

# SECTION CHG

## CHARGING SYSTEM

### CONTENTS

|                                                                                                  |   |                                                                                    |    |
|--------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------|----|
| <b>PRECAUTION</b> .....                                                                          | 3 | WARNING/INDICATOR/CHIME LIST : Warning Lamps/Indicator Lamps .....                 | 8  |
| <b>PRECAUTIONS</b> .....                                                                         | 3 | <b>WIRING DIAGRAM</b> .....                                                        | 9  |
| Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" ..... | 3 | <b>CHARGING SYSTEM</b> .....                                                       | 9  |
| Precaution for Power Generation Voltage Variable Control System .....                            | 3 | Wiring Diagram .....                                                               | 9  |
| <b>PREPARATION</b> .....                                                                         | 4 | <b>BASIC INSPECTION</b> .....                                                      | 13 |
| <b>PREPARATION</b> .....                                                                         | 4 | <b>DIAGNOSIS AND REPAIR WORK FLOW</b> .....                                        | 13 |
| Special Service Tools .....                                                                      | 4 | Work Flow (With EXP-800 NI or GR8-1200 NI) .....                                   | 13 |
| Commercial Service Tools .....                                                                   | 4 | Work Flow (Without EXP-800 NI or GR8-1200 NI).....                                 | 17 |
| <b>SYSTEM DESCRIPTION</b> .....                                                                  | 5 | <b>CHARGING SYSTEM PRELIMINARY INSPECTION</b> .....                                | 20 |
| <b>COMPONENT PARTS</b> .....                                                                     | 5 | Inspection Procedure .....                                                         | 20 |
| <b>CHARGING SYSTEM</b> .....                                                                     | 5 | <b>POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM OPERATION INSPECTION</b> ..... | 21 |
| CHARGING SYSTEM : Component Parts Location .....                                                 | 5 | Inspection Procedure .....                                                         | 21 |
| CHARGING SYSTEM : Alternator .....                                                               | 5 | <b>DTC/CIRCUIT DIAGNOSIS</b> .....                                                 | 23 |
| <b>POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM</b> .....                                    | 5 | <b>B TERMINAL CIRCUIT</b> .....                                                    | 23 |
| POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : Component Parts Location.....                 | 5 | Diagnosis Procedure .....                                                          | 23 |
| POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : Alternator (IC voltage regulator) .....       | 6 | <b>L TERMINAL CIRCUIT (OPEN)</b> .....                                             | 24 |
| <b>SYSTEM</b> .....                                                                              | 7 | Diagnosis Procedure .....                                                          | 24 |
| <b>CHARGING SYSTEM</b> .....                                                                     | 7 | <b>L TERMINAL CIRCUIT (SHORT)</b> .....                                            | 25 |
| CHARGING SYSTEM : System Description .....                                                       | 7 | Diagnosis Procedure .....                                                          | 25 |
| <b>POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM</b> .....                                    | 7 | <b>S TERMINAL CIRCUIT</b> .....                                                    | 26 |
| POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description .....                      | 7 | Diagnosis Procedure .....                                                          | 26 |
| <b>WARNING/INDICATOR/CHIME LIST</b> .....                                                        | 8 | <b>SYMPTOM DIAGNOSIS</b> .....                                                     | 27 |
|                                                                                                  |   | <b>CHARGING SYSTEM</b> .....                                                       | 27 |
|                                                                                                  |   | Symptom Table .....                                                                | 27 |
|                                                                                                  |   | <b>REMOVAL AND INSTALLATION</b> .....                                              | 28 |

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|------------------------------------------|-----------|----------------------------------------|-----------|
| <b>ALTERNATOR .....</b>                  | <b>28</b> | <b>SERVICE DATA AND SPECIFICATIONS</b> |           |
| <b>VQ37VHR .....</b>                     | <b>28</b> | <b>(SDS) .....</b>                     | <b>31</b> |
| VQ37VHR : Exploded View .....            | 28        | <b>SERVICE DATA AND SPECIFICATIONS</b> |           |
| VQ37VHR : Removal and Installation ..... | 28        | <b>(SDS) .....</b>                     | <b>31</b> |
| VQ37VHR : Inspection .....               | 30        | Alternator .....                       | 31        |

# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

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

INFOID:000000009239666

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

#### **WARNING:**

Always observe the following items for preventing accidental activation.

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

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

#### **WARNING:**

Always observe the following items for preventing accidental activation.

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

#### Precaution for Power Generation Voltage Variable Control System

INFOID:000000009239669

#### **CAUTION:**

For this model, the battery current sensor that is installed to the battery cable at the negative terminal measures the charging/discharging current of the battery, and performs various controls. If the electrical component or the ground wire is connected directly to the battery terminal, the current other than that being measured with the battery current sensor is charging to or discharging from the battery. This condition causes the malfunction of the control, and then the battery discharge may occur. Do not connect the electrical component or the ground wire directly to the battery terminal.

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# PREPARATION

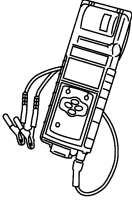
< PREPARATION >

## PREPARATION

### PREPARATION

#### Special Service Tools

INFOID:000000009402431

| Tool number<br>(Kent-Moore No.)<br>Tool name                                                                                                                                                       | Description                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>—<br/>(—) Model GR8-1200 NI<br/>Multitasking battery and electrical diagnostic station</p>  <p>AWI1A1239ZZ</p> | <p>Tests batteries, starting and charging systems and charges batteries.<br/>For operating instructions, refer to diagnostic station instruction manual.</p> |
| <p>—<br/>(—) Model EXP-800 NI<br/>Battery and electrical diagnostic analyzer</p>  <p>JSMIA0806ZZ</p>              | <p>Tests batteries and charging systems.<br/>For operating instructions, refer to diagnostic analyzer instruction manual.</p>                                |

#### Commercial Service Tools

INFOID:000000009239671

| Tool name                                                                                                              | Description                             |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <p>Power tool</p>  <p>PIIB1407E</p> | <p>Loosening bolts, nuts and screws</p> |

## COMPONENT PARTS

< SYSTEM DESCRIPTION >

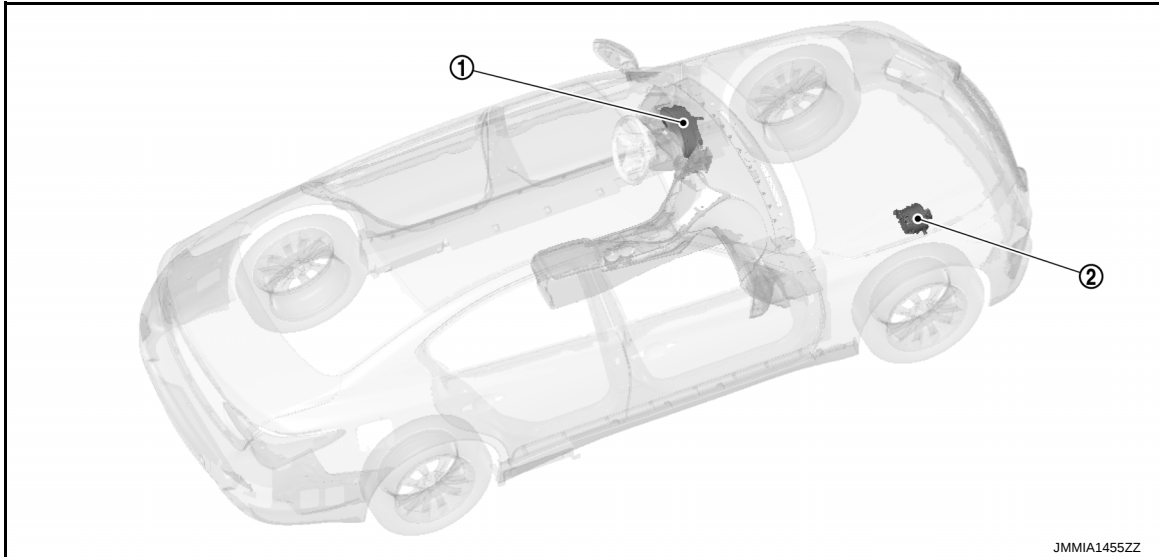
### SYSTEM DESCRIPTION

#### COMPONENT PARTS

#### CHARGING SYSTEM

#### CHARGING SYSTEM : Component Parts Location

INFOID:000000009402919

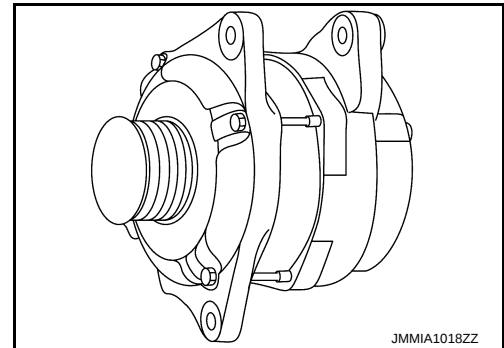


| No. | Component                                  | Function                                                                                                                                                                                                                                                                            |
|-----|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ①   | Combination meter<br>(Charge warning lamp) | The IC voltage regulator warning function activates to illuminate the charge warning lamp, if any of the following symptoms occur while alternator is operating: <ul style="list-style-type: none"><li>• Excessive voltage is produced.</li><li>• No voltage is produced.</li></ul> |
| ②   | Alternator                                 | Refer to <a href="#">CHG-5, "CHARGING SYSTEM : Alternator"</a> .                                                                                                                                                                                                                    |

#### CHARGING SYSTEM : Alternator

INFOID:000000009402920

The alternator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged. The voltage output is controlled by the IC voltage regulator.



#### POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

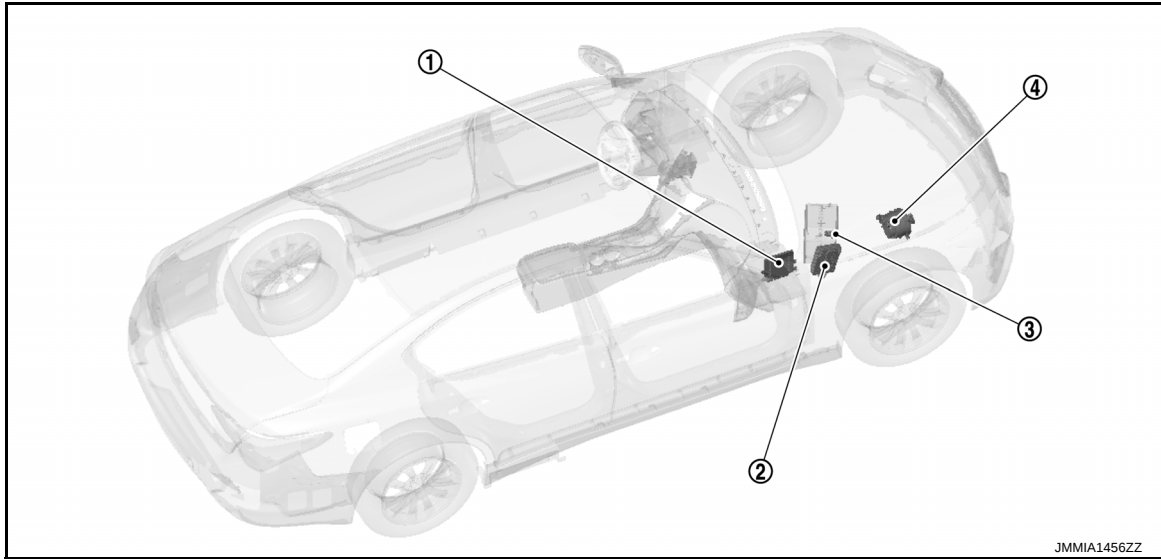
#### POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : Component

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

## Parts Location

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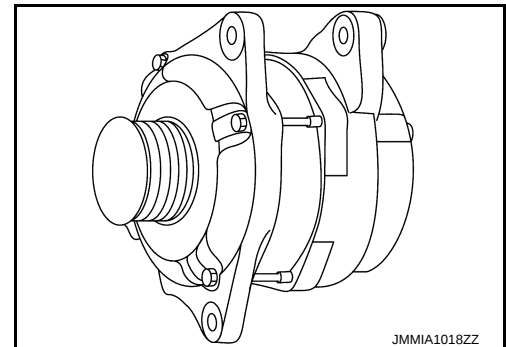


| No. | Component                            | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ①   | ECM                                  | ECM judges whether to perform the power generation voltage variable control according to the battery condition.<br>When performing the power generation voltage variable control, ECM calculates the target power generation voltage according to the battery condition and sends the calculated value as the power generation command value signal to IPDM E/R.<br>Refer to <a href="#">EC-16, "ENGINE CONTROL SYSTEM : Component Parts Location"</a> for detailed installation location. |
| ②   | IPDM E/R                             | IPDM E/R converts the received power generation command value into the power generation command signal (PWM signal) and sends it to the IC voltage regulator.<br>Refer to <a href="#">PCS-4, "Component Parts Location"</a> for detailed installation location.                                                                                                                                                                                                                            |
| ③   | Battery current sensor               | Battery current sensor is installed to the battery cable at the negative terminal, and it detects the charging/discharging current of the battery and sends the voltage signal to ECM according to the current value.<br>Refer to <a href="#">EC-24, "Battery Current Sensor (With Battery Temperature Sensor)"</a> .                                                                                                                                                                      |
| ④   | Alternator<br>(IC voltage regulator) | Refer to <a href="#">CHG-6, "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : Alternator (IC voltage regulator)"</a> .                                                                                                                                                                                                                                                                                                                                                                   |

## POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : Alternator (IC voltage regulator)

INFOID:000000009402922

The output voltage of the alternator is controlled by the IC voltage regulator inside the alternator.  
IC voltage regulator controls the power generation voltage by the target power generation voltage based on the received power generation command signal (PWM signal).  
When there is no power generation command signal (PWM signal), the alternator performs the normal power generation according to the characteristic of the IC voltage regulator.



# SYSTEM

< SYSTEM DESCRIPTION >

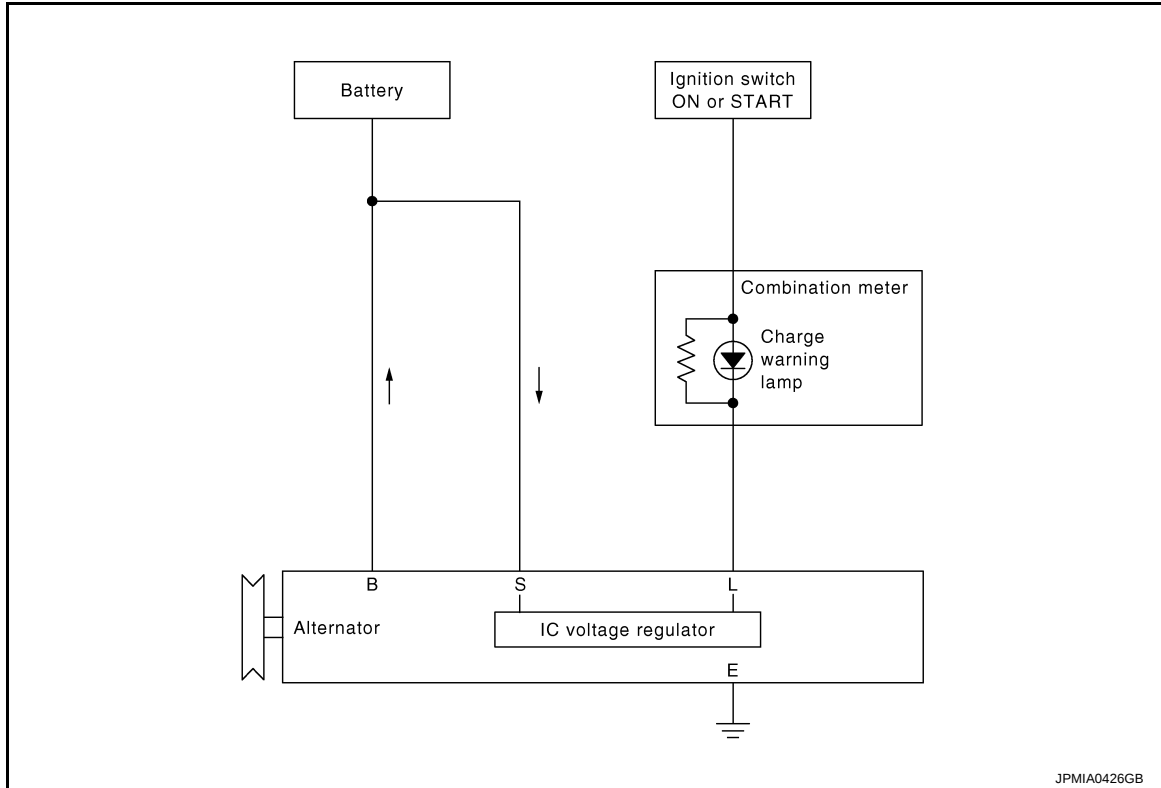
## SYSTEM

### CHARGING SYSTEM

#### CHARGING SYSTEM : System Description

INFOID:000000009402923

#### SYSTEM DIAGRAM



#### SYSTEM DESCRIPTION

- “B” terminal circuit supplies power to charge the battery and to operate the vehicle’s electrical system.
- “L” terminal circuit controls the charge warning lamp. The charge warning lamp illuminates when the ignition switch is set to ON or START. When the alternator is providing sufficient voltage with the engine running, the charge warning lamp will go off. If the charge warning lamp illuminates with the engine running, a malfunction is indicated.  
Refer to [MWI-23, "WARNING LAMPS/INDICATOR LAMPS : Charge Warning Lamp"](#).
- “S” terminal circuit detects the battery voltage to adjust the alternator output voltage with the IC voltage regulator.

#### POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

#### POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System De-

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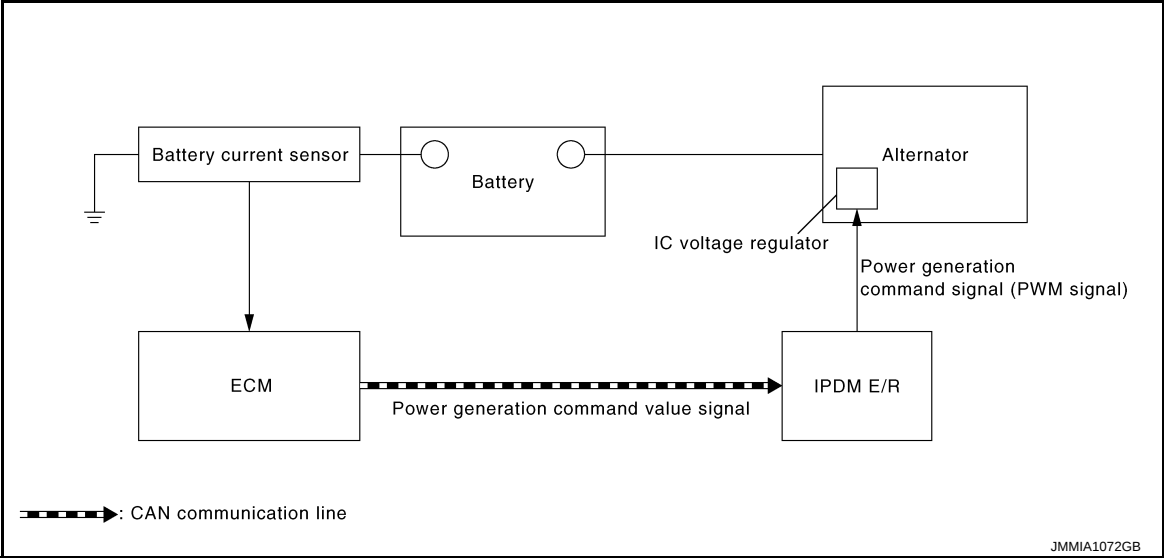
SYSTEM

< SYSTEM DESCRIPTION >

scription

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SYSTEM DIAGRAM



SYSTEM DESCRIPTION

By performing the power generation voltage variable control, the engine load due to the power generation of the alternator is reduced and fuel consumption is decreased.

NOTE:

When any malfunction is detected in the power generation voltage variable control system, the power generation is performed according to the characteristic of the IC voltage regulator of the alternator.

WARNING/INDICATOR/CHIME LIST

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

INFOID:000000009402925

| Item                | Design | Reference                                                                                              |
|---------------------|--------|--------------------------------------------------------------------------------------------------------|
| Charge warning lamp |        | For layout, refer to <a href="#">MWI-8, "METER SYSTEM : Design"</a> .                                  |
|                     |        | For function, refer to <a href="#">MWI-23, "WARNING LAMPS/INDICATOR LAMPS : Charge Warning Lamp"</a> . |

CHARGING SYSTEM

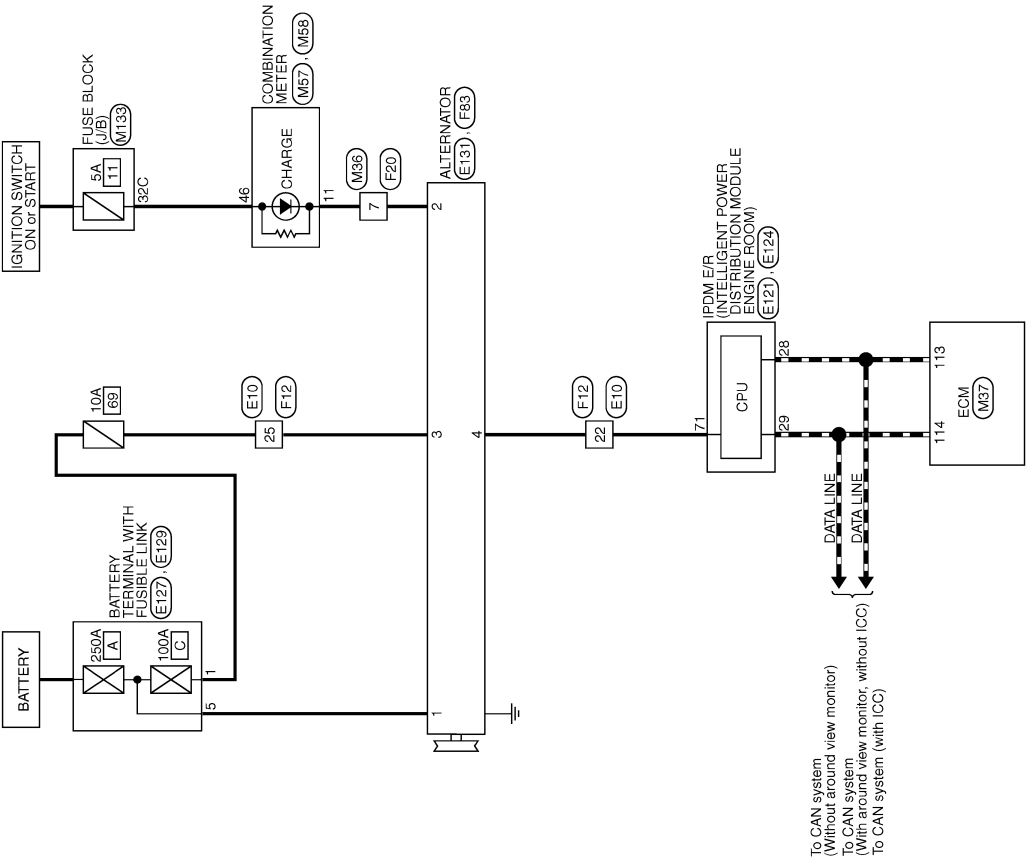
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WIRING DIAGRAM

CHARGING SYSTEM

Wiring Diagram

INFOID:000000009239680



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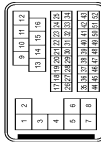
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# CHARGING SYSTEM

< WIRING DIAGRAM >

## CHARGING SYSTEM

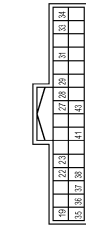
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|----------------|------------------|
| Connector No.  | E10              |
| Connector Name | WIRE TO WIRE     |
| Connector Type | SAAS9MB-RSS-SUZB |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 1            | SHIELD        | -                           |
| 2            | SHIELD        | -                           |
| 3            | LB            | -                           |
| 4            | SHIELD        | -                           |
| 5            | SB            | -                           |
| 6            | SB            | -                           |
| 7            | G             | -                           |
| 8            | W             | -                           |
| 9            | W             | -                           |
| 10           | Y             | -                           |
| 11           | P             | -                           |
| 12           | SB            | -                           |
| 13           | L             | -                           |
| 14           | G             | -                           |
| 15           | LG            | -                           |
| 16           | BR            | -                           |
| 17           | L             | -                           |
| 18           | P             | -                           |
| 19           | GR            | -                           |
| 20           | G             | -                           |
| 21           | V             | -                           |
| 22           | Y             | -                           |
| 23           | L             | -                           |
| 24           | GR            | -                           |
| 25           | V             | -                           |
| 26           | BR            | -                           |
| 27           | W             | -                           |
| 28           | V             | -                           |
| 29           | BR            | -                           |
| 30           | G             | -                           |
| 31           | P             | -                           |
| 32           | G             | -                           |
| 33           | B             | -                           |
| 34           | BG            | -                           |
| 35           | LG            | -                           |

