENSOR

### DTC Logic

INFOID:000000008758448

### DTC DETECTION LOGIC

**NOTE:**

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-138, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2135	TP SENSOR-B1 (Throttle position sensor circuit range/performance)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	<ul style="list-style-type: none"><li>• Harness or connector (TP sensor 1 or 2 circuit is open or shorted.)</li><li>• Electric throttle control actuator (TP sensor 1 or 2)</li></ul>

# P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR20DD]

## P2138 APP SENSOR

### DTC Logic

INFOID:000000008758449

### DTC DETECTION LOGIC

**NOTE:**

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-138, "DTC Logic"](#).

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2138	APP SENSOR (Accelerator pedal position sensor circuit range/performance)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	<ul style="list-style-type: none"> <li>• Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) (Atmospheric pressure sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.)</li> <li>• Accelerator pedal position sensor (APP sensor 1 or 2)</li> <li>• Atmospheric pressure sensor</li> <li>• Fuel rail pressure sensor</li> <li>• Battery current sensor</li> <li>• Camshaft position sensor</li> <li>• Exhaust valve timing control position sensor</li> <li>• Engine oil pressure sensor</li> </ul>

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# ENGINE CONTROL SYSTEM

[MR20DD]

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### ENGINE CONTROL SYSTEM

#### Symptom Table

INFOID:000000008758450

#### SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM												
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)
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
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4		
	Fuel injector circuit	1	1	2	3	2		2	2			2		
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4		
	FRP sensor circuit	1	1	2	2	2		2	2			2		
	High pressure fuel pump circuit			4		3								
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1	
	Incorrect idle speed adjustment						1	1	1	1		1		
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2
	Tumble control valve system				4	4								
Igni- tion	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1		
	Ignition circuit	1	1	2	2	2		2	2			2		
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		
Mass air flow sensor circuit		1	1	2	3	2	3	2	2	3		2		
Engine coolant temperature sensor circuit														
Air fuel ratio (A/F) sensor 1 circuit														
Throttle position sensor circuit														
Accelerator pedal position sensor circuit														
Knock sensor circuit				3	2	1						3		
Engine oil temperature sensor circuit				4		2						3		
Crankshaft position sensor (POS) circuit		2	2											
Camshaft position sensor (PHASE) circuit		3	2											
Vehicle speed signal circuit			2	3		3						3		
ECM		2	2	3	3	3	3	3	3	3	3	3		
Intake valve timing control solenoid valve circuit			3	2		1	3	2	2	3		3		

# ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[MR20DD]

	SYMPTOM												
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3		
Exhaust valve timing control position sensor circuit	5	5	5	5	5		5	5			5		
PNP signal circuit			3		3		3	3			3		
Refrigerant pressure sensor circuit		2				3			3		4		
Cooling fan control module circuit	5	5	5	5	5		5	5	5	4	5		
Main battery current sensor circuit						4	5	5					3
Sub battery current sensor circuit						4	5	5					3
Sub battery relay circuit	5										5		3
Electrical load signal circuit							3						
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2
ABS actuator and electric unit (control unit)			4										

1 - 6: The numbers refer to the order of inspection.

## SYSTEM — ENGINE MECHANICAL & OTHER

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# ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

[MR20DD]

		SYMPTOM																	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/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																
	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	5	5	5	5	5	5	5	5	5	5	5	5					
	Air cleaner																		
	Air leakage from air duct (Mass air flow sensor - electric throttle control actuator)																		
	Electric throttle control actuator																		
	Air leakage from intake manifold/Collector/Gasket																		
Cranking	Battery	1	1	1		1		1	1					1					
	Generator circuit																		
	Starter circuit	3										1							
	Signal plate	6																	
	PNP signal	4																	
Engine	Cylinder head	5	5	5	5	5	5	5	5	5	4	5	3	5					
	Cylinder head gasket																		
	Cylinder block																		
	Piston																4		
	Piston ring																		
	Connecting rod	6		6	6	6		6			6	6				6			
	Bearing																		
	Crankshaft																		

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Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA
Valve mechanism	Timing chain													
	Camshaft													
	Intake valve timing control	5	5	5	5	5		5	5			5		
	Exhaust valve timing control													
	Intake valve												3	
	Exhaust valve													
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5		
	Three way catalyst													
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5		
	Oil level (Low)/Filthy oil													
Cooling	Radiator/Hose/Radiator filler cap													
	Thermostat									5				
	Water pump													
	Water gallery	5	5	5	5	5		5	5		4	5		
	Cooling fan													
	Coolant level (Low)/Contaminated coolant									5				
Idling stop system			1											

1 - 6: The numbers refer to the order of inspection.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

# IDLING STOP SYSTEM

< SYMPTOM DIAGNOSIS >

[MR20DD]

