# SECTION CHG
# CHARGING SYSTEM

## CONTENTS

### TYPE 1

## TYPE 2

# HOW TO USE THIS MANUAL

## APPLICATION NOTICE

### Information

INFOID:0000000010957593

Check the vehicle type to use the service information in this section.

| Service information | System |
|---|---|
| TYPE 1 | With stop/start system |
| TYPE 2 | Without stop/start system |

# PRECAUTION

## PRECAUTIONS

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

INFOID:0000000010957594

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:**

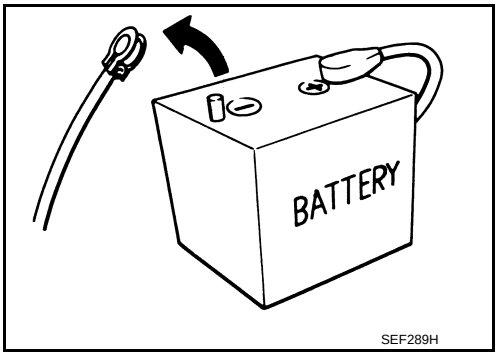
**Always observe the following items for preventing accidental activation.**

- **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.**

### Precautions for Removing Battery Terminal

INFOID:0000000010957595

- With the adoption of Auto ACC function, ACC power is automatically supplied by operating the intelligent key or remote keyless entry or by opening/closing the driver side door. In addition, ACC power is supplied even after the ignition switch is turned to the OFF position, i.e. ACC power is supplied for a certain fixed time.
- When disconnecting the 12V battery terminal, turn off the ACC power before disconnecting the 12V battery terminal, observing “How to disconnect 12V battery terminal” described below.
  **NOTE:**
  Some ECUs operate for a certain fixed time even after ignition switch is turned OFF and ignition power supply is stopped. If the battery terminal is disconnected before ECU stops, accidental DTC detection or ECU data damage may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  **NOTE:**
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  **NOTE:**
  The removal of 12V battery may cause a DTC detection error.



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#### HOW TO DISCONNECT 12V BATTERY TERMINAL

Disconnect 12V battery terminal according to Instruction 1 or Instruction 2 described below.
For vehicles parked by ignition switch OFF, refer to Instruction 2.

INSTRUCTION 1

1. Open the hood.

2. Turn key switch to the OFF position with the driver side door opened.
3. Get out of the vehicle and close the driver side door.
4. Wait at least 3 minutes. For vehicle with the engine listed below, remove the battery terminal after a lapse of the specified time.

| | |
|---|---|
| D4D engine | : 20 minutes |
| HRA2DDT | : 12 minutes |
| K9K engine | : 4 minutes |
| M9R engine | : 4 minutes |
| R9M engine | : 4 minutes |
| V9X engine | : 4 minutes |

**CAUTION:**
**While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.**

5. Remove 12V battery terminal.
**CAUTION:**
**After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.**

INSTRUCTION 2 (FOR VEHICLES PARKED BY IGNITION SWITCH OFF)

1. Unlock the door with intelligent key or remote keyless entry.
**NOTE:**
At this moment, ACC power is supplied.
2. Open the driver side door.
3. Open the hood.
4. Close the driver side door.
5. Wait at least 3 minutes.
**CAUTION:**
**While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.**
6. Remove 12V battery terminal.
**CAUTION:**
**After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.**

## Precaution for Stop/Start System Service

INFOID:0000000010957630

**CAUTION:**
**When performing an inspection and its related work with the engine at idle, always turn the stop/start OFF switch ON or open the hood to release the stop/start system.**

## Precaution for Energy Management System

INFOID:0000000010957597

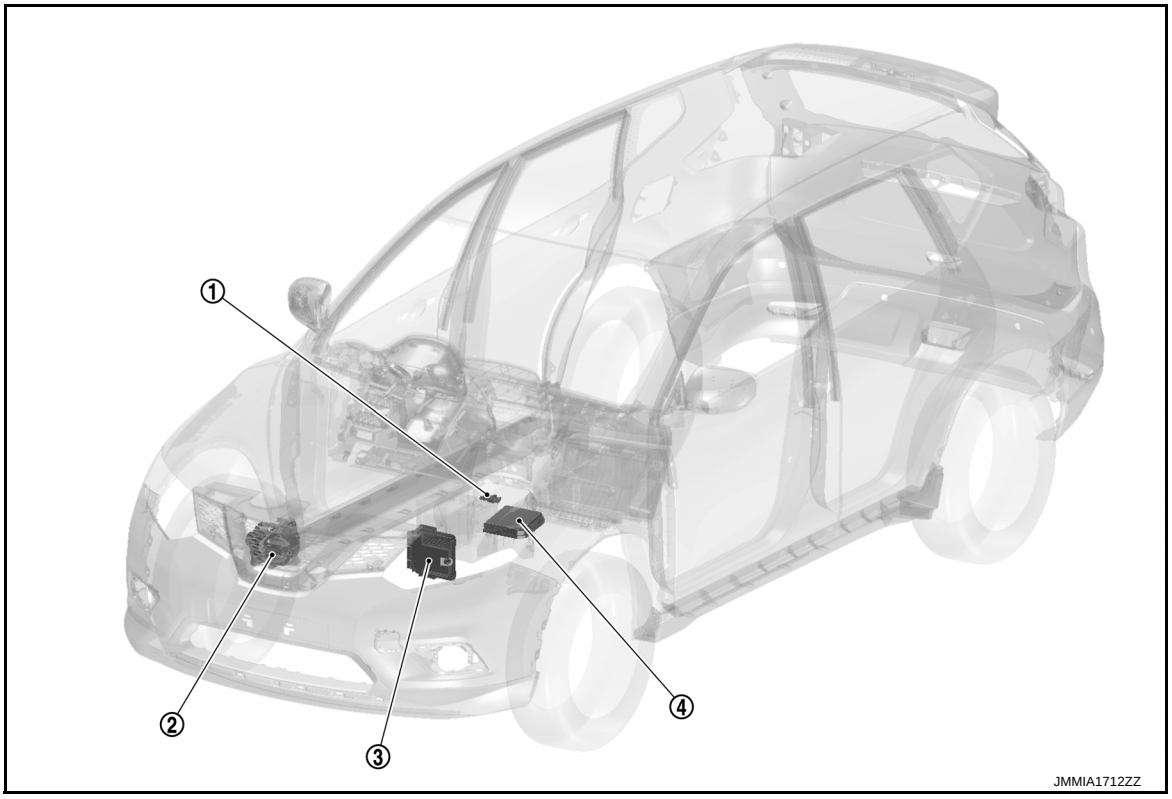
**CAUTION:**
**Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the energy management system, and then the battery discharge may occur.**

# SYSTEM DESCRIPTION

## COMPONENT PARTS

### Component Parts Location

INFOID:0000000010957631

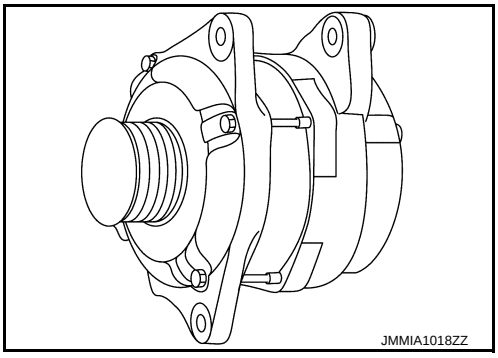



| No. | Component | Function |
|---|---|---|
| ① | Battery current sensor (With battery temperature sensor) | Refer to CHG-6, "Battery Current Sensor (With Battery Temperature Sensor)". |
| ② | Alternator | Refer to CHG-6, "Alternator". |
| ③ | ECM | ECM transmits the received alternator voltage request signal to alternator via LIN communication.<br>Refer to EC-812, "Component Parts Location" for detailed installation location. |
| ④ | IPDM E/R | IPDM E/R sends the alternator voltage request signal to ECM via CAN communication.<br>Refer to PCS-5, "Component Parts Location" for detailed installation location. |

### Alternator

INFOID:0000000010957599

The alternator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged.

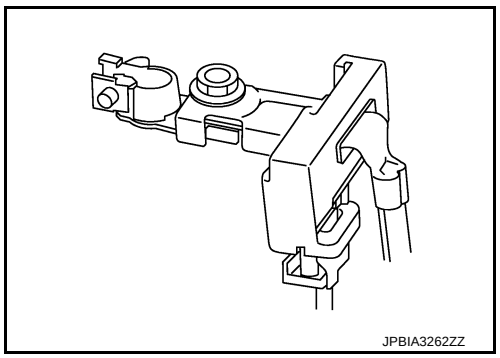



### Battery Current Sensor (With Battery Temperature Sensor)

INFOID:0000000010957600

BATTERY CURRENT SENSOR

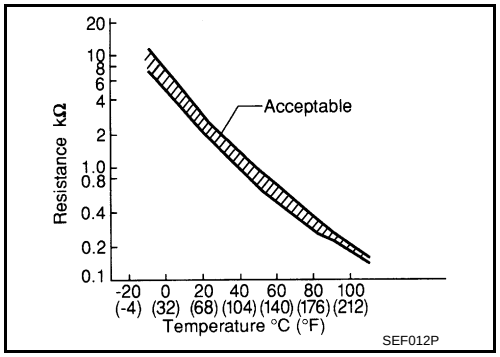
The battery current sensor is installed to the battery negative cable. The sensor measures the charging/discharging current of the battery.




## BATTERY TEMPERATURE SENSOR

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

| Temperature [°C (°F)] | Resistance (kΩ) |
|---|---|
| 25 (77) | 1.9 - 2.1 |
| 90 (194) | 0.222 - 0.258 |



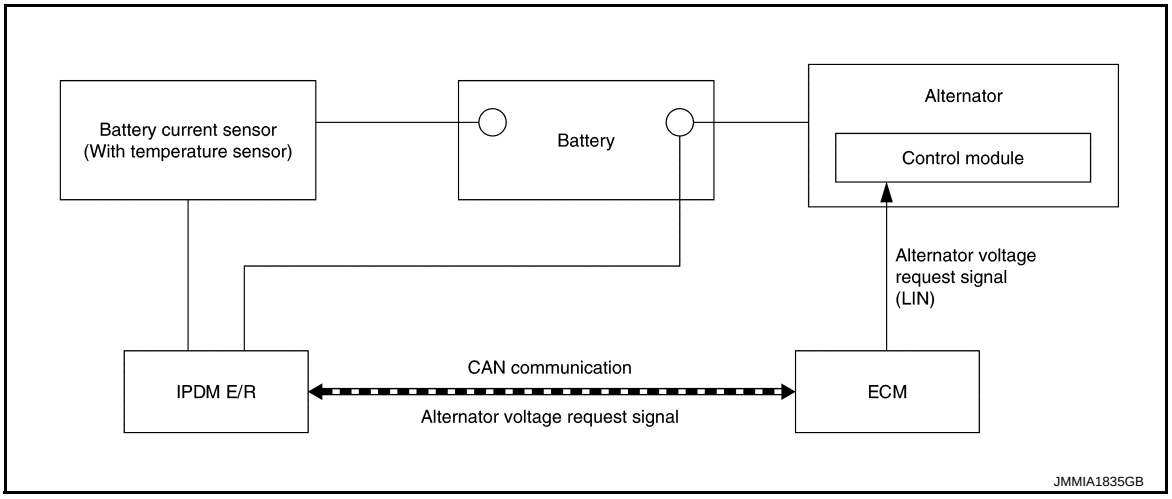
# SYSTEM

## ENERGY MANAGEMENT SYSTEM

### ENERGY MANAGEMENT SYSTEM : System Description

INFOID:0000000010957601

#### SYSTEM DIAGRAM




#### SYSTEM DESCRIPTION

- Battery current sensor (With battery temperature sensor) measures the charging/discharging current of the battery and the temperature around the battery.
- IPDM E/R judges battery condition according to the charging/discharging current of the battery and the temperature around the battery.
- IPDM E/R calculates the target power generation voltage according to the battery condition and sends the calculated value as alternator voltage request signal to ECM via CAN communication.
- ECM transmits alternator voltage request signal to alternator via LIN communication.
- Control module inside alternator controls the power generation voltage based on the received alternator voltage request signal.
- Alternator includes a self-diagnosis function and transmits the diagnosis result to ECM via LIN communication when detecting any malfunction.