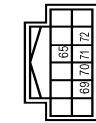
|    |        |   |
|----|--------|---|
| 36 | W      | - |
| 37 | SHIELD | - |
| 38 | L      | - |
| 39 | P      | - |
| 40 | R      | - |
| 41 | W      | - |
| 42 | LG     | - |
| 43 | G      | - |
| 44 | V      | - |
| 45 | Y      | - |
| 46 | SHIELD | - |
| 47 | W      | - |
| 48 | BR     | - |
| 49 | G      | - |
| 50 | GR     | - |
| 51 | SB     | - |
| 52 | R      | - |

|                |                                                        |
|----------------|--------------------------------------------------------|
| Connector No.  | E121                                                   |
| Connector Name | ROOM INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM |
| Connector Type | TH432FW-NH                                             |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 19           | G             | -                           |
| 22           | BG            | -                           |
| 23           | LG            | -                           |
| 27           | GR            | -                           |
| 28           | P             | -                           |
| 29           | L             | -                           |
| 31           | G             | -                           |
| 33           | SB            | -                           |
| 34           | Y             | -                           |
| 35           | G             | -                           |
| 36           | SB            | -                           |
| 37           | GR            | -                           |
| 38           | BR            | -                           |
| 41           | GR            | -                           |
| 43           | V             | -                           |

|                |                                                        |
|----------------|--------------------------------------------------------|
| Connector No.  | E124                                                   |
| Connector Name | ROOM INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM |
| Connector Type | TH12FW-NH                                              |



| Terminal No. | Color Of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 69           | GR            | -                           |
| 70           | GR            | -                           |
| 71           | Y             | -                           |
| 72           | P             | -                           |

|                |                                    |
|----------------|------------------------------------|
| Connector No.  | E127                               |
| Connector Name | BATTERY TERMINAL WITH FUSE/LE LINK |
| Connector Type | L02FB-NC                           |



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

|                |                                    |
|----------------|------------------------------------|
| Connector No.  | E129                               |
| Connector Name | BATTERY TERMINAL WITH FUSE/LE LINK |
| Connector Type | Z4340-75905                        |



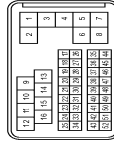
| Terminal No. | Color Of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 5            | R             | -                           |

|                |             |
|----------------|-------------|
| Connector No.  | E131        |
| Connector Name | ALTERNATOR  |
| Connector Type | Z4340-65F45 |



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

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|----------------|------------------|
| Connector No.  | F12              |
| Connector Name | WIRE TO WIRE     |
| Connector Type | SAAS9FB-RSS-SIZE |



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# CHARGING SYSTEM

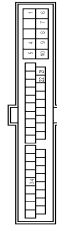
< WIRING DIAGRAM >

## CHARGING SYSTEM

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 48           | L             | -                           |
| 49           | R             | -                           |
| 50           | SB            | -                           |
| 51           | LG            | -                           |
| 52           | GR            | -                           |
| 53           | Y             | -                           |
| 54           | W             | -                           |
| 55           | BR            | -                           |
| 56           | GR            | -                           |
| 57           | G             | -                           |
| 58           | W             | -                           |
| 59           | W             | -                           |
| 60           | G             | -                           |
| 61           | R             | -                           |
| 62           | P             | -                           |
| 63           | L             | -                           |
| 64           | LG            | -                           |
| 65           | R             | -                           |
| 66           | Y             | -                           |
| 67           | L             | -                           |
| 68           | P             | -                           |
| 69           | GR            | -                           |
| 70           | BG            | -                           |
| 71           | LG            | -                           |
| 72           | W             | -                           |
| 73           | Y             | -                           |
| 74           | LG            | -                           |
| 75           | V             | -                           |
| 76           | W             | -                           |
| 77           | V             | -                           |
| 78           | BR            | -                           |
| 79           | LG            | -                           |
| 80           | R             | -                           |
| 81           | P             | -                           |
| 82           | GR            | -                           |
| 83           | B             | -                           |
| 84           | BG            | -                           |
| 85           | LG            | -                           |
| 86           | SB            | -                           |
| 87           | SHIELD        | -                           |
| 88           | W             | -                           |
| 89           | Y             | -                           |
| 90           | G             | -                           |
| 91           | B             | -                           |
| 92           | GR            | -                           |
| 93           | R             | -                           |
| 94           | BG            | -                           |
| 95           | Y             | -                           |
| 96           | SHIELD        | -                           |
| 97           | W             | -                           |
| 98           | LG            | -                           |

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 48           | L             | -                           |
| 49           | R             | -                           |
| 50           | SB            | -                           |
| 51           | LG            | -                           |
| 52           | GR            | -                           |

| Connector No. | Signal Name [Specification] |
|---------------|-----------------------------|
| F20           | WIRE TO WIRE                |
| TK308-W-NS10  | WIRE TO WIRE                |



HS

| Terminal No. | Color Of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 1            | Y             | -                           |
| 4            | R             | -                           |
| 5            | B             | -                           |
| 6            | W             | -                           |
| 7            | G             | -                           |
| 8            | BG            | -                           |
| 9            | Y             | -                           |
| 10           | GR            | -                           |
| 21           | LG            | -                           |
| 22           | W             | -                           |
| 31           | BG            | -                           |
| 32           | Y             | -                           |
| 33           | B             | -                           |
| 34           | BG            | -                           |

| Connector No. | Signal Name [Specification] |
|---------------|-----------------------------|
| FE3           | ALTERNATOR                  |
| H303FB        | WIRE TO WIRE                |



HS

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

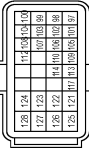
| Connector No. | Signal Name [Specification] |
|---------------|-----------------------------|
| M38           | WIRE TO WIRE                |
| TK308W-NS10   | WIRE TO WIRE                |



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| Terminal No. | Color Of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 1            | Y             | -                           |
| 4            | R             | -                           |
| 5            | B             | -                           |
| 6            | W             | -                           |
| 7            | G             | -                           |
| 8            | BG            | -                           |
| 9            | Y             | -                           |
| 10           | GR            | -                           |
| 21           | LG            | -                           |
| 22           | W             | -                           |
| 31           | BG            | -                           |
| 32           | Y             | -                           |
| 33           | B             | -                           |
| 34           | BG            | -                           |

| Connector No.    | Signal Name [Specification] |
|------------------|-----------------------------|
| M37              | WIRE TO WIRE                |
| ECM              | WIRE TO WIRE                |
| R124EY-2ZS-R-U-Z | WIRE TO WIRE                |



HS

| Terminal No. | Color Of Wire | Signal Name [Specification]         |
|--------------|---------------|-------------------------------------|
| 107          | Y             | ACCELERATOR PEDAL POSITION SENSOR 1 |
| 108          | BR            | ACCELERATOR PEDAL POSITION SENSOR 2 |
| 109          | W             | SENSOR GROUND                       |
| 110          | G             | SENSOR GROUND                       |
| 111          | SB            | ASCD STEERING SWITCH                |
| 112          | SB            | ECG STEERING SWITCH                 |
| 113          | LG            | EVAP CONTROL SYSTEM PRESSURE SENSOR |
| 114          | L             | SENSOR CHARGE SUPPLY                |
| 115          | R             | SENSOR GROUND                       |
| 116          | R             | ACCELERATOR PEDAL POSITION SENSOR 1 |
| 117          | L             | REFRIGERANT PRESSURE SENSOR         |
| 118          | P             | FUEL TANK TEMPERATURE SENSOR        |
| 119          | Y             | SENSOR GROUND                       |
| 120          | BR            | ASCD STEERING SWITCH                |
| 121          | Y             | TRANSMISSION RANGE SWITCH           |
| 122          | V             | ENGINE SPEED SIGNAL OUTPUT          |
| 123          | P             | CAN COMMUNICATION LINE              |
| 124          | L             | CAN COMMUNICATION LINE              |
| 125          | V             | DATA LINK CONNECTOR                 |
| 126          | LG            | EVAP CANISTER VENT CONTROL VALVE    |
| 127          | SB            | STOP LAMP SWITCH                    |
| 128          | B             | ECM GROUND                          |
| 129          | B             | ECM GROUND                          |
| 130          | R             | POWER SUPPLY FOR ECM                |
| 131          | BG            | POWER SUPPLY FOR ECM                |
| 132          | B             | POWER SUPPLY FOR ECM                |
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| 413          | B             | POWER SUPPLY FOR ECM                |
| 414          | B             | POWER SUPPLY FOR ECM                |