## IDLING STOP SYSTEM

### Symptom Table

INFOID:000000008758451

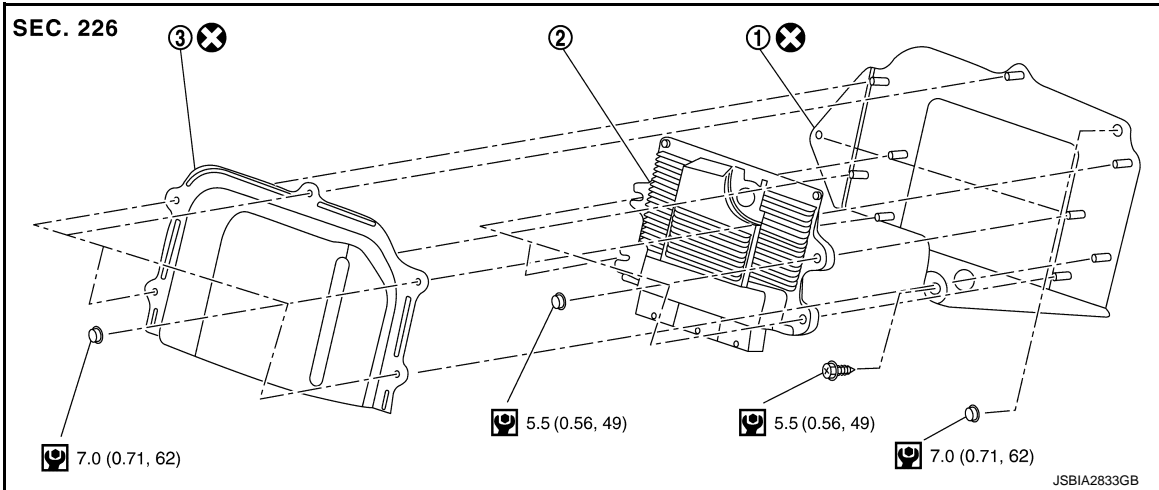
Symptom	Check items		Possible cause location/Trouble shooting
Idling stop system does not operate normally	Does not stop the engine	Idling stop indicator lamp does not turn ON	<ul style="list-style-type: none"> <li>• Idling stop system operation condition dissatisfaction (Refer to <a href="#">EC-20</a>.)</li> <li>• Sub starter &amp; generator</li> <li>• Battery</li> <li>- Data monitor item "CML B/DCHG CRNT" (Indicated less than "6,5000")</li> <li>• Idling stop OFF switch circuit</li> <li>• Hood switch circuit</li> <li>• Brake booster pressure sensor circuit</li> <li>• Battery current sensor circuit</li> <li>• Stop lamp switch circuit</li> <li>• G sensor circuit</li> <li>• Brake fluid pressure sensor circuit</li> <li>• ECM</li> <li>• TCM</li> <li>• ABS actuator and electric unit (control unit)</li> <li>• EPS control unit</li> <li>• A/C auto amp.</li> <li>• Combination meter</li> <li>• CAN communication circuit</li> </ul>
		Idling stop indicator lamp turn ON	Sub starter & generator
	Does not restart the engine		<ul style="list-style-type: none"> <li>• Sub starter &amp; generator</li> <li>• Engine mechanical</li> </ul>
Idling stop indicator lamp does not turn ON	Idling stop system operate normally		Combination meter

# REMOVAL AND INSTALLATION

## ECM

### Exploded View

INFOID:000000008901983



- 1. Bracket
- 2. ECM
- 3. Cover

:Always replace after every disassembly.

:N·m (kg·m, in·lb)

### Removal and Installation

INFOID:000000008758452

#### CAUTION:

- Before replacing ECM, perform “SAVING DATA FOR REPLC CPU” in “WORK SUPPORT” of CONSULT to save the current ECM data in CONSULT. Refer to [EC-68, "Work Procedure"](#).
- Must be perform additional service when replacing ECM. Refer to [EC-68, "Work Procedure"](#).

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR20DD]

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Idle Speed

INFOID:000000008758453

Condition	Specification
No load*	650 ± 50 rpm

\*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater and rear window defogger)
- Steering wheel: Kept in straight-ahead position

#### Ignition Timing

INFOID:000000008758454

Condition	Specification
No load*	12 ± 2°BTDC

\*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater and rear window defogger)
- Steering wheel: Kept in straight-ahead position

#### Calculated Load Value

INFOID:000000008758455

Condition	Specification
At idle	5 – 35%
2,500 rpm	5 – 35%

#### Mass Air Flow Sensor

INFOID:000000008758456

Condition	Specification
At idle	1.0 - 4.0 g/s
2,500 rpm	2.0 - 12.0 g/s