## WARNING/INDICATOR/CHIME LIST

### WARNING/INDICATOR/CHIME LIST : Warning Lamps/Indicator Lamps

INFOID:0000000010957634

| Item | Design | Reference |
|---|---|---|
| Charge warning lamp |  | For layout, refer to MWI-10, "METER SYSTEM : Design".<br>For function, refer to MWI-30, "WARNING LAMPS/INDICATOR LAMPS : Charge Warning Lamp". |

# ECU DIAGNOSIS INFORMATION

## ECM, IPDM E/R

### List of ECU Reference

INFOID:0000000010957602

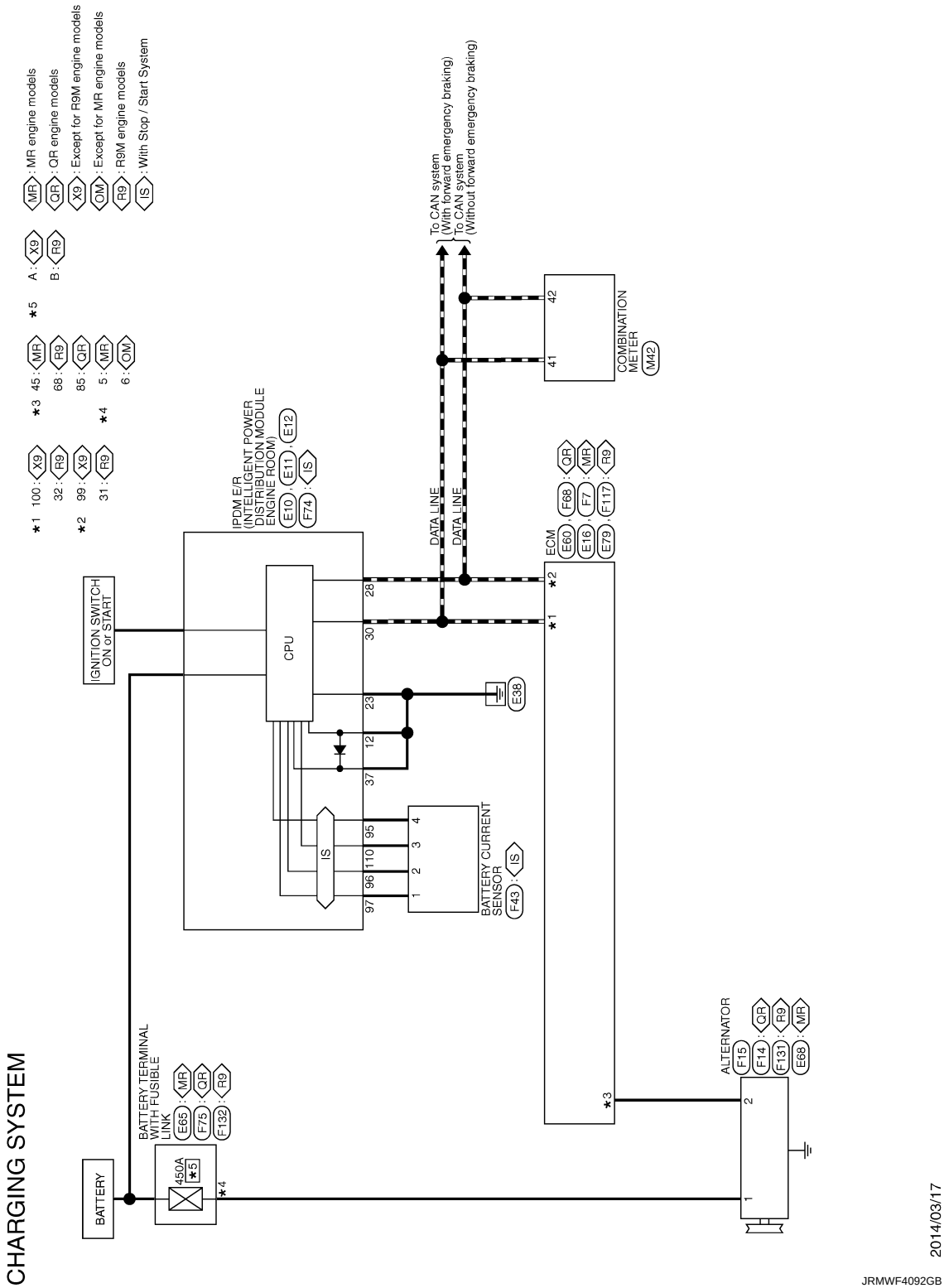
| ECU | Reference |
|---|---|
| ECM | EC-889, "Reference Value" |
| | EC-901, "Fail-safe" |
| | EC-907, "DTC Inspection Priority Chart" |
| | EC-908, "DTC Index" |
| IPDM E/R | PCS-22, "Reference Value" |
| | PCS-34, "Fail-safe" |
| | PCS-37, "DTC Inspection Priority Chart" |
| | PCS-38, "DTC Index" |

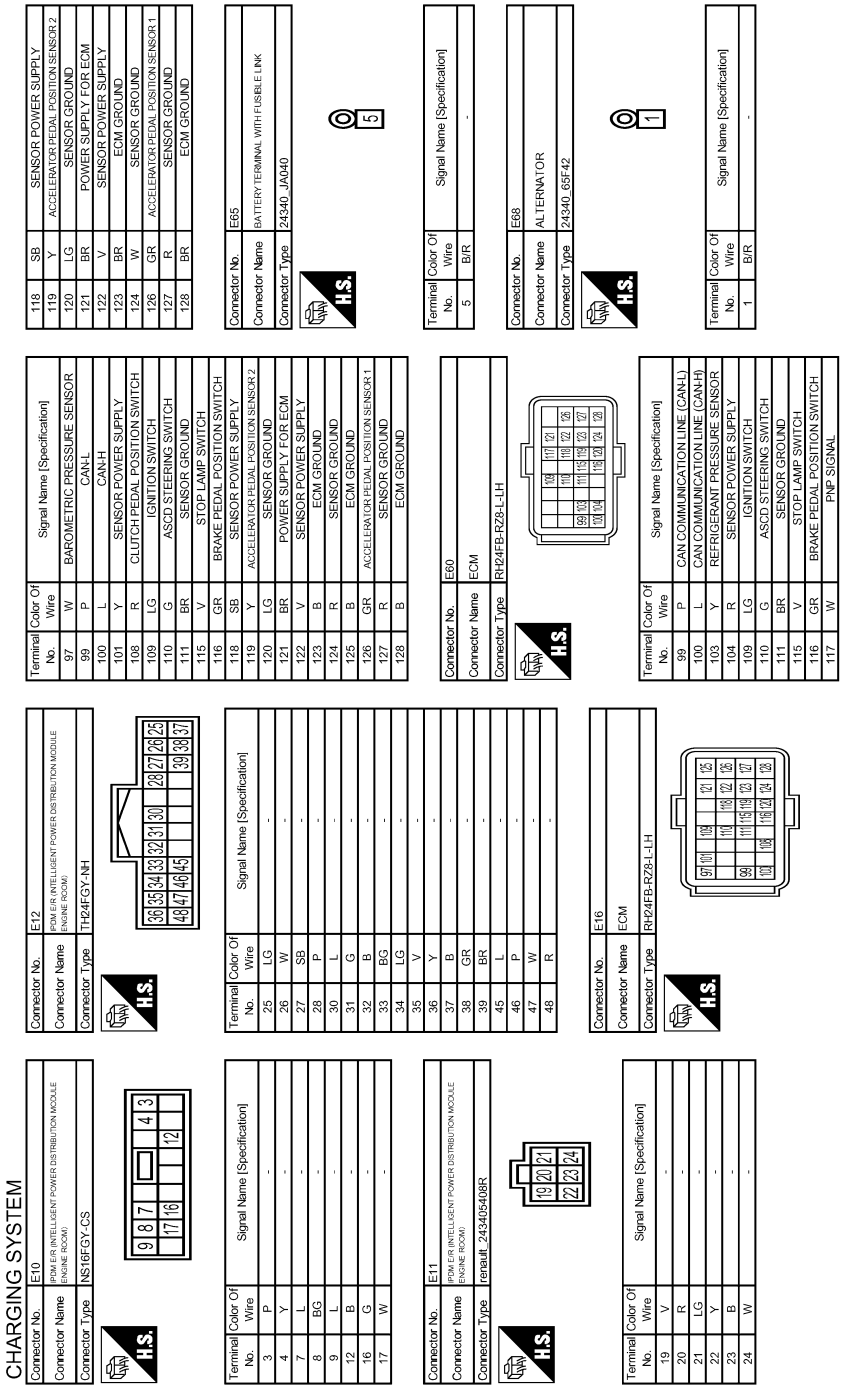
# WIRING DIAGRAM

## CHARGING SYSTEM

### Wiring Diagram

INFOID:0000000010957603



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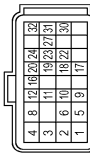
CHARGING SYSTEM

| Connector No. | E79 |
|---|---|
| Connector Name | ECM |
| Connector Type | RH24FB-RZ8-R-RH |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | B | ECM GROUND |
| 2 | W | ACCELERATOR PEDAL POSITION SENSOR 1 |
| 3 | Y | SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 1) |
| 4 | B | ECM GROUND |
| 5 | L | POWER SUPPLY FOR ECM |
| 6 | G | SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 1) |
| 8 | B | ECM GROUND |
| 9 | L | FUEL HEATER AND WATER IN FUEL LEVEL SENSOR |
| 10 | L | SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 2) |
| 11 | V | ACCELERATOR PEDAL POSITION SENSOR 2 |
| 12 | P | SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 2) |
| 16 | BG | STOP LAMP SWITCH [With M/T] |
| 16 | R | BRAKE PEDAL POSITION SWITCH [With CVT] |
| 17 | LG | IGNITION SWITCH |
| 18 | G | ASCD STEERING SWITCH |
| 19 | BR | SENSOR GROUND (ASCD STEERING SWITCH) |
| 20 | BR | FUEL PUMP CONTROL MODULE (COMMAND) |
| 22 | G | FUEL PUMP CONTROL MODULE (DIAGNOSIS) |
| 23 | V | SPEED LIMITER MAIN SWITCH |
| 24 | R | CLUTCH PEDAL POSITION SWITCH |
| 27 | V | CLUTCH INTERLOCK SWITCH |
| 30 | BR | ASCD MAIN SWITCH |
| 31 | P | CAN-L |
| 32 | L | CAN-H |

| Connector No. | F7 |
|---|---|
| Connector Name | ECM |
| Connector Type | RH40FB-RZ8-R-LH |

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | FUEL INJECTOR NO.1(HI) |
| 2 | W | FUEL INJECTOR NO.2(HI) |
| 3 | W | FUEL INJECTOR NO.3(HI) |
| 4 | W | FUEL INJECTOR NO.4(HI) |
| 5 | B | FUEL INJECTOR NO.1(LO) |
| 6 | B | FUEL INJECTOR NO.2(LO) |
| 7 | B | FUEL INJECTOR NO.3(LO) |
| 8 | B | FUEL INJECTOR NO.4(LO) |
| 11 | B | ECM GROUND |
| 12 | BR | SHIELD |
| 14 | W | PARK/NEUTRAL POSITION SIGNAL |
| 15 | R | GND(A-PHASE |
| 19 | W | CAMSHAFT POSITION SENSOR |
| 20 | L | SENSOR GROUND |
| 21 | L | SENSOR POWER SUPPLY |
| 23 | Y | SENSOR POWER SUPPLY |
| 24 | Y | SENSOR POWER SUPPLY |
| 25 | L | SENSOR GROUND |
| 28 | BR | MASS AIR FLOW SENSOR |
| 29 | GR | ENGINE OIL PRESSURE SENSOR |
| 31 | G | ENGINE COOLANT TEMPERATURE SENSOR |
| 32 | P | ENGINE OIL TEMPERATURE SENSOR |
| 33 | G | FUEL RAIL PRESSURE SENSOR |
| 34 | P | REFRIGERANT PRESSURE SENSOR |
| 35 | V | INTAKE AIR TEMPERATURE SENSOR |
| 36 | SHIELD | SENSOR GROUND |
| 39 | R | SENSOR GROUND |
| 40 | W | KNOCK SENSOR |
| 42 | B | SENSOR GROUND |
| 43 | G | SENSOR POWER SUPPLY |
| 44 | BR | SENSOR GROUND |
| 45 | G | LIN COMMUNICATION LINE [Without ISS] |
| 45 | L | LIN COMMUNICATION LINE [With ISS] |
| 46 | LG | EXHAUST VALVE TIMING CONTROL POSITION SENSOR |
| 48 | GR | CRANKSHAFT POSITION SENSOR |

| Connector No. | F14 |
|---|---|
| Connector Name | ALTERNATOR |
| Connector Type | 24340_EN013 |

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

| Connector No. | F15 |
|---|---|
| Connector Name | ALTERNATOR |
| Connector Type | RH02FB |