## < WIRING DIAGRAM >

|                |                   |
|----------------|-------------------|
| Connector No.  | M58               |
| Connector Name | COMBINATION METER |
| Connector Type | TH12FW-INH        |

| Terminal | Color Of Wire | Signal Name [Specification]                |
|----------|---------------|--------------------------------------------|
| 1        | B             | GROUND                                     |
| 2        | G             | SECURITY SIGNAL                            |
| 3        | B             | -                                          |
| 4        | B             | ALTERNATOR SIGNAL                          |
| 5        | W             | LED HEADLAMP (LH) WARNING SIGNAL           |
| 6        | G             | LED HEADLAMP (RH) WARNING SIGNAL           |
| 7        | BR            | WIPER MOTOR SPEED SIGNAL                   |
| 8        | W             | AIR POWER SUPPLY                           |
| 9        | V             | AIR BAG SIGNAL                             |
| 10       | V             | METER CONTROL SWITCH GROUND                |
| 11       | BR            | TRIP RESET SIGNAL                          |
| 12       | B             | STEERING SWITCH SIGNAL GROUND              |
| 13       | B             | STEERING SWITCH SIGNAL A                   |
| 14       | W/B           | WASHER FLUID SWITCH SIGNAL                 |
| 15       | W             | WASHER FLUID LEVEL SWITCH SIGNAL           |
| 16       | V             | BRAKE FLUID LEVEL SWITCH SIGNAL            |
| 17       | BR            | PARKING BRAKE SWITCH SIGNAL                |
| 18       | SB            | PASSENGER SEAT BELT WARNING SIGNAL         |
| 19       | V             | SEAT BELT BUCKLE SWITCH SIGNAL DRIVER SIDE |
| 20       | W             | MANUAL MODE SIGNAL                         |
| 21       | G             | MANUAL MODE SHIFT UP SIGNAL                |
| 22       | BR            | MANUAL MODE SHIFT DOWN SIGNAL              |
| 23       | GR            | PADDLE SHIFTER UP SIGNAL                   |
| 24       | GR            | PADDLE SHIFTER DOWN SIGNAL                 |
| 25       | G             | ILLUMINATION CONTROL SWITCH SIGNAL A       |
| 26       | GR            | ILLUMINATION CONTROL SWITCH SIGNAL B       |
| 27       | BR            | VEHICLE SPEED SIGNAL (4-PIN SET)           |
| 28       | R             | VEHICLE SPEED SIGNAL (2-PIN SET)           |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 41           | L             | IGN-H                       |
| 42           | P             | IGN-L                       |
| 43           | B             | ILLUMINATION CONTROL SIGNAL |
| 44           | Y             | FUEL LEVEL SENSOR GROUND    |
| 45           | W             | BATTERY POWER SUPPLY        |
| 46           | R             | IGNITION SIGNAL             |
| 47           | LG            | AV COMMUNICATION SIGNAL (H) |
| 48           | SB            | AV COMMUNICATION SIGNAL (L) |
| 51           | BR            | FUEL LEVEL SENSOR SIGNAL    |
| 52           | B             | GROUND                      |

|                |                  |
|----------------|------------------|
| Connector No.  | M133             |
| Connector Name | FUSE BLOCK (J/B) |
| Connector Type | TH40FW-IH        |