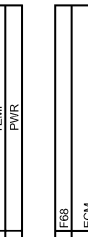
| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 2 | G | - |

| Connector No. | F43 |
|---|---|
| Connector Name | BATTERY CURRENT SENSOR |
| Connector Type | RH04FB |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | P | OUTPUT |
| 2 | W | GND |
| 3 | SB | TEMP |
| 4 | LG | PWR |

| Connector No. | F68 |
|---|---|
| Connector Name | ECM |
| Connector Type | RH40FBR-RZ8-R-LH |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 49 | G | INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (CLOSE) |
| 50 | V | INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY |
| 51 | Y | INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (OPEN) |
| 52 | B | ECM GROUND |
| 53 | P | A/F SENSOR 1 HEATER |
| 54 | V | HEATED OXYGEN SENSOR 2 HEATER |
| 56 | GR | INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL SOLENOID VALVE |
| 70 | BR | SENSOR GROUND |
| 71 | GR | CRANKSHAFT POSITION SENSOR |
| 72 | L | SENSOR POWER SUPPLY |
| 73 | SHIELD | SHIELD |
| 77 | W | THROTTLE POSITION SENSOR 2 |
| 78 | B | SENSOR GROUND |
| 79 | G | THROTTLE POSITION SENSOR 1 |
| 80 | R | SENSOR POWER SUPPLY |
| 83 | L | INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR |
| 84 | V | SENSOR POWER SUPPLY |
| 85 | G | LIN COMMUNICATION LINE |
| 86 | Y | IGNITION SIGNAL NO. 1 |
| 87 | BR | IGNITION SIGNAL NO. 2 |
| 89 | P | ECM RELAY (SELF SHUT-OFF) |
| 90 | W | IGNITION SIGNAL NO. 3 |
| 91 | SB | IGNITION SIGNAL NO. 4 |
| 92 | LG | SENSOR GROUND |
| 93 | L | INTAKE VALVE TIMING CONTROL SOLENOID VALVE |
| 94 | BR | EXHAUST VALVE TIMING CONTROL SOLENOID VALVE |

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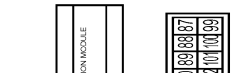
CHARGING SYSTEM

| Connector No. | F74 |
|---|---|
| Connector Name | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Type | TH24FB-NH |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 87 | L | - |
| 88 | P | - |
| 89 | W | - |
| 90 | R | - |
| 92 | GR | - |
| 93 | G | - [With R9M Engine] |
| 93 | P | - [With MR20 or QR25 Engine] |
| 94 | SB | - |
| 95 | LG | - |
| 96 | W | - |
| 97 | P | - |
| 98 | Y | - |
| 99 | BG | - |
| 100 | LG | - |
| 101 | V | - |
| 102 | Y | - |
| 105 | W | - |
| 106 | BR | - |
| 107 | V | - |
| 110 | SB | - |

| Connector No. | F75 |
|---|---|
| Connector Name | BATTERY TERMINAL WITH FUSIBLE LINK |
| Connector Type | 24348_51E05 |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 6 | B/R | - |

| Connector No. | F117 |
|---|---|
| Connector Name | ECM |
| Connector Type | RH66FB-RZ8-R-LH |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 35 | R | GLOW PLUG CONTROL (COMMAND) |
| 37 | LG | VOLTAGE STABILIZER SIGNAL |
| 38 | GR | FUEL PUMP RELAY CONTROL |
| 41 | G | ECM RELAY (SELF SHUT-OFF) |
| 42 | Y | RESTART RELAY |
| 43 | R | FUEL FLOW ACTUATOR |
| 46 | V | THERMOPLUNGER RELAY 2 |
| 49 | P | INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (-) |
| 50 | BG | THERMOPLUNGER RELAY 1 |
| 53 | Y | THERMAL MANAGEMENT CONTROL VALVE |
| 55 | R | |
| 56 | B | CRANKSHAFT POSITION SENSOR (POS) |
| 57 | SB | THERMOPLUNGER RELAY 3 |
| 59 | Y | |
| 60 | R | SENSOR POWER SUPPLY (CRANKSHAFT POSITION SENSOR) |
| 63 | LG | THERMOPLUNGER DIAGNOSIS 1 |
| 65 | SB | |
| 66 | SB | SENSOR GROUND (FUEL PRESSURE SENSOR) |
| 67 | W | GLOW PLUG CONTROL (DIAGNOSIS) |
| 68 | G | ENGINE COMUNICATION LINE |
| 69 | GR | |
| 70 | Y | SENSOR GROUND (CAMSHAFT POSITION SENSOR) |
| 71 | L | CAMSHAFT POSITION SENSOR |
| 73 | B | SENSOR GROUND (FUEL RAIL PRESSURE SENSOR) |
| 74 | BR | INTAKE AIR TEMPERATURE SENSOR 1 |
| 76 | BR | THERMOPLUNGER DIAGNOSIS 2 |
| 77 | L | FUEL RAIL PRESSURE SENSOR |
| 78 | GR | MASS AIR FLOW SENSOR |
| 80 | W | PNP SIGNAL |
| 81 | P | |
| 82 | V | |
| 85 | G | TURBOCHARGER BOOST SENSOR |
| 86 | R | INTAKE AIR TEMPERATURE SENSOR 2 |
| 88 | W | FUEL PRESSURE SENSOR |
| 89 | BR | A/F SENSOR HEATER |
| 91 | G | SENSOR POWER SUPPLY (FUEL RAIL PRESSURE SENSOR) |
| 93 | B | FUEL HEATER RELAY CONTROL |
| 96 | R | POWER SUPPLY FOR ECM (BACK-UP) |

| Connector No. | F131 |
|---|---|
| Connector Name | ALTERNATOR |
| Connector Type | 24340_EN013 |





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

| Connector No. | F132 |
|---|---|
| Connector Name | BATTERY TERMINAL WITH FUSIBLE LINK |
| Connector Type | 24340_1MG2A |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 6 | B/R | - |

| Connector No. | M42 |
|---|---|
| Connector Name | COMBINATION METER |
| Connector Type | TH12FW-NH |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 41 | L | CAN-H |
| 42 | P | CAN-L |
| 43 | W | ILLUMINATION CONTROL SIGNAL |
| 44 | LA/B | FUEL LEVEL SENSOR GROUND |
| 45 | LA/G | BATTERY POWER SUPPLY |
| 46 | LA/BR | IGNITION SIGNAL [Without ISS] |
| 46 | V | IGNITION SIGNAL [With ISS] |
| 47 | SB | AV COMMUNICATION SIGNAL (H) |
| 48 | LG | AV COMMUNICATION SIGNAL (L) |
| 49 | Y | OIL LEVEL SENSOR SIGNAL |
| 50 | BG | OIL LEVEL SENSOR GROUND |
| 51 | LA/L | FUEL LEVEL SENSOR SIGNAL |
| 52 | B | GROUND |

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# BASIC INSPECTION

## DIAGNOSIS AND REPAIR WORK FLOW

### Work Flow

INFOID:0000000010957604

DETAILED FLOW

#### 1.CHECK FOR DTC

Perform self diagnosis with CONSULT

Is any DTC detected?

YES >> Repair as needed.
NO >> GO TO 2.

#### 2.PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to CHG-15, "Inspection Procedure".

>> GO TO 3.

#### 3.STOP POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

Turn ignition switch OFF, and disconnect the battery current sensor connector to stop the operation of energy management system. [However, DTC (B20BD or B20BE) might remain. After finishing the inspection, connect the battery current sensor connector and erase the self-diagnostic results history using CONSULT.]

>> GO TO 4.

#### 4.INSPECTION WITH CHARGE WARNING LAMP (IDLING)

Start the engine and run it at idle.

Does the charge warning lamp turn OFF?

YES >> GO TO 5.
NO >> GO TO 6.

#### 5.INSPECTION WITH CHARGE WARNING LAMP (ENGINE AT 2,500 RPM)

Increase and maintain the engine speed at 2,500 rpm.

Does the charge warning lamp illuminate?

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

#### 6.MEASURE “B” TERMINAL VOLTAGE

Start engine. With engine running at 2,500 rpm, measure “B” terminal voltage.

What voltage does the measurement result show?

Less than 13.0 V>>GO TO 7.
More than 16.0 V>>Replace alternator. Refer to CHG-26, "R9M : Removal and Installation".

#### 7.“B” TERMINAL CIRCUIT INSPECTION

Check “B” terminal circuit. Refer to CHG-24, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace alternator. Refer to CHG-26, "R9M : Removal and Installation".
NO >> Repair as needed.

# CHARGING SYSTEM PRELIMINARY INSPECTION

## Inspection Procedure

INFOID:0000000010957605

### 1.CHECK BATTERY TERMINALS CONNECTION

Check if battery terminals are clean and tight.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair battery terminals connection.

### 2.CHECK “E” TERMINAL CONNECTION

Check if “E” terminal (alternator ground harness) is clean and tight.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair “E” terminal connection.

### 3.CHECK BATTERY STATUS

Check battery status. Refer to PG-120, "R9M : Work Flow".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace battery. Refer to PG-139, "R9M : Removal and Installation".

### 4.CHECK DRIVE BELT TENSION

Check drive belt tension. Refer to EM-301, "Inspection".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair as needed.

# DTC/CIRCUIT DIAGNOSIS

## B20BD BATTERY CURRENT SENSOR

### DTC Description

INFOID:0000000010957606

#### DTC DETECTION LOGIC

| DTC No. | CONSULT screen terms (Trouble diagnosis content) | | DTC detecting condition |
|---|---|---|---|
| B20BD | CURRENT SENSOR (Current sensor) | [CIRC SHORT TO GRND] | An excessively low voltage from the sensor is sent to IPDM E/R. |
| | | [CIRC SHORT TO BATTERY] | An excessively high voltage from the sensor is sent to IPDM E/R. |
| | | [CIRC OPEN] | The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough or the changing of voltage is lower than the specified value. |
| | | [CMPNENT INTERNAL MLFNCTN] | |

#### POSSIBLE CAUSE

[CIRC SHORT TO GRND]
- Harness or connectors
- Battery current sensor input signal (Current) circuit is shorted (Ground)
- Battery current sensor power circuit is open
- Battery current sensor

[CIRC SHORT TO BATTERY]
- Harness or connectors
- Battery current sensor input signal (Current) circuit is shorted (Power)
- Battery current sensor

[CIRC OPEN] or [CMPNENT INTERNAL MLFNCTN]
- Battery terminal is not connected
- Harness or connectors
- Battery current sensor input circuit is open
- Battery current sensor

#### FAIL-SAFE

Stop/start system is inhibited when this DTC is detected.

#### DTC CONFIRMATION PROCEDURE

##### 1.PERFORM COMPONENT FUNCTION CHECK

1. Start engine and wait for 10 seconds or more.
2. Perform “Self Diagnostic Result” mode of “IPDM E/R” using CONSULT.

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to GI-44, "Intermittent Incident".
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to CHG-16, "Diagnosis Procedure"

### Diagnosis Procedure

INFOID:0000000010957607

##### 1.CHECK DTC

Perform each inspection according to the displayed DTC.

Which DTC is displayed?

[CIRC SHORT TO GRND]>>GO TO 2.
[CIRC SHORT TO BATTERY]>>GO TO 7.
[CIRC OPEN] or [CMPNENT INTERNAL MLFNCTN]>>GO TO 8.

##### 2.CHECK BATTERY CURRENT SENSOR POWER

1. Turn ignition switch OFF.
2. Disconnect battery current sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

| (+) | | (-) | Voltage (V) |
|---|---|---|---|
| Battery current sensor | | | |
| Connector | Terminal | | |
| F43 | 4 | Ground | Approx. 5 |

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

## 3. CHECK BATTERY CURRENT SENSOR POWER CIRCUIT

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

| Battery current sensor | | IPDM E/R | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| F43 | 4 | F74 | 95 | Existed |

4. Check the continuity between battery current sensor harness connector and ground.

| Battery current sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F43 | 4 | Ground | Not existed |

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-60, "Removal and Installation".
NO >> Repair or replace harness.

## 4. CHECK BATTERY CURRENT SENSOR GROUND

1. Turn ignition switch OFF.
2. Check the continuity between battery current sensor harness connector and ground.

| Battery current sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F43 | 2 | Ground | Existed |

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

## 5. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Disconnect IPDM E/R connector.
2. Check the continuity between battery current sensor harness connector and IPDM E/R harness connector.

| Battery current sensor | | IPDM E/R | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| F43 | 2 | F74 | 96 | Existed |

3. Check the continuity between battery current sensor harness connector and ground.

| Battery current sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F43 | 2 | Ground | Not existed |

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-60, "Removal and Installation".
NO >> Repair or replace harness.

## 6.CHECK BATTERY CURRENT INPUT SIGNAL CIRCUIT 1

1. Disconnect IPDM E/R connector.
2. Check the continuity between battery current sensor harness connector and ground.

| Battery current sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F43 | 1 | Ground | Not existed |

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace harness.

## 7.CHECK BATTERY CURRENT INPUT SIGNAL CIRCUIT 2

1. Turn ignition switch OFF.
2. Disconnect battery current sensor connector.
3. Check the voltage between battery current sensor harness connector and ground.

| (+) | | (-) | Voltage (V) |
|---|---|---|---|
| Battery current sensor | | | |
| Connector | Terminal | | |
| F43 | 1 | Ground | 0 |

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace harness.

## 8.CHECK BATTERY NEGATIVE TERMINAL CONNECTION

Check if battery negative terminal is clean and tight.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair battery negative terminal connection.

## 9.CHECK BATTERY CURRENT INPUT SIGNAL CIRCUIT 3

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

| Battery current sensor | | IPDM E/R | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| F43 | 1 | F74 | 97 | Existed |

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace harness.

## 10.CHECK BATTERY CURRENT SENSOR

Refer to CHG-19, "Component Inspection".

Is the inspection result normal?

YES >> Refer to GI-44, "Intermittent Incident". If the inspection result of the connector is normal then replace IPDM E/R. Refer to PCS-60, "Removal and Installation".

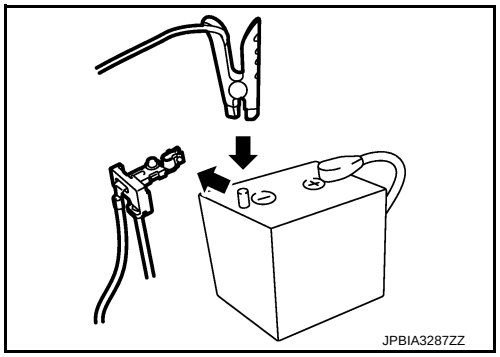
NO >> Replace battery current sensor.

## Component Inspection

INFOID:0000000010957608

### 1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect connector which is disconnected
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between IPDM E/R harness connector terminals as per the following.




| IPDM E/R | | | Voltage (V) |
|---|---|---|---|
| Connector | + | – | |
| | Terminal | Terminal | |
| F74 | 97 (Battery current sensor signal) | 96 | Approx. 2.5 |

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-120, "R9M : Work Flow".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor.

# B20BE BATTERY TEMPERATURE SENSOR

## DTC Description

INFOID:0000000010957609

### DTC DETECTION LOGIC

| DTC No. | CONSULT screen terms (Trouble diagnosis content) | | DTC detecting condition |
|---|---|---|---|
| B20BE | TEMP SENSOR (Temperature sensor) | [CIRC SHORT TO GRND] | An excessively low voltage from the sensor is sent to IPDM E/R. |
| | | [CIRC SHORT TO BATTERY OR OPEN] | An excessively high voltage from the sensor is sent to IPDM E/R. |

### POSSIBLE CAUSE

[CIRC SHORT TO GRND]
- Harness or connectors
- Battery current sensor input signal (Temperature) circuit is shorted (Ground)
- Battery current sensor power circuit is open
- Battery current sensor

[CIRC SHORT TO BATTERY]
- Harness or connectors
- Battery current sensor input signal (Temperature) circuit is shorted (Power)
- Battery current sensor input signal (Temperature) circuit is open
- Battery current sensor

### FAIL-SAFE

—

### DTC CONFIRMATION PROCEDURE

#### 1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition ON, and wait for 5 seconds or more.
2. Perform “Self Diagnostic Result” mode of “IPDM E/R” using CONSULT.

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to GI-44, "Intermittent Incident".
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to CHG-20, "Diagnosis Procedure"

## Diagnosis Procedure

INFOID:0000000010957610

#### 1.CHECK DTC

Perform each inspection according to the displayed DTC.

Which DTC is displayed?

[CIRC SHORT TO GRND]>>GO TO 2.
[CIRC SHORT TO BATTERY OR OPEN]>>GO TO 7.

#### 2.CHECK BATTERY CURRENT SENSOR POWER

1. Turn ignition switch OFF.
2. Disconnect battery current sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

| (+) | | (-) | Voltage (V) |
|---|---|---|---|
| Battery current sensor | | | |
| Connector | Terminal | | |
| F43 | 4 | Ground | Approx. 5 |

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

## 3. CHECK BATTERY CURRENT SENSOR POWER CIRCUIT

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

| Battery current sensor | | IPDM E/R | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| F43 | 4 | F74 | 95 | Existed |

4. Check the continuity between battery current sensor harness connector and ground.

| Battery current sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F43 | 4 | Ground | Not existed |

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-60, "Removal and Installation".
NO >> Repair or replace harness.

## 4. CHECK BATTERY CURRENT SENSOR GROUND

1. Turn ignition switch OFF.
2. Check the continuity between battery current sensor harness connector and ground.

| Battery current sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F43 | 2 | Ground | Existed |

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

## 5. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Disconnect IPDM E/R connector.
2. Check the continuity between battery current sensor harness connector and IPDM E/R harness connector.

| Battery current sensor | | IPDM E/R | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| F43 | 2 | F74 | 96 | Existed |

3. Check the continuity between battery current sensor harness connector and ground.

| Battery current sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F43 | 2 | Ground | Not existed |

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-60, "Removal and Installation".
NO >> Repair or replace harness.

## 6. CHECK BATTERY TEMPERATURE INPUT SIGNAL CIRCUIT 1

1. Disconnect IPDM E/R connector.

2. Check the continuity between battery current sensor harness connector and ground.

| Battery current sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F43 | 3 | Ground | Not existed |

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace harness.

## 7. CHECK BATTERY TEMPERATURE INPUT SIGNAL CIRCUIT 2

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

| Battery current sensor | | IPDM E/R | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| F43 | 3 | F74 | 110 | Existed |

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace harness.

## 8. CHECK BATTERY TEMPERATURE INPUT SIGNAL CIRCUIT 3

1. Connect IPDM E/R connector.
2. Check the voltage between battery current sensor harness connector and ground.

| (+) | | (-) | Voltage (V) |
|---|---|---|---|
| Battery current sensor | | | |
| Connector | Terminal | | |
| F43 | 3 | Ground | 0 |

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace harness.

## 9. CHECK BATTERY CURRENT SENSOR

Refer to CHG-22, "Component Inspection".

Is the inspection result normal?

YES >> Refer to GI-44, "Intermittent Incident". If the inspection result of the connector is normal then replace IPDM E/R. Refer to PCS-60, "Removal and Installation".
NO >> Replace battery current sensor.

# Component Inspection

INFOID:0000000010957611

## 1. CHECK BATTERY TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect battery current sensor connector.
3. Check the resistance between battery current sensor terminals.

| Battery current sensor | | Resistance |
|---|---|---|
| Terminal | | |
| 2 | 3 | Continuity existed and the resistance value is 100 Ω or more |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor.

# B TERMINAL CIRCUIT

## Diagnosis Procedure

INFOID:0000000010957612

### 1.CHECK “B” TERMINAL CONNECTION

1. Turn ignition switch OFF.
2. Check if “B” terminal is clean and tight.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair “B” terminal connection.

### 2.CHECK “B” TERMINAL CIRCUIT

Check voltage between alternator “B” terminal and ground.

| (+) | | (–) | Voltage (Approx.) |
|---|---|---|---|
| Alternator | | | |
| Connector | Terminal | | |
| F131 | 1 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check harness for open between alternator and fusible link.

### 3.CHECK “B” TERMINAL CONNECTION (VOLTAGE DROP TEST)

1. Start engine, then engine running at idle and warm.
2. Check voltage between battery positive terminal and alternator “B” terminal.

| (+) | (–) | | Voltage (Approx.) |
|---|---|---|---|
| | Alternator | | |
| | Connector | Terminal | |
| Battery positive terminal | F131 | 1 | Less than 0.2 V |

Is the inspection result normal?

YES >> “B” terminal circuit is normal. Refer to CHG-14, "Work Flow".
NO >> Check harness between battery and alternator for poor continuity.

# SYMPTOM DIAGNOSIS

## CHARGING SYSTEM

### Symptom Table

INFOID:0000000010957613

| Symptom | Reference |
|---|---|
| Discharged battery | Refer to CHG-14, "Work Flow". |
| The charge warning lamp does not turn OFF after the engine starts. | |

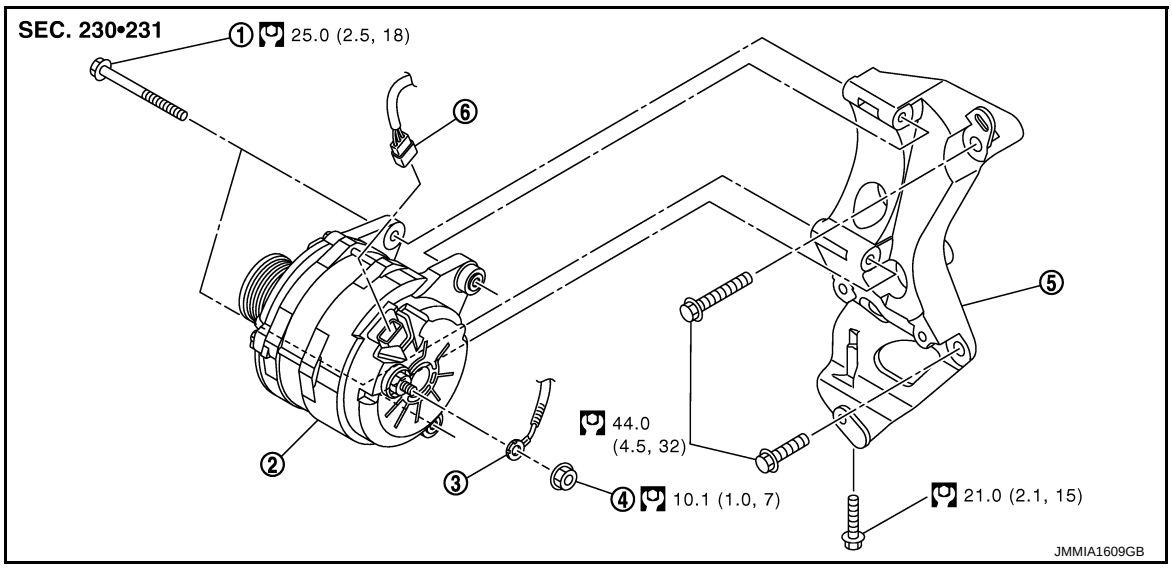
# REMOVAL AND INSTALLATION

## ALTERNATOR

### R9M

### R9M : Exploded View

INFOID:0000000010728733




| | | |
|---|---|---|
| ① Alternator mounting bolt | ② Alternator | ③ “B” terminal harness |
| ④ “B” terminal nut | ⑤ Alternator bracket | ⑥ Alternator connector |

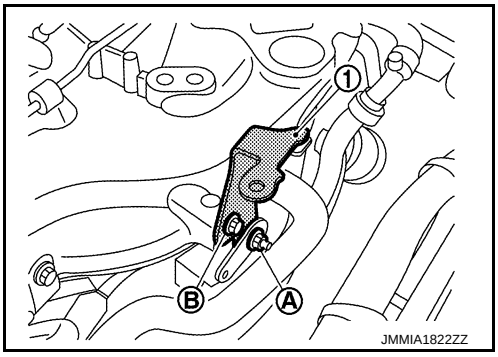
: N·m (kg-m, ft-lb)

### R9M : Removal and Installation

INFOID:0000000010728734

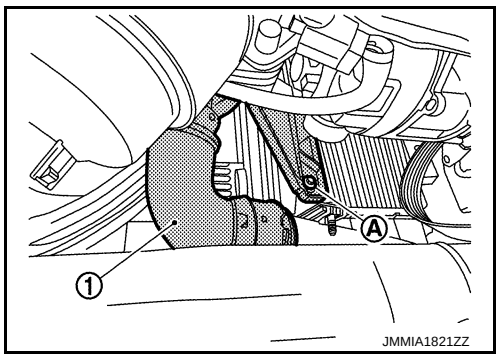
REMOVAL

1. Disconnect battery cable from negative terminal. Refer to PG-139, "R9M : Removal and Installation".
2. Remove drive belt. Refer to EM-300, "Removal and Installation".
3. Remove air duct (inlet). Refer to EM-308, "Removal and Installation".
4. Remove electric throttle control actuator. Refer to EM-314, "Removal and Installation".
   **CAUTION:**
   **Cover the openings to avoid entry of foreign materials.**
5. Remove electric throttle control actuator bracket mounting nut Ⓐ and bolt Ⓑ, and then remove electric throttle control actuator bracket ①.




6. Remove air inlet hose 2. Refer to EM-310, "Removal and Installation".

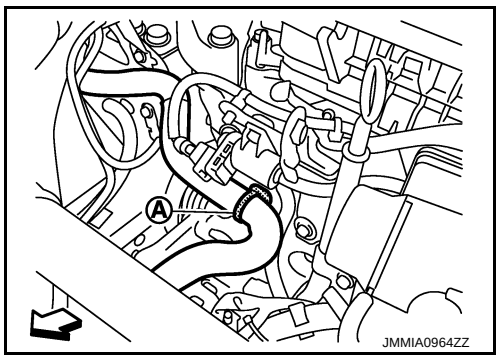
7. Remove air inlet tube 2 mounting bolt Ⓐ and disconnect air inlet tube 2 ① from charge air cooler, and then get air inlet tube 2 out of alternator removal area.