| Terminal | Color Of Wire | Signal Name [Specification] |
|----------|---------------|-----------------------------|
| 1        | Red           | +                           |
| 2        | Black         | -                           |
| 3        | Blue          | +                           |
| 4        | White         | -                           |
| 5        | Green         | +                           |
| 6        | Yellow        | -                           |
| 7        | Purple        | +                           |
| 8        | Brown         | -                           |
| 9        | Pink          | +                           |
| 10       | Grey          | -                           |
| 11       | Orange        | +                           |
| 12       | Light Blue    | -                           |
| 13       | Dark Blue     | +                           |
| 14       | Light Green   | -                           |
| 15       | Dark Green    | +                           |
| 16       | Light Yellow  | -                           |
| 17       | Dark Yellow   | +                           |
| 18       | Light Purple  | -                           |
| 19       | Dark Purple   | +                           |
| 20       | Light Brown   | -                           |
| 21       | Dark Brown    | +                           |
| 22       | Light Pink    | -                           |
| 23       | Dark Pink     | +                           |
| 24       | Light Grey    | -                           |
| 25       | Dark Grey     | +                           |
| 26       | Light Orange  | -                           |
| 27       | Dark Orange   | +                           |
| 28       | Light Blue    | -                           |
| 29       | Dark Blue     | +                           |
| 30       | Light Green   | -                           |
| 31       | Dark Green    | +                           |
| 32       | Light Yellow  | -                           |
| 33       | Dark Yellow   | +                           |
| 34       | Light Purple  | -                           |
| 35       | Dark Purple   | +                           |
| 36       | Light Brown   | -                           |
| 37       | Dark Brown    | +                           |
| 38       | Light Pink    | -                           |
| 39       | Dark Pink     | +                           |
| 40       | Light Grey    | -                           |
| 41       | Dark Grey     | +                           |
| 42       | Light Orange  | -                           |
| 43       | Dark Orange   | +                           |
| 44       | Light Blue    | -                           |
| 45       | Dark Blue     | +                           |
| 46       | Light Green   | -                           |
| 47       | Dark Green    | +                           |
| 48       | Light Yellow  | -                           |
| 49       | Dark Yellow   | +                           |
| 50       | Light Purple  | -                           |
| 51       | Dark Purple   | +                           |
| 52       | Light Brown   | -                           |
| 53       | Dark Brown    | +                           |
| 54       | Light Pink    | -                           |
| 55       | Dark Pink     | +                           |
| 56       | Light Grey    | -                           |
| 57       | Dark Grey     | +                           |
| 58       | Light Orange  | -                           |
| 59       | Dark Orange   | +                           |
| 60       | Light Blue    | -                           |
| 61       | Dark Blue     | +                           |
| 62       | Light Green   | -                           |
| 63       | Dark Green    | +                           |
| 64       | Light Yellow  | -                           |
| 65       | Dark Yellow   | +                           |
| 66       | Light Purple  | -                           |
| 67       | Dark Purple   | +                           |
| 68       | Light Brown   | -                           |
| 69       | Dark Brown    | +                           |
| 70       | Light Pink    | -                           |
| 71       | Dark Pink     | +                           |
| 72       | Light Grey    | -                           |
| 73       | Dark Grey     | +                           |
| 74       | Light Orange  | -                           |
| 75       | Dark Orange   | +                           |
| 76       | Light Blue    | -                           |
| 77       | Dark Blue     | +                           |
| 78       | Light Green   | -                           |
| 79       | Dark Green    | +                           |
| 80       | Light Yellow  | -                           |
| 81       | Dark Yellow   | +                           |
| 82       | Light Purple  | -                           |
| 83       | Dark Purple   | +                           |
| 84       | Light Brown   | -                           |
| 85       | Dark Brown    | +                           |
| 86       | Light Pink    | -                           |
| 87       | Dark Pink     | +                           |
| 88       | Light Grey    | -                           |
| 89       | Dark Grey     | +                           |
| 90       | Light Orange  | -                           |
| 91       | Dark Orange   | +                           |
| 92       | Light Blue    | -                           |
| 93       | Dark Blue     | +                           |
| 94       | Light Green   | -                           |
| 95       | Dark Green    | +                           |
| 96       | Light Yellow  | -                           |
| 97       | Dark Yellow   | +                           |
| 98       | Light Purple  | -                           |
| 99       | Dark Purple   | +                           |
| 100      | Light Brown   | -                           |
| 101      | Dark Brown    | +                           |
| 102      | Light Pink    | -                           |
| 103      | Dark Pink     | +                           |
| 104      | Light Grey    | -                           |
| 105      | Dark Grey     | +                           |
| 106      | Light Orange  | -                           |
| 107      | Dark Orange   | +                           |
| 108      | Light Blue    | -                           |
| 109      | Dark Blue     | +                           |
| 110      | Light Green   | -                           |
| 111      | Dark Green    | +                           |
| 112      | Light Yellow  | -                           |
| 113      | Dark Yellow   | +                           |
| 114      | Light Purple  | -                           |
| 115      | Dark Purple   | +                           |
| 116      | Light Brown   | -                           |
| 117      | Dark Brown    | +                           |
| 118      | Light Pink    | -                           |
| 119      | Dark Pink     | +                           |
| 120      | Light Grey    | -                           |
| 121      | Dark Grey     | +                           |
| 122      | Light Orange  | -                           |
| 123      | Dark Orange   | +                           |
| 124      | Light Blue    | -                           |
| 125      | Dark Blue     | +                           |
| 126      | Light Green   | -                           |
| 127      | Dark Green    | +                           |
| 128      | Light Yellow  | -                           |
| 129      | Dark Yellow   | +                           |
| 130      | Light Purple  | -                           |
| 131      | Dark Purple   | +                           |
| 132      | Light Brown   | -                           |
| 133      | Dark Brown    | +                           |
| 134      | Light Pink    | -                           |
| 135      | Dark Pink     | +                           |
| 136      | Light Grey    | -                           |
| 137      | Dark Grey     | +                           |
| 138      | Light Orange  | -                           |
| 139      | Dark Orange   | +                           |
| 140      | Light Blue    | -                           |
| 141      | Dark Blue     | +                           |
| 142      | Light Green   | -                           |
| 143      | Dark Green    | +                           |
| 144      | Light Yellow  | -                           |
| 145      | Dark Yellow   | +                           |
| 146      | Light Purple  | -                           |
| 147      | Dark Purple   | +                           |
| 148      | Light Brown   | -                           |
| 149      | Dark Brown    | +                           |
| 150      | Light Pink    | -                           |
| 151      | Dark Pink     | +                           |
| 152      | Light Grey    | -                           |
| 153      | Dark Grey     | +                           |
| 154      | Light Orange  | -                           |
| 155      | Dark Orange   | +                           |
| 156      | Light Blue    | -                           |
| 157      | Dark Blue     | +                           |
| 158      | Light Green   | -                           |
| 159      | Dark Green    | +                           |
| 160      | Light Yellow  | -                           |
| 161      | Dark Yellow   | +                           |
| 162      | Light Purple  | -                           |
| 163      | Dark Purple   | +                           |
| 164      | Light Brown   | -                           |
| 165      | Dark Brown    | +                           |
| 166      | Light Pink    | -                           |
| 167      | Dark Pink     | +                           |
| 168      | Light Grey    | -                           |
| 169      | Dark Grey     | +                           |
| 170      | Light Orange  | -                           |
| 171      | Dark Orange   | +                           |
| 172      | Light Blue    | -                           |
| 173      | Dark Blue     | +                           |
| 174      | Light Green   | -                           |
| 175      | Dark Green    | +                           |
| 176      | Light Yellow  | -                           |
| 177      | Dark Yellow   | +                           |
| 178      | Light Purple  | -                           |
| 179      | Dark Purple   | +                           |
| 180      | Light Brown   | -                           |
| 181      | Dark Brown    | +                           |
| 182      | Light Pink    | -                           |
| 183      | Dark Pink     | +                           |
| 184      | Light Grey    | -                           |
| 185      | Dark Grey     | +                           |
| 186      | Light Orange  | -                           |
| 187      | Dark Orange   | +                           |
| 188      | Light Blue    | -                           |
| 189      | Dark Blue     | +                           |
| 190      | Light Green   | -                           |
| 191      | Dark Green    | +                           |
| 192      | Light Yellow  | -                           |
| 193      | Dark Yellow   | +                           |
| 194      | Light Purple  | -                           |
| 195      | Dark Purple   | +                           |
| 196      | Light Brown   | -                           |
| 197      | Dark Brown    | +                           |
| 198      | Light Pink    | -                           |
| 199      | Dark Pink     | +                           |
| 200      | Light Grey    | -                           |
| 201      | Dark Grey     | +                           |
| 202      | Light Orange  | -                           |
| 203      | Dark Orange   | +                           |
| 204      | Light Blue    | -                           |
| 205      | Dark Blue     | +                           |
| 206      | Light Green   | -                           |
| 207      | Dark Green    | +                           |
| 208      | Light Yellow  | -                           |
| 209      | Dark Yellow   | +                           |
| 210      | Light Purple  | -                           |
| 211      | Dark Purple   | +                           |
| 212      | Light Brown   | -                           |
| 213      | Dark Brown    | +                           |
| 214      | Light Pink    | -                           |
| 215      | Dark Pink     | +                           |
| 216      | Light Grey    | -                           |
| 217      | Dark Grey     | +                           |
| 218      | Light Orange  | -                           |
| 219      | Dark Orange   | +                           |
| 220      | Light Blue    | -                           |
| 221      | Dark Blue     | +                           |
| 222      | Light Green   | -                           |
| 223      | Dark Green    | +                           |
| 224      | Light Yellow  | -                           |
| 225      | Dark Yellow   | +                           |
| 226      | Light Purple  | -                           |
| 227      | Dark Purple   | +                           |
| 228      | Light Brown   | -                           |
| 229      | Dark Brown    | +                           |
| 230      | Light Pink    | -                           |
| 231      | Dark Pink     | +                           |
| 232      | Light Grey    | -                           |
| 233      | Dark Grey     | +                           |
| 234      | Light Orange  | -                           |
| 235      | Dark Orange   | +                           |
| 236      | Light Blue    | -                           |
| 237      | Dark Blue     | +                           |
| 238      | Light Green   | -                           |
| 239      | Dark Green    | +                           |
| 240      | Light Yellow  | -                           |
| 241      | Dark Yellow   | +                           |
| 242      | Light Purple  | -                           |
| 243      | Dark Purple   | +                           |
| 244      | Light Brown   | -                           |
| 245      | Dark Brown    | +                           |
| 246      | Light Pink    | -                           |
| 247      | Dark Pink     | +                           |
| 248      | Light Grey    | -                           |
| 249      | Dark Grey     | +                           |
| 250      | Light Orange  | -                           |
| 251      | Dark Orange   | +                           |
| 252      | Light Blue    | -                           |
| 253      | Dark Blue     | +                           |
| 254      | Light Green   | -                           |
| 255      | Dark Green    | +                           |
| 256      | Light Yellow  | -                           |
| 257      | Dark Yellow   | +                           |
| 258      | Light Purple  | -                           |
| 259      | Dark Purple   | +                           |