8. Remove solenoid valve and bracket assembly.

a. Remove water hose fixing clip Ⓐ from solenoid valve bracket.

⇦ : Vehicle front

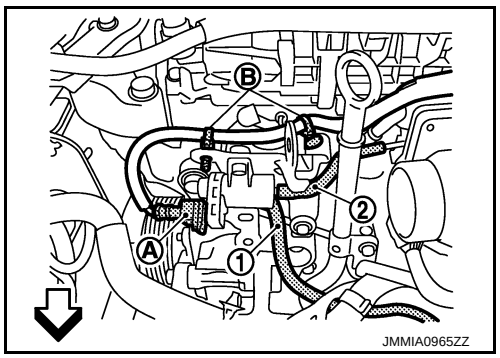



b. Disconnect vacuum hose ① and ② from solenoid valve.

c. Disconnect solenoid valve connector Ⓐ.

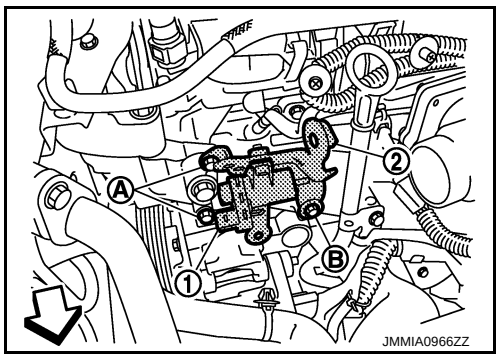
d. Remove solenoid valve harness fixing clips Ⓑ from solenoid valve bracket.

⇦ : Vehicle front




e. Remove mounting bolts Ⓐ and Ⓑ, and then remove solenoid valve ① and bracket assembly ② as a set.

⇦ : Vehicle front



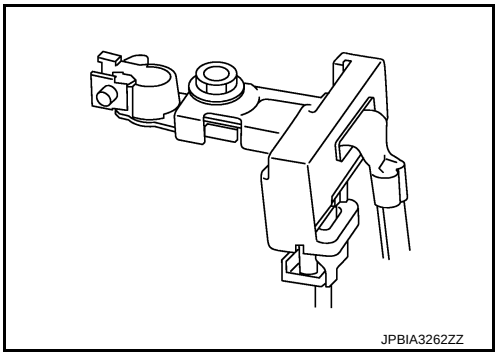

9. Remove oil level gauge and oil level gauge guide. Refer to EM-330, "Exploded View".
**CAUTION:**
**Cover the openings to avoid entry of foreign materials.**
10. Disconnect alternator connector.
11. Remove “B” terminal nut and disconnect “B” terminal harness.
12. Remove alternator mounting bolts.
13. Remove alternator upward from the vehicle.
**CAUTION:**
**Never contact with and damage surrounding parts when removing alternator from the vehicle.**

INSTALLATION

Note the following items, and then install in the reverse order of removal.

**CAUTION:**

- **Temporarily tighten the alternator bolts in order from the upper to the lower, and then tighten them in order from the upper to the lower.**
  **For the alternator, the front side (pulley side) surface is the reference surface. Fit the reference surface to the alternator mounting part, and then tighten the bolts.**
- **Be careful to tighten “B” terminal nut to the specified torque.**
- **Install alternator, and check tension of belt. Refer to EM-301, "Inspection".**
- **For this model (with battery current sensor models), the energy management system that controls the power generation voltage of the alternator has been adopted. Therefore, the power generation voltage variable control system operation inspection should be performed after replacing the alternator, and then make sure that the system operates normally. Refer to CHG-14, "Work Flow".**
  **The battery current sensor is installed to the battery cable at the negative terminal.**




- **When installing the tire assembly, tighten wheel nuts to the specified torque. Refer to WT-61, "Exploded View".**

# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### Alternator

INFOID:0000000010957626

| | | |
|---|---|---|
| Applied model | | R9M |
| Type | | F 000 BL0 841 |
| | | BOSCH make |
| Nominal rating | [V - A] | 14 - 150 |
| Ground polarity | | Negative |
| Minimum revolution under no-load (When 13.5 V is applied) | [rpm] | Less than 1,500 |
| Hot output current (When 13.5 V is applied) | [A/rpm] | More than 84/1,800<br>More than 124/2,500<br>More than 151/5,000 |
| Regulated output voltage | [V] | 12.0 - 14.8* |

*: Adjustment range of energy management system.

# HOW TO USE THIS MANUAL

## APPLICATION NOTICE

### Information

INFOID:0000000010957592

Check the vehicle type to use the service information in this section.

| Service information | System |
|---|---|
| TYPE 1 | With stop/start system |
| TYPE 2 | Without stop/start system |

# PRECAUTION

## PRECAUTIONS

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

INFOID:0000000010957577

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:**

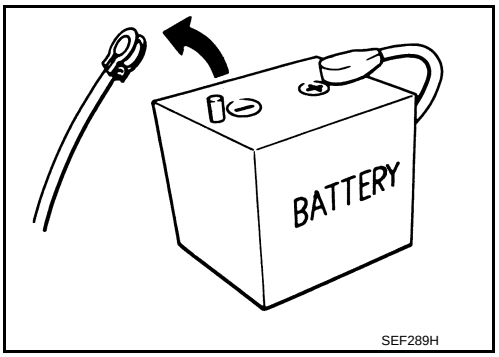
**Always observe the following items for preventing accidental activation.**

- **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.**

### Precautions for Removing Battery Terminal

INFOID:0000000011009668

- With the adoption of Auto ACC function, ACC power is automatically supplied by operating the intelligent key or remote keyless entry or by opening/closing the driver side door. In addition, ACC power is supplied even after the ignition switch is turned to the OFF position, i.e. ACC power is supplied for a certain fixed time.
- When disconnecting the 12V battery terminal, turn off the ACC power before disconnecting the 12V battery terminal, observing “How to disconnect 12V battery terminal” described below.
  **NOTE:**
  Some ECUs operate for a certain fixed time even after ignition switch is turned OFF and ignition power supply is stopped. If the battery terminal is disconnected before ECU stops, accidental DTC detection or ECU data damage may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  **NOTE:**
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  **NOTE:**
  The removal of 12V battery may cause a DTC detection error.



SEF289H

#### HOW TO DISCONNECT 12V BATTERY TERMINAL

Disconnect 12V battery terminal according to Instruction 1 or Instruction 2 described below.
For vehicles parked by ignition switch OFF, refer to Instruction 2.

INSTRUCTION 1

1. Open the hood.

2. Turn key switch to the OFF position with the driver side door opened.
3. Get out of the vehicle and close the driver side door.
4. Wait at least 3 minutes.
   **CAUTION:**
   **While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.**
5. Remove 12V battery terminal.
   **CAUTION:**
   **After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.**

INSTRUCTION 2 (FOR VEHICLES PARKED BY IGNITION SWITCH OFF)

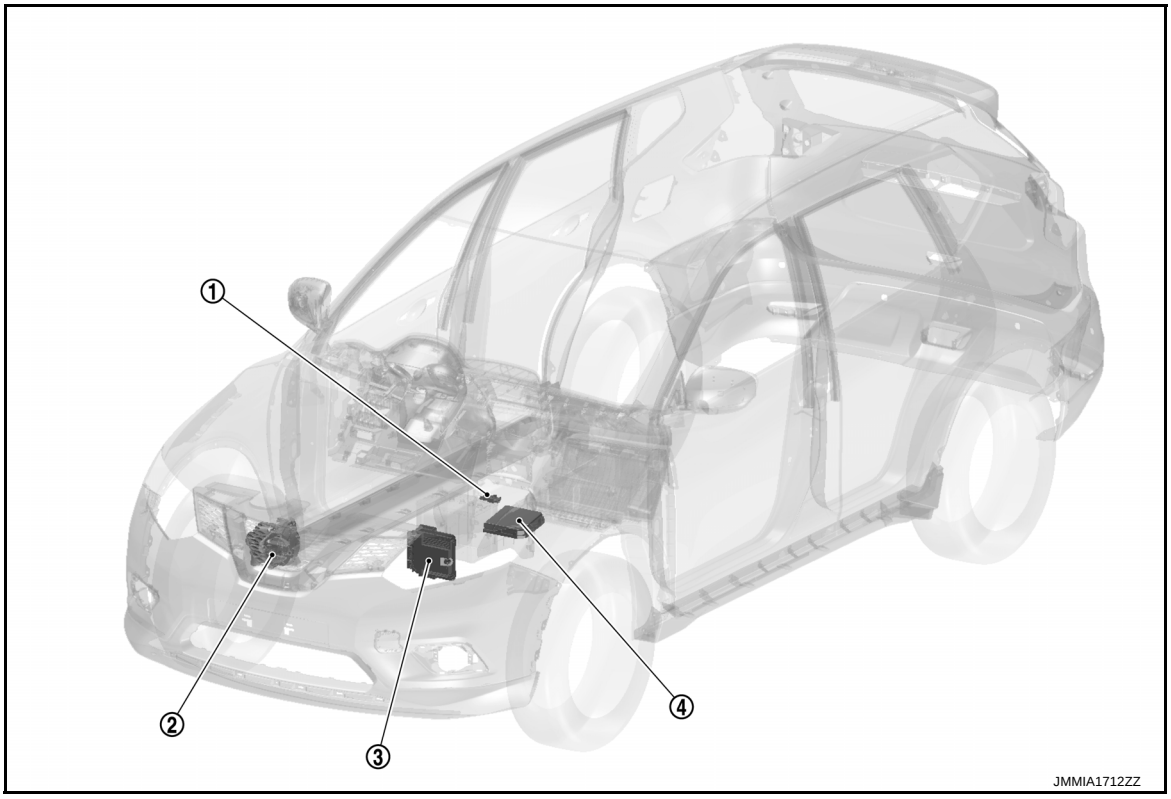
1. Unlock the door with intelligent key or remote keyless entry.
   **NOTE:**
   At this moment, ACC power is supplied.
2. Open the driver side door.
3. Open the hood.
4. Close the driver side door.
5. Wait at least 3 minutes.
   **CAUTION:**
   **While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.**
6. Remove 12V battery terminal.
   **CAUTION:**
   **After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.**

# SYSTEM DESCRIPTION

## COMPONENT PARTS

### Component Parts Location

INFOID:0000000010957581



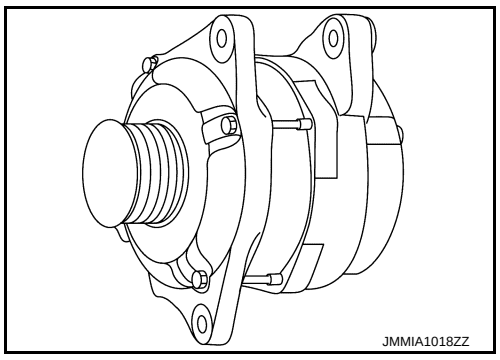

| No. | Component | Function |
|---|---|---|
| ① | Battery current sensor* | — |
| ② | Alternator | Refer to CHG-33, "Alternator". |
| ③ | ECM | ECM transmits the received alternator voltage request signal to alternator via LIN communication.<br>Refer to EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location" (MR engine) or EC-440, "Component Parts Location" (QR engine) for detailed installation location. |
| ④ | IPDM E/R | IPDM E/R sends the alternator voltage request signal to ECM via CAN communication.<br>Refer to PCS-5, "Component Parts Location" for detailed installation location. |

*: Not applicable

### Alternator

INFOID:0000000010957582

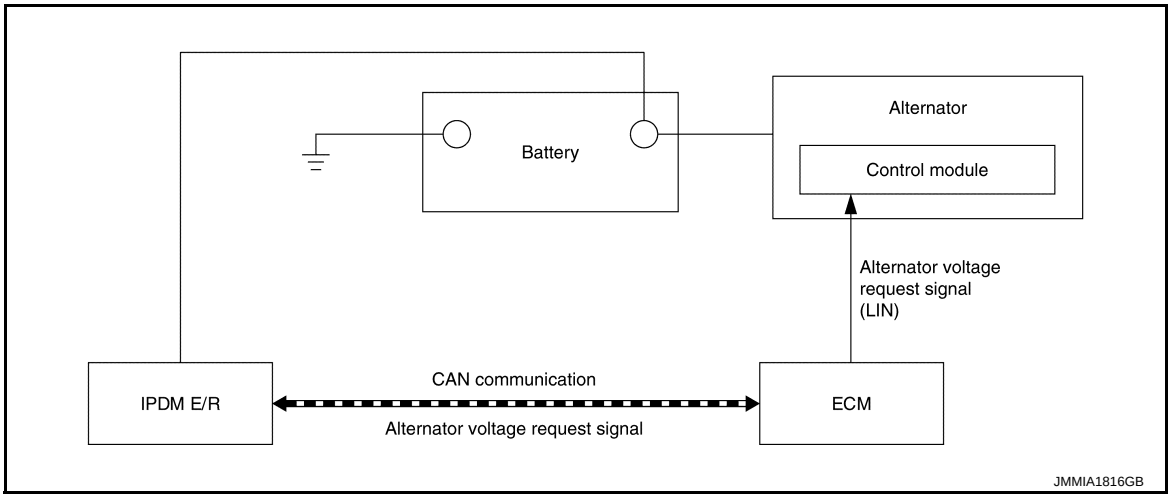
The alternator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged.



# SYSTEM
## CHARGING SYSTEM
### CHARGING SYSTEM : System Description

INFOID:0000000010957583

#### SYSTEM DIAGRAM




#### SYSTEM DESCRIPTION

- IPDM E/R sends alternator voltage request signal to ECM via CAN communication.
- ECM transmits alternator voltage request signal to alternator via LIN communication.
- Control module inside alternator controls the power generation voltage based on the received alternator voltage request signal.
- Alternator includes a self-diagnosis function and transmits the diagnosis result to ECM via LIN communication when detecting any malfunction.

## WARNING/INDICATOR/CHIME LIST
### WARNING/INDICATOR/CHIME LIST : Warning Lamps/Indicator Lamps

INFOID:0000000010957584

| Item | Design | Reference |
|---|---|---|
| Charge warning lamp |  | For layout, refer to MWI-10, "METER SYSTEM : Design".<br>For function, refer to MWI-30, "WARNING LAMPS/INDICATOR LAMPS : Charge Warning Lamp". |

# ECU DIAGNOSIS INFORMATION

## ECM, IPDM E/R

### List of ECU Reference

INFOID:0000000010957585

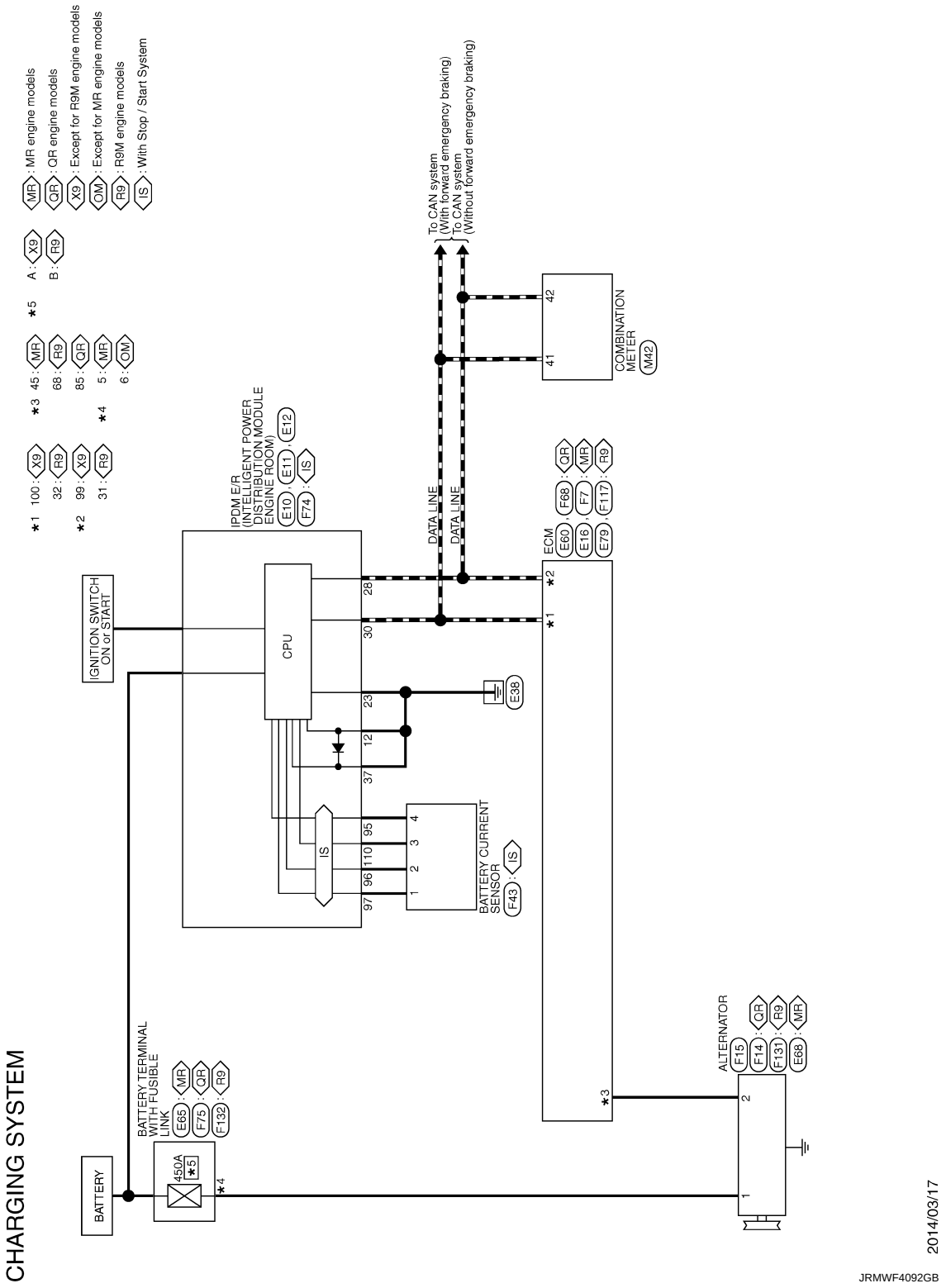
| ECU | Reference |
|---|---|
| ECM (MR engine) | EC-89, "Reference Value". |
| | EC-103, "Fail-safe". |
| | EC-107, "DTC Inspection Priority Chart". |
| | EC-109, "DTC Index". |
| | EC-112, "Test Value and Test Limit". |
| ECM (QR engine) | EC-501, "Reference Value". |
| | EC-513, "Fail Safe". |
| | EC-515, "DTC Inspection Priority Chart". |
| | EC-517, "DTC Index". |
| | EC-519, "Test Value and Test Limit". |
| IPDM E/R | PCS-22, "Reference Value". |
| | PCS-34, "Fail-safe". |
| | PCS-37, "DTC Inspection Priority Chart". |
| | PCS-38, "DTC Index". |

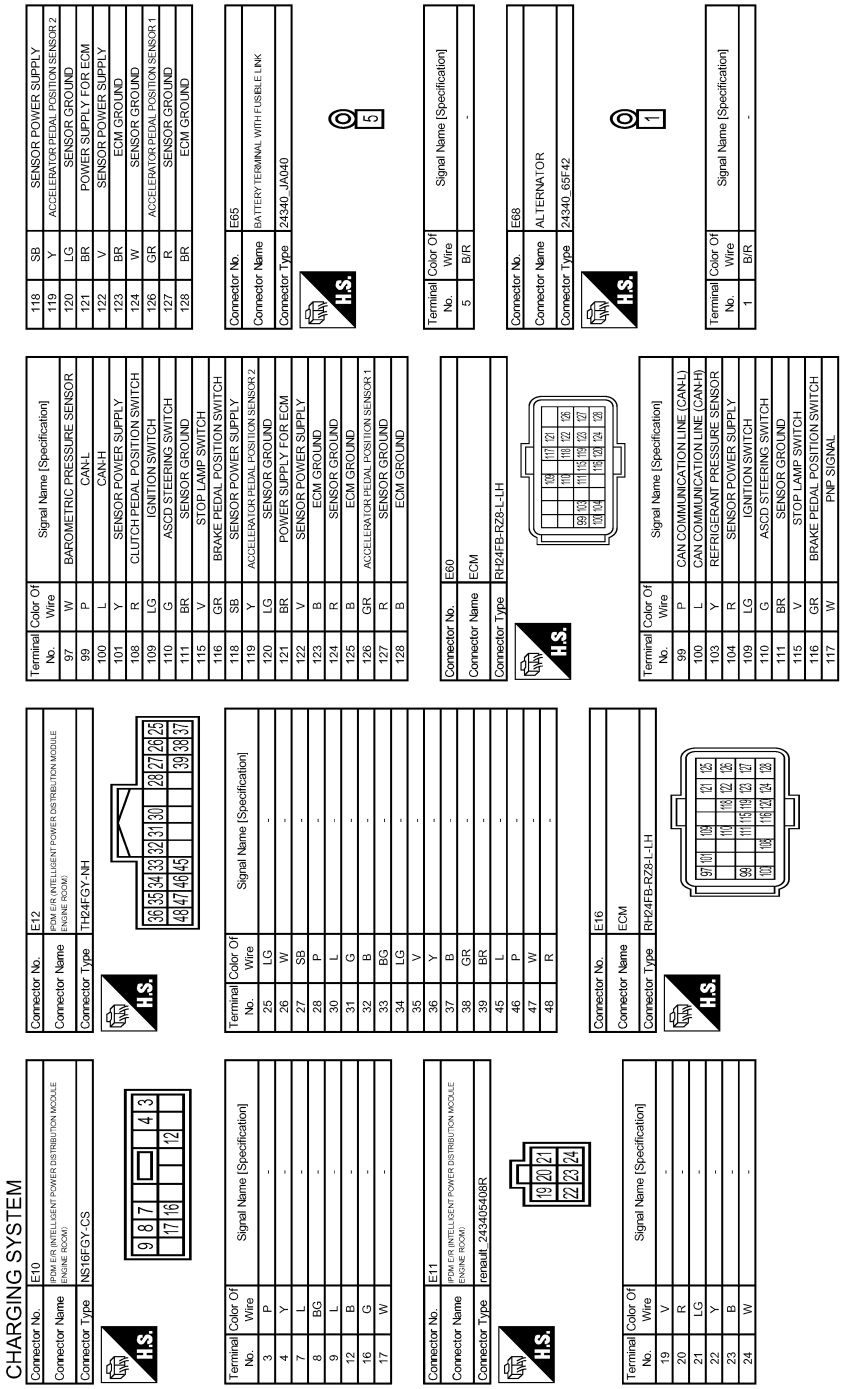
# WIRING DIAGRAM

## CHARGING SYSTEM

### Wiring Diagram

INFOID:0000000010957586






JRMWF4093GB

CHARGING SYSTEM

| Connector No. | E79 |
|---|---|
| Connector Name | ECM |
| Connector Type | RH24FB-RZ8-R-RH |

H.S.


| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | B | ECM GROUND |
| 2 | W | ACCELERATOR PEDAL POSITION SENSOR 1 |
| 3 | Y | SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 1) |
| 4 | B | ECM GROUND |
| 5 | L | POWER SUPPLY FOR ECM |
| 6 | G | SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 1) |
| 8 | B | ECM GROUND |
| 9 | L | FUEL HEATER AND WATER IN FUEL LEVEL SENSOR |
| 10 | L | SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 2) |
| 11 | V | ACCELERATOR PEDAL POSITION SENSOR 2 |
| 12 | P | SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 2) |
| 16 | BG | STOP LAMP SWITCH [With M/T] |
| 16 | R | BRAKE PEDAL POSITION SWITCH [With CVT] |
| 17 | LG | IGNITION SWITCH |
| 18 | G | ASCD STEERING SWITCH |
| 19 | BR | SENSOR GROUND (ASCD STEERING SWITCH) |
| 20 | BR | FUEL PUMP CONTROL MODULE (COMMAND) |
| 22 | G | FUEL PUMP CONTROL MODULE (DIAGNOSIS) |
| 23 | V | SPEED LIMITER MAIN SWITCH |
| 24 | R | CLUTCH PEDAL POSITION SWITCH |
| 27 | V | CLUTCH INTERLOCK SWITCH |
| 30 | BR | ASCD MAIN SWITCH |
| 31 | P | CAN-L |
| 32 | L | CAN-H |

| Connector No. | F7 |
|---|---|
| Connector Name | ECM |
| Connector Type | RH40FB-RZ8-R-LH |

H.S.