| 260      | Light Brown   | -                           |
| 261      | Dark Brown    | +                           |
| 262      | Light Pink    | -                           |
| 263      | Dark Pink     | +                           |
| 264      | Light Grey    | -                           |
| 265      | Dark Grey     | +                           |
| 266      | Light Orange  | -                           |
| 267      | Dark Orange   | +                           |
| 268      | Light Blue    | -                           |
| 269      | Dark Blue     | +                           |
| 270      | Light Green   | -                           |
| 271      | Dark Green    | +                           |
| 272      | Light Yellow  | -                           |
| 273      | Dark Yellow   | +                           |
| 274      | Light Purple  | -                           |
| 275      | Dark Purple   | +                           |
| 276      | Light Brown   | -                           |
| 277      | Dark Brown    | +                           |
| 278      | Light Pink    | -                           |
| 279      | Dark Pink     | +                           |
| 280      | Light Grey    | -                           |
| 281      | Dark Grey     | +                           |
| 282      | Light Orange  | -                           |
| 283      | Dark Orange   | +                           |
| 284      | Light Blue    | -                           |
| 285      | Dark Blue     | +                           |
| 286      | Light Green   | -                           |
| 287      | Dark Green    | +                           |
| 288      | Light Yellow  | -                           |
| 289      | Dark Yellow   | +                           |
| 290      | Light Purple  | -                           |
| 291      | Dark Purple   | +                           |
| 292      | Light Brown   | -                           |
| 293      | Dark Brown    | +                           |
| 294      | Light Pink    | -                           |
| 295      | Dark Pink     | +                           |
| 296      | Light Grey    | -                           |
| 297      | Dark Grey     | +                           |
| 298      | Light Orange  | -                           |
| 299      | Dark Orange   | +                           |
| 300      | Light Blue    | -                           |
| 301      | Dark Blue     | +                           |
| 302      | Light Green   | -                           |
| 303      | Dark Green    | +                           |
| 304      | Light Yellow  | -                           |
| 305      | Dark Yellow   | +                           |
| 306      | Light Purple  | -                           |
| 307      | Dark Purple   | +                           |
| 308      | Light Brown   | -                           |
| 309      | Dark Brown    | +                           |
| 310      | Light Pink    | -                           |
| 311      | Dark Pink     | +                           |
| 312      | Light Grey    | -                           |
| 313      | Dark Grey     | +                           |
| 314      | Light Orange  | -                           |
| 315      | Dark Orange   | +                           |
| 316      | Light Blue    | -                           |
| 317      | Dark Blue     | +                           |
| 318      | Light Green   | -                           |
| 319      | Dark Green    | +                           |
| 320      | Light Yellow  | -                           |
| 321      | Dark Yellow   | +                           |
| 322      | Light Purple  | -                           |
| 323      | Dark Purple   | +                           |
| 324      | Light Brown   | -                           |
| 325      | Dark Brown    | +                           |
| 326      | Light Pink    | -                           |
| 327      | Dark Pink     | +                           |
| 328      | Light Grey    | -                           |
| 329      | Dark Grey     | +                           |
| 330      | Light Orange  | -                           |
| 331      | Dark Orange   | +                           |
| 332      | Light Blue    | -                           |
| 333      | Dark Blue     | +                           |
| 334      | Light Green   | -                           |
| 335      | Dark Green    | +                           |
| 336      | Light Yellow  | -                           |
| 337      | Dark Yellow   | +                           |
| 338      | Light Purple  | -                           |
| 339      | Dark Purple   | +                           |
| 340      | Light Brown   | -                           |
| 341      | Dark Brown    | +                           |
| 342      | Light Pink    | -                           |
| 343      | Dark Pink     | +                           |
| 344      | Light Grey    | -                           |
| 345      | Dark Grey     | +                           |
| 346      | Light Orange  | -                           |
| 347      | Dark Orange   | +                           |
| 348      | Light Blue    | -                           |
| 349      | Dark Blue     | +                           |
| 350      | Light Green   | -                           |
| 351      | Dark Green    | +                           |
| 352      | Light Yellow  | -                           |
| 353      | Dark Yellow   | +                           |
| 354      | Light Purple  | -                           |
| 355      | Dark Purple   | +                           |
| 356      | Light Brown   | -                           |
| 357      | Dark Brown    | +                           |
| 358      | Light Pink    | -                           |
| 359      | Dark Pink     | +                           |
| 360      | Light Grey    | -                           |
| 361      | Dark Grey     | +                           |
| 362      | Light Orange  | -                           |
| 363      | Dark Orange   | +                           |
| 364      | Light Blue    | -                           |
| 365      | Dark Blue     | +                           |
| 366      | Light Green   | -                           |
| 367      | Dark Green    | +                           |
| 368      | Light Yellow  | -                           |
| 369      | Dark Yellow   | +                           |
| 370      | Light Purple  | -                           |
| 371      | Dark Purple   | +                           |
| 372      | Light Brown   | -                           |
| 373      | Dark Brown    | +                           |
| 374      | Light Pink    | -                           |
| 375      | Dark Pink     | +                           |
| 376      | Light Grey    | -                           |
| 377      | Dark Grey     | +                           |
| 378      | Light Orange  | -                           |
| 379      | Dark Orange   | +                           |
| 380      | Light Blue    | -                           |
| 381      | Dark Blue     | +                           |
| 382      | Light Green   | -                           |
| 383      | Dark Green    | +                           |
| 384      | Light Yellow  | -                           |
| 385      | Dark Yellow   | +                           |
| 386      | Light Purple  | -                           |
| 387      | Dark Purple   | +                           |
| 388      | Light Brown   | -                           |
| 389      | Dark Brown    | +                           |
| 390      | Light Pink    | -                           |
| 391      | Dark Pink     | +                           |
| 392      | Light Grey    | -                           |
| 393      | Dark Grey     | +                           |
| 394      | Light Orange  | -                           |
| 395      | Dark Orange   | +                           |
| 396      | Light Blue    | -                           |
| 397      | Dark Blue     | +                           |
| 398      | Light Green   | -                           |
| 399      | Dark Green    | +                           |
| 400      | Light Yellow  | -                           |
| 401      | Dark Yellow   | +                           |
| 402      | Light Purple  | -                           |
| 403      | Dark Purple   | +                           |
| 404      | Light Brown   | -                           |
| 405      | Dark Brown    | +                           |
| 406      | Light Pink    | -                           |
| 407      | Dark Pink     | +                           |
| 408      | Light Grey    | -                           |
| 409      | Dark Grey     | +                           |
| 410      | Light Orange  | -                           |
| 411      | Dark Orange   | +                           |
| 412      | Light Blue    | -                           |
| 413      | Dark Blue     | +                           |
| 414      | Light Green   | -                           |
| 415      | Dark Green    | +                           |
| 416      | Light Yellow  | -                           |
| 417      | Dark Yellow   | +                           |
| 418      | Light Purple  | -                           |
| 419      | Dark Purple   | +                           |
| 420      | Light Brown   | -                           |
| 421      | Dark Brown    | +                           |
| 422      | Light Pink    | -                           |
| 423      | Dark Pink     | +                           |
| 424      | Light Grey    | -                           |
| 425      | Dark Grey     | +                           |
| 426      | Light Orange  | -                           |
| 427      | Dark Orange   | +                           |
| 428      | Light Blue    | -                           |
| 429      | Dark Blue     | +                           |
| 430      | Light Green   | -                           |
| 431      | Dark Green    | +                           |
| 432      | Light Yellow  | -                           |
| 433      | Dark Yellow   | +                           |
| 434      | Light Purple  | -                           |
| 435      | Dark Purple   | +                           |
| 436      | Light Brown   | -                           |
| 437      | Dark Brown    | +                           |
| 438      | Light Pink    | -                           |
| 439      | Dark Pink     | +                           |
| 440      | Light Grey    | -                           |
| 441      | Dark Grey     | +                           |
| 442      | Light Orange  | -                           |
| 443      | Dark Orange   | +                           |
| 444      | Light Blue    | -                           |
| 445      | Dark Blue     | +                           |
| 446      | Light Green   | -                           |
| 447      | Dark Green    | +                           |
| 448      | Light Yellow  | -                           |
| 449      | Dark Yellow   | +                           |
| 450      | Light Purple  | -                           |
| 451      | Dark Purple   | +                           |
| 452      | Light Brown   | -                           |
| 453      | Dark Brown    | +                           |
| 454      | Light Pink    | -                           |
| 455      | Dark Pink     | +                           |
| 456      | Light Grey    | -                           |
| 457      | Dark Grey     | +                           |
| 458      | Light Orange  | -                           |
| 459      | Dark Orange   | +                           |
| 460      | Light Blue    | -                           |
| 461      | Dark Blue     | +                           |
| 462      | Light Green   | -                           |
| 463      | Dark Green    | +                           |
| 464      | Light Yellow  | -                           |
| 465      | Dark Yellow   | +                           |
| 466      | Light Purple  | -                           |
| 467      | Dark Purple   | +                           |
| 468      | Light Brown   | -                           |
| 469      | Dark Brown    | +                           |
| 470      | Light Pink    | -                           |
| 471      | Dark Pink     | +                           |
| 472      | Light Grey    | -                           |
| 473      | Dark Grey     | +                           |
| 474      | Light Orange  | -                           |
| 475      | Dark Orange   | +                           |
| 476      | Light Blue    | -                           |
| 477      | Dark Blue     | +                           |
| 478      | Light Green   | -                           |
| 479      | Dark Green    | +                           |
| 480      | Light Yellow  | -                           |
| 481      | Dark Yellow   | +                           |
| 482      | Light Purple  | -                           |
| 483      | Dark Purple   | +                           |
| 484      | Light Brown   | -                           |
| 485      | Dark Brown    | +                           |
| 486      | Light Pink    | -                           |
| 487      | Dark Pink     | +                           |
| 488      | Light Grey    | -                           |
| 489      | Dark Grey     | +                           |
| 490      | Light Orange  | -                           |
| 491      | Dark Orange   | +                           |
| 492      | Light Blue    | -                           |
| 493      | Dark Blue     | +                           |
| 494      | Light Green   | -                           |
| 495      | Dark Green    | +                           |
| 496      | Light Yellow  | -                           |
| 497      | Dark Yellow   | +                           |
| 498      | Light Purple  | -                           |
| 499      | Dark Purple   | +                           |
| 500      | Light Brown   | -                           |
| 501      | Dark Brown    | +                           |
| 502      | Light Pink    | -                           |
| 503      | Dark Pink     | +                           |
| 504      | Light Grey    | -                           |
| 505      | Dark Grey     | +                           |
| 506      | Light Orange  | -                           |
| 507      | Dark Orange   | +                           |
| 508      | Light Blue    | -                           |
| 509      | Dark Blue     | +                           |
| 510      | Light Green   | -                           |
| 511      | Dark Green    | +                           |
| 512      | Light Yellow  | -                           |
| 513      | Dark Yellow   | +                           |
| 514      | Light Purple  | -                           |
| 515      | Dark Purple   | +                           |
| 516      | Light Brown   | -                           |
| 517      | Dark Brown    | +                           |
| 518      | Light Pink    | -                           |
| 519      | Dark Pink     | +                           |
| 520      | Light Grey    |                             |

|     |     |   |
|-----|-----|---|
| 39C | W   | — |
| 21C | L   | — |
| 22C | L   | — |
| 23C | L   | — |
| 25C | LG  | — |
| 26C | SB  | — |
| 27C | P   | — |
| 28C | W   | — |
| 29C | W   | — |
| 30C | R   | — |
| 31C | W   | — |
| 32C | R   | — |
| 33C | B   | — |
| 34C | W/B | — |
| 35C | SB  | — |
| 36C | R   | — |
| 37C | SB  | — |
| 38C | V   | — |
| 39C | P   | — |
| 40C | G   | — |
| 4C  | P   | — |
| 5C  | P   | — |
| 6C  | G   | — |
| 7C  | V   | — |

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (With EXP-800 NI or GR8-1200 NI)

INFOID:0000000009755479

CHARGING SYSTEM DIAGNOSIS WITH EXP-800 NI OR GR8-1200 NI

To test the charging system, use the following special service tools:

- EXP-800 NI Battery and electrical diagnostic analyzer
- GR8-1200 NI Multitasking battery and electrical diagnostic station

NOTE:

Refer to the applicable Instruction Manual for proper charging system diagnosis procedures.

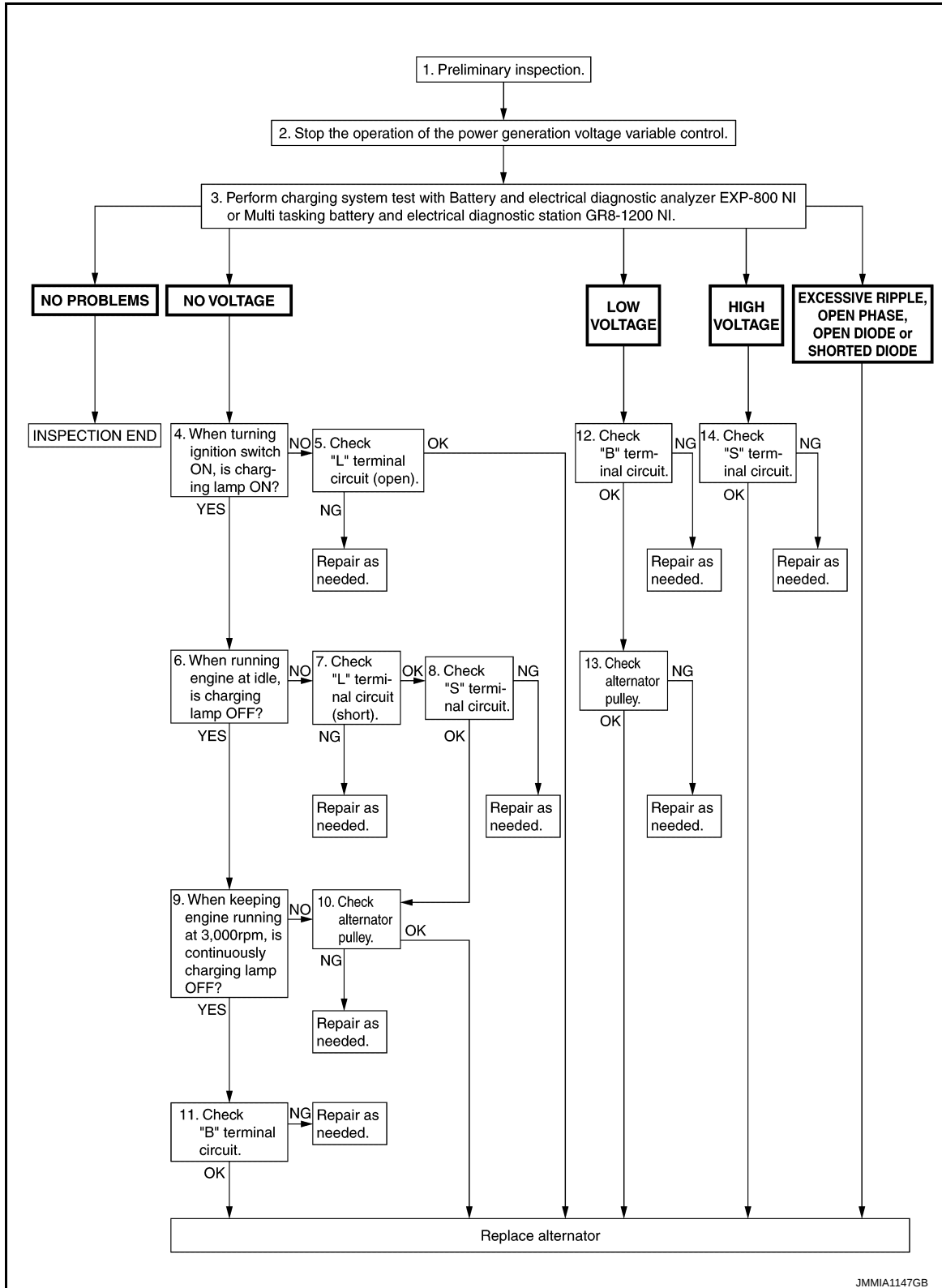
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CHG

# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## OVERALL SEQUENCE



## DETAILED FLOW

### NOTE:

To ensure a complete and thorough diagnosis, the battery, starter and alternator test segments must be done as a set from start to finish.

### 1. PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to [CHG-20, "Inspection Procedure"](#).

# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

>> GO TO 2.

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

Stop the operation of the power generation voltage variable control in either of the following procedures.

- After selecting "ENGINE" of "SELECT SYSTEM" using CONSULT, set the DUTY value of "ALTERNATOR DUTY" to 0 % by selecting "ALTERNATOR DUTY" of "Active Test". Continue "Active Test" until the end of inspection. (When the DUTY value is 0 or 100 %, the normal power generation is performed according to the characteristic of the IC voltage regulator of the alternator.)
- Turn the ignition switch OFF, and disconnect the battery current sensor connector. [However, DTC (P1550 - P1554) of the engine might remain. After finishing the inspection, connect the battery current sensor connector and erase the self-diagnosis results history of the engine using CONSULT.]

>> GO TO 3.

### 3. DIAGNOSIS WITH EXP-800 NI OR GR8-1200 NI

Perform the charging system test using Multitasking battery and electrical diagnostic station GR8-1200 NI or Battery and electrical diagnostic analyzer EXP-800 NI. Refer to the applicable Instruction Manual for proper testing procedures.

#### Test result

NO PROBLEMS>>Charging system is normal and will also show "DIODE RIPPLE" test result.

NO VOLTAGE>>GO TO 4.

LOW VOLTAGE>>GO TO 12.

HIGH VOLTAGE>>GO TO 14.

EXCESSIVE RIPPLE, OPEN PHASE, OPEN DIODE or SHORTED DIODE>>Replace the alternator. Perform "DIODE RIPPLE" test again using Multitasking battery and electrical diagnostic station GR8-1200 NI or Battery and electrical diagnostic analyzer EXP-800 NI to confirm repair.

### 4. INSPECTION WITH CHARGE WARNING LAMP (IGNITION SWITCH IS ON)

Turn the ignition switch ON.

#### Does the charge warning lamp illuminate?

YES >> GO TO 6.

NO >> GO TO 5.

### 5. "L" TERMINAL CIRCUIT (OPEN) INSPECTION

Check "L" terminal circuit (open). Refer to [CHG-24, "Diagnosis Procedure"](#).

#### Is the "L" terminal circuit normal?

YES >> Replace alternator. Refer to [CHG-28, "VQ37VHR : Removal and Installation"](#).

NO >> Repair as needed.

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

Start the engine and run it at idle.

#### Does the charge warning lamp turn OFF?

YES >> GO TO 9.

NO >> GO TO 7.

### 7. "L" TERMINAL CIRCUIT (SHORT) INSPECTION

Check "L" terminal circuit (short). Refer to [CHG-25, "Diagnosis Procedure"](#).

#### Is the "L" terminal circuit normal?

YES >> GO TO 8.

NO >> Repair as needed.

### 8. "S" TERMINAL CIRCUIT INSPECTION

Check "S" terminal circuit. Refer to [CHG-26, "Diagnosis