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | FUEL INJECTOR NO.1(HI) |
| 2 | W | FUEL INJECTOR NO.2(HI) |
| 3 | W | FUEL INJECTOR NO.3(HI) |
| 4 | W | FUEL INJECTOR NO.4(HI) |
| 5 | B | FUEL INJECTOR NO.1(LO) |
| 6 | B | FUEL INJECTOR NO.2(LO) |
| 7 | B | FUEL INJECTOR NO.3(LO) |
| 8 | B | FUEL INJECTOR NO.4(LO) |
| 11 | B | ECM GROUND |
| 12 | BR | SHIELD |
| 14 | W | PARK/NEUTRAL POSITION SIGNAL |
| 15 | R | GND4-PHASE |
| 19 | W | CAMSHAFT POSITION SENSOR |
| 20 | L | SENSOR GROUND |
| 21 | L | SENSOR POWER SUPPLY |
| 23 | Y | SENSOR POWER SUPPLY |
| 24 | Y | SENSOR POWER SUPPLY |
| 25 | L | SENSOR GROUND |
| 28 | BR | MASS AIR FLOW SENSOR |
| 29 | GR | ENGINE OIL PRESSURE SENSOR |
| 31 | G | ENGINE COOLANT TEMPERATURE SENSOR |
| 32 | P | ENGINE OIL TEMPERATURE SENSOR |
| 33 | G | FUEL RAIL PRESSURE SENSOR |
| 34 | P | REFRIGERANT PRESSURE SENSOR |
| 35 | V | INTAKE AIR TEMPERATURE SENSOR |
| 36 | SHIELD | SENSOR GROUND |
| 39 | R | SENSOR GROUND |
| 40 | W | KNOCK SENSOR |
| 42 | B | SENSOR GROUND |
| 43 | G | SENSOR POWER SUPPLY |
| 44 | BR | SENSOR GROUND |
| 45 | G | LIN COMMUNICATION LINE [Without ISS] |
| 45 | L | LIN COMMUNICATION LINE [With ISS] |
| 46 | LG | EXHAUST VALVE TIMING CONTROL POSITION SENSOR |
| 48 | GR | CRANKSHAFT POSITION SENSOR |

| Connector No. | F14 |
|---|---|
| Connector Name | ALTERNATOR |
| Connector Type | 24340_EN613 |

H.S.

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

| Connector No. | F15 |
|---|---|
| Connector Name | ALTERNATOR |
| Connector Type | RH02FB |

H.S.

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 2 | G | - |

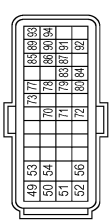
| Connector No. | F43 |
|---|---|
| Connector Name | BATTERY CURRENT SENSOR |
| Connector Type | RH04FB |

H.S.

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | P | OUTPUT |
| 2 | W | GND |
| 3 | SB | TEMP |
| 4 | LG | PWR |

| Connector No. | F68 |
|---|---|
| Connector Name | ECM |
| Connector Type | RH40FBR-RZ8-R-LH |

H.S.

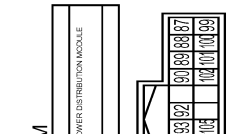



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 49 | G | INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (CLOSE) |
| 50 | V | INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY |
| 51 | Y | INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (OPEN) |
| 52 | B | ECM GROUND |
| 53 | P | A/F SENSOR 1 HEATER |
| 54 | V | HEATED OXYGEN SENSOR 2 HEATER |
| 56 | GR | INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL SOLENOID VALVE |
| 70 | BR | SENSOR GROUND |
| 71 | GR | CRANKSHAFT POSITION SENSOR |
| 72 | L | SENSOR POWER SUPPLY |
| 73 | SHIELD | SHIELD |
| 77 | W | THROTTLE POSITION SENSOR 2 |
| 78 | B | SENSOR GROUND |
| 79 | G | THROTTLE POSITION SENSOR 1 |
| 80 | R | SENSOR POWER SUPPLY |
| 83 | L | INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR |
| 84 | V | SENSOR POWER SUPPLY |
| 85 | G | LIN COMMUNICATION LINE |
| 86 | Y | IGNITION SIGNAL NO. 1 |
| 87 | BR | IGNITION SIGNAL NO. 2 |
| 89 | P | ECM RELAY (SELF SHUT-OFF) |
| 90 | W | IGNITION SIGNAL NO. 3 |
| 91 | SB | IGNITION SIGNAL NO. 4 |
| 92 | LG | SENSOR GROUND |
| 93 | L | INTAKE VALVE TIMING CONTROL SOLENOID VALVE |
| 94 | BR | EXHAUST VALVE TIMING CONTROL SOLENOID VALVE |

JRMWF4094GB

CHARGING SYSTEM

| Connector No. | F74 |
|---|---|
| Connector Name | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Type | TH24FB-NH |

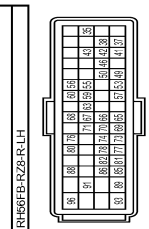


| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 87 | L | - |
| 88 | P | - |
| 89 | W | - |
| 90 | R | - |
| 92 | GR | - |
| 93 | G | - [With R9M Engine] |
| 93 | P | - [With MR20 or QR25 Engine] |
| 94 | SB | - |
| 95 | LG | - |
| 96 | W | - |
| 97 | P | - |
| 98 | Y | - |
| 99 | BG | - |
| 100 | LG | - |
| 101 | V | - |
| 102 | Y | - |
| 105 | W | - |
| 106 | BR | - |
| 107 | V | - |
| 110 | SB | - |

| Connector No. | F75 |
|---|---|
| Connector Name | BATTERY TERMINAL WITH FUSIBLE LINK |
| Connector Type | 24348_51E05 |

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 6 | B/R | - |

| Connector No. | F117 |
|---|---|
| Connector Name | ECM |
| Connector Type | RH66FB-RZ8-R-LH |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 35 | R | GLOW PLUG CONTROL (COMMAND) |
| 37 | LG | VOLTAGE STABILIZER SIGNAL |
| 38 | GR | FUEL PUMP RELAY CONTROL |
| 41 | G | ECM RELAY (SELF SHUT-OFF) |
| 42 | Y | RESTART RELAY |
| 43 | R | FUEL FLOW ACTUATOR |
| 46 | V | THERMOPLUNGER RELAY 2 |
| 49 | P | INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (-) |
| 50 | BG | THERMOPLUNGER RELAY 1 |
| 53 | Y | THERMAL MANAGEMENT CONTROL VALVE |
| 55 | R | |
| 56 | B | CRANKSHAFT POSITION SENSOR (POS) |
| 57 | SB | THERMOPLUNGER RELAY 3 |
| 59 | Y | |
| 60 | R | SENSOR POWER SUPPLY (CRANKSHAFT POSITION SENSOR) |
| 63 | LG | THERMOPLUNGER DIAGNOSIS 1 |
| 65 | SB | |
| 66 | SB | SENSOR GROUND (FUEL PRESSURE SENSOR) |
| 67 | W | GLOW PLUG CONTROL (DIAGNOSIS) |
| 68 | G | ENGINE COMUNICATION LINE |
| 69 | GR | |
| 70 | Y | SENSOR GROUND (CAMSHAFT POSITION SENSOR) |
| 71 | L | CAMSHAFT POSITION SENSOR |
| 73 | B | SENSOR GROUND (FUEL RAIL PRESSURE SENSOR) |
| 74 | BR | INTAKE AIR TEMPERATURE SENSOR 1 |
| 76 | BR | THERMOPLUNGER DIAGNOSIS 2 |
| 77 | L | FUEL RAIL PRESSURE SENSOR |
| 78 | GR | MASS AIR FLOW SENSOR |
| 80 | W | PNP SIGNAL |
| 81 | P | |
| 82 | V | |
| 85 | G | TURBOCHARGER BOOST SENSOR |
| 86 | R | INTAKE AIR TEMPERATURE SENSOR 2 |
| 88 | W | FUEL PRESSURE SENSOR |
| 89 | BR | A/F SENSOR HEATER |
| 91 | G | SENSOR POWER SUPPLY (FUEL RAIL PRESSURE SENSOR) |
| 93 | B | FUEL HEATER RELAY CONTROL |
| 96 | R | POWER SUPPLY FOR ECM (BACK-UP) |

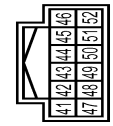
| Connector No. | F131 |
|---|---|
| Connector Name | ALTERNATOR |
| Connector Type | 24340_EN013 |

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

| Connector No. | F132 |
|---|---|
| Connector Name | BATTERY TERMINAL WITH FUSIBLE LINK |
| Connector Type | 24340_1MG2A |

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 6 | B/R | - |

| Connector No. | M42 |
|---|---|
| Connector Name | COMBINATION METER |
| Connector Type | TH12FW-NH |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|---|---|---|
| 41 | L | CAN-H |
| 42 | P | CAN-L |
| 43 | W | ILLUMINATION CONTROL SIGNAL |
| 44 | LA/B | FUEL LEVEL SENSOR GROUND |
| 45 | LA/G | BATTERY POWER SUPPLY |
| 46 | LA/BR | IGNITION SIGNAL [Without ISS] |
| 46 | V | IGNITION SIGNAL [With ISS] |
| 47 | SB | AV COMMUNICATION SIGNAL (H) |
| 48 | LG | AV COMMUNICATION SIGNAL (L) |
| 49 | Y | OIL LEVEL SENSOR SIGNAL |
| 50 | BG | OIL LEVEL SENSOR GROUND |
| 51 | LA/L | FUEL LEVEL SENSOR SIGNAL |
| 52 | B | GROUND |

JRMWF4095GB

# BASIC INSPECTION

## DIAGNOSIS AND REPAIR WORK FLOW

### Work Flow

INFOID:0000000010957587

DETAILED FLOW

#### 1.CHECK FOR DTC

Perform self diagnosis with CONSULT.

Is any DTC detected?

YES >> Repair as needed.
NO >> GO TO 2.

#### 2.PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to CHG-41, "Inspection Procedure".

>> GO TO 3.

#### 3.INSPECTION WITH CHARGE WARNING LAMP (IDLING)

Start the engine and run it at idle.

Does the charge warning lamp turn OFF?

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

#### 4.INSPECTION WITH CHARGE WARNING LAMP (ENGINE AT 2,500 RPM)

Increase and maintain the engine speed at 2,500 rpm.

Does the charge warning lamp illuminate?

YES >> GO TO 5.
NO >> INSPECTION END

#### 5.MEASURE “B” TERMINAL VOLTAGE

Start engine. With engine running at 2,500 rpm, measure “B” terminal voltage.

What voltage does the measurement result show?

Less than 13.0 V>>GO TO 6.
More than 16.0 V>>Replace alternator. Refer to CHG-44, "MR20DD : Removal and Installation" (MR engine) or CHG-46, "QR25DE : Removal and Installation" (QR engine).

#### 6.“B” TERMINAL CIRCUIT INSPECTION

Check “B” terminal circuit. Refer to CHG-42, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace alternator. Refer to CHG-44, "MR20DD : Removal and Installation" (MR engine) or CHG-46, "QR25DE : Removal and Installation" (QR engine).
NO >> Repair as needed.

# CHARGING SYSTEM PRELIMINARY INSPECTION

## Inspection Procedure

INFOID:0000000010957588

### 1.CHECK BATTERY TERMINALS CONNECTION

Check if battery terminals are clean and tight.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair battery terminals connection.

### 2.CHECK “E” TERMINAL CONNECTION

Check if “E” terminal (alternator ground harness) is clean and tight.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair “E” terminal connection.

### 3.CHECK BATTERY STATUS

Check battery status. Refer to PG-124, "EXCEPT FOR R9M : Work Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace battery. Refer to PG-142, "EXCEPT FOR R9M : Removal and Installation".

### 4.CHECK DRIVE BELT TENSION

Check drive belt tension. Refer to EM-23, "Inspection" (MR engine) or EM-167, "Inspection" (QR engine).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair as needed.

# DTC/CIRCUIT DIAGNOSIS

## B TERMINAL CIRCUIT

### Diagnosis Procedure

INFOID:0000000010957589

### 1.CHECK “B” TERMINAL CONNECTION

1. Turn ignition switch OFF.
2. Check if “B” terminal is clean and tight.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair “B” terminal connection.

### 2.CHECK “B” TERMINAL CIRCUIT

Check voltage between alternator “B” terminal and ground.

MR engine

| (+) | | (–) | Voltage (Approx.) |
|---|---|---|---|
| Alternator | | | |
| Connector | Terminal | | |
| E68 | 1 | Ground | Battery voltage |

QR engine

| (+) | | (–) | Voltage (Approx.) |
|---|---|---|---|
| Alternator | | | |
| Connector | Terminal | | |
| F14 | 1 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check harness for open between alternator and fusible link.

### 3.CHECK “B” TERMINAL CONNECTION (VOLTAGE DROP TEST)

1. Start engine, then engine running at idle and warm.
2. Check voltage between battery positive terminal and alternator “B” terminal.

MR engine

| (+) | (–) | | Voltage (Approx.) |
|---|---|---|---|
| | Alternator | | |
| | Connector | Terminal | |
| Battery positive terminal | E68 | 1 | Less than 0.2 V |

QR engine

| (+) | (–) | | Voltage (Approx.) |
|---|---|---|---|
| | Alternator | | |
| | Connector | Terminal | |
| Battery positive terminal | F14 | 1 | Less than 0.2 V |

Is the inspection result normal?

YES >> “B” terminal circuit is normal. Refer to CHG-40, "Work Flow".
NO >> Check harness between battery and alternator for poor continuity.

# SYMPTOM DIAGNOSIS

## CHARGING SYSTEM

### Symptom Table

INFOID:0000000010957590

| Symptom | Reference |
|---|---|
| Discharged battery | Refer to CHG-40, "Work Flow". |
| The charge warning lamp does not turn OFF after the engine starts. | |

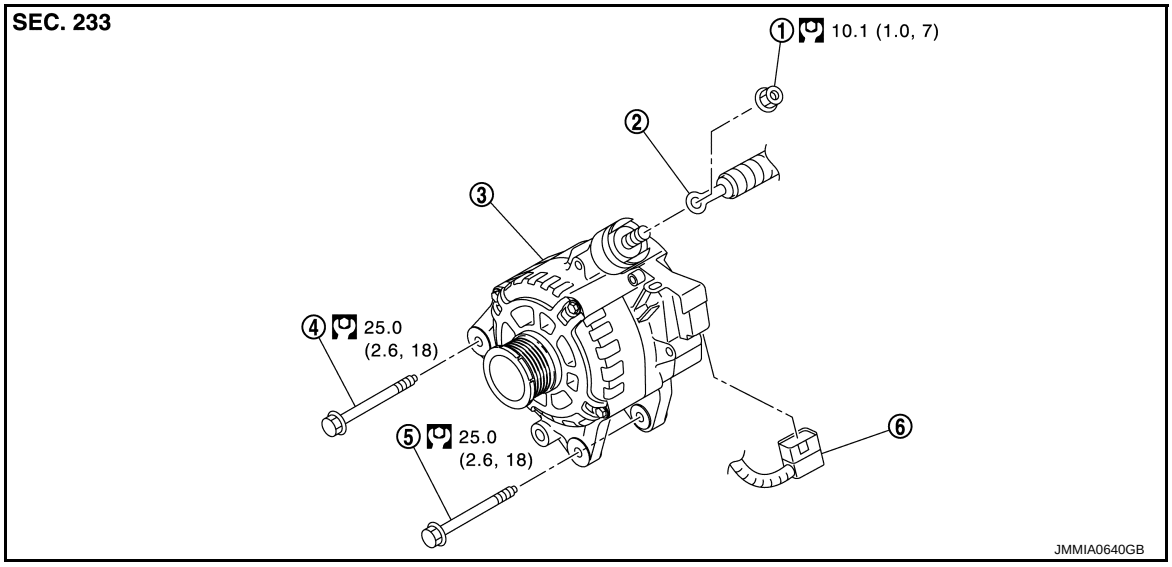
# REMOVAL AND INSTALLATION

## ALTERNATOR

### MR20DD

### MR20DD : Exploded View

INFOID:0000000010957571




① "B" terminal nut
② "B" terminal harness
③ Alternator
④ Alternator mounting bolt (upper)
⑤ Alternator mounting bolt (lower)
⑥ Alternator harness connector

: N·m (kg-m, ft-lb)

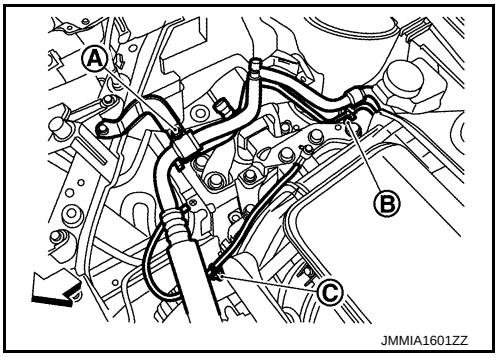
### MR20DD : Removal and Installation

INFOID:0000000010957572

REMOVAL

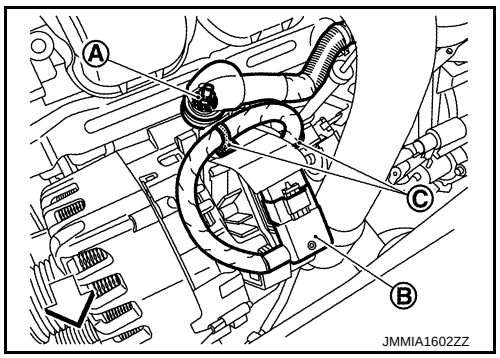
1. Disconnect battery cable from negative terminal. Refer to PG-142, "EXCEPT FOR R9M : Removal and Installation".
2. Remove drive belt. Refer to EM-22, "Removal and Installation".
3. Remove washer tank inlet. Refer to WW-91, "Removal and Installation".
4. Remove low pressure flexible hose bracket mounting bolt Ⓐ and nut Ⓑ.
5. Remove ground cable clip Ⓒ.

⇦ : Vehicle front



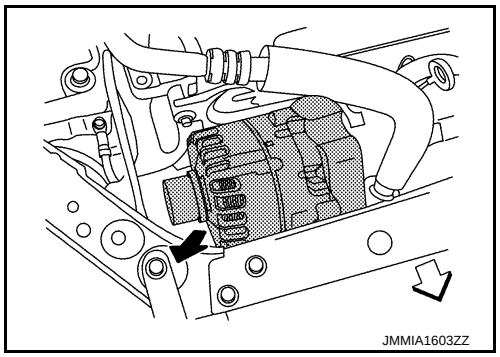
6. Remove “B” terminal nut Ⓐ and “B” terminal harness.
7. Disconnect alternator harness connector Ⓑ and harness clips Ⓒ.

⇦ : Vehicle front




8. Remove alternator mounting bolt (upper).
9. Completely loosen alternator mounting bolt (lower), and pull it out until the bolt head is in contact with the side member. And then, remove the alternator by pulling it forward.
**NOTE:**
The alternator can be removed together with the bolts by pulling it forward and using the alternator bracket bolt hole cutout.
10. Remove alternator upward from the vehicle.
**CAUTION:**
- **Never put excessive power on low pressure flexible hose and high pressure pipe.**
- **Never bend ground cable.**

⇦ : Vehicle front




## INSTALLATION

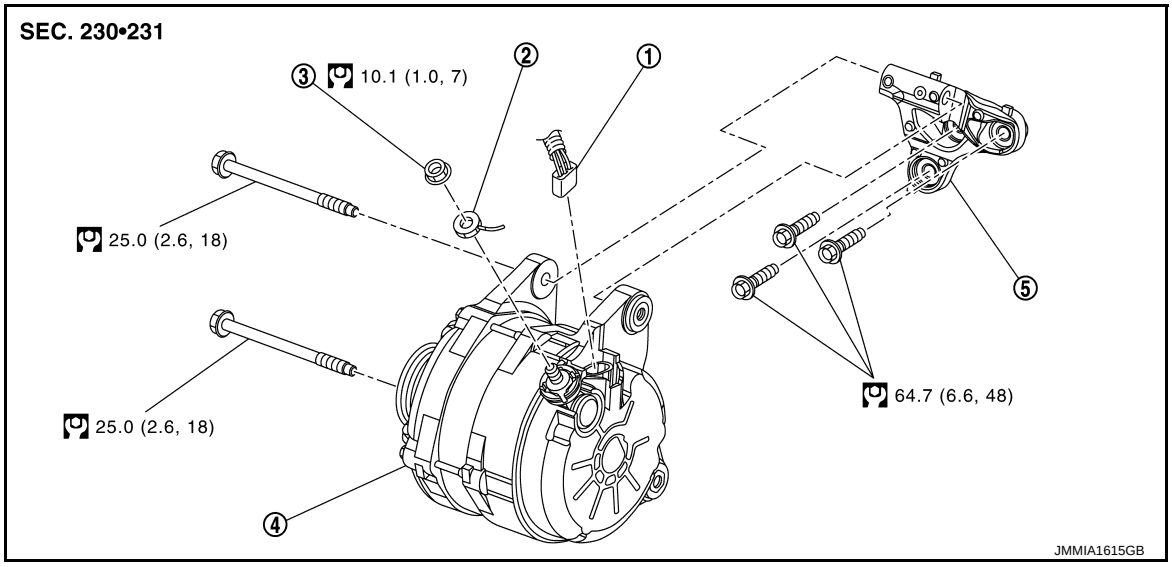
Note the following items, and then install in the reverse order of removal.

**CAUTION:**
- **Temporarily tighten the alternator bolts in order from the lower to the upper, and then tighten them in order from the upper to the lower.**
- **For the alternator, the front side (pulley side) surface is the reference surface. Fit the reference surface to the alternator mounting part, and then tighten the bolts.**
- **Be careful to tighten “B” terminal nut to the specified torque.**
- **Install alternator, and check tension of belt. Refer to EM-23, "Inspection".**

QR25DE

## QR25DE : Exploded View

INFOID:0000000010957573




① Alternator harness connector ② "B" terminal harness ③ "B" terminal nut
④ Alternator ⑤ Alternator mounting bracket
: N·m (kg-m, ft-lb)

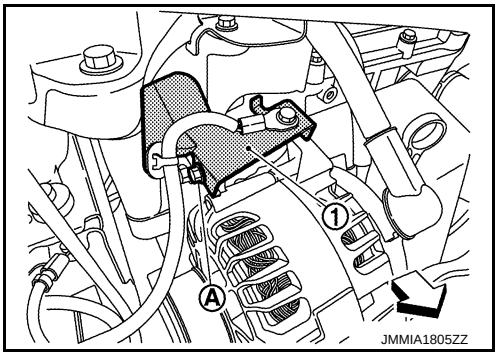
## QR25DE : Removal and Installation

INFOID:0000000010957574

REMOVAL

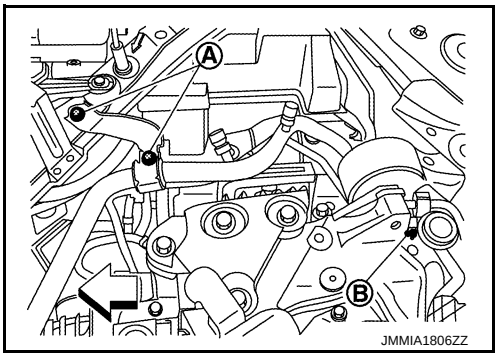
1. Disconnect battery cable from negative terminal. Refer to PG-142, "EXCEPT FOR R9M : Removal and Installation".
2. Remove drive belt. Refer to EM-166, "Removal and Installation".
3. Remove washer tank inlet. Refer to WW-91, "Removal and Installation".
4. Remove ground cable bracket mounting bolt Ⓐ, and then move ground cable bracket ① to a location where it does not inhibit work.
   **CAUTION:**
   **Never bend ground cable.**

   ⇦ : Vehicle front




5. Remove low pressure flexible hose bracket mounting bolts Ⓐ and nut Ⓑ.

   ⇦ : Vehicle front




6. Remove "B" terminal nut and disconnect "B" terminal harness.

7. Disconnect alternator harness connector.
8. Remove alternator mounting bolts.
9. Remove alternator upward from the vehicle.
   **CAUTION:**
   **Never strong force to low pressure flexible hose and high pressure pipe.**

## INSTALLATION

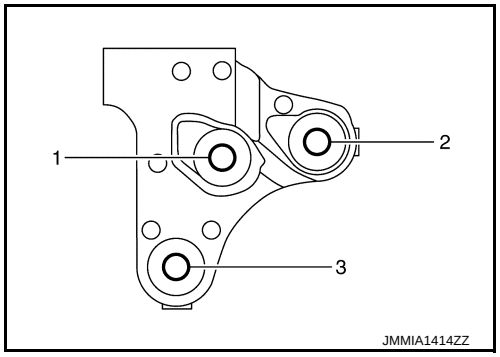
Note the following items, and then install in the reverse order of removal.

**CAUTION:**

- **Temporarily tighten the alternator bolts in order from the lower side to the upper side, and then tighten them in order from the upper side to the lower side.**
- **For the alternator, the front side (pulley side) surface is the reference surface. Fit the reference surface to the alternator mounting part, and then tighten the bolts.**
- **Be careful to tighten "B" terminal nut to the specified torque.**
- **Install alternator and check tension of belt. Refer to EM-167, "Inspection".**

**NOTE:**

Tighten mounting bolts according to the following procedure for installing alternator bracket.



# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### Alternator

INFOID:0000000010957591

| Applied model | | MR engine | QR engine |
|---|---|---|---|
| Type | | 2620093 | 2620168 |
| | | Valeo Make | Valeo Make |
| Nominal rating | [V - A] | 12 - 120 | 12 - 120 |
| Ground polarity | | Negative | Negative |
| Minimum revolution under no-load (When 13.5 V is applied) | [rpm] | Less than 1,200 | Less than 1,200 |
| Hot output current (When 13.5 V is applied) | [A/rpm] | More than 46/1,500<br>More than 96/2,500<br>More than 117/5,000 | More than 46/1,500<br>More than 96/2,500<br>More than 117/5,000 |
| Regulated output voltage | [V] | 14.0 – 14.6 | 14.0 – 14.6 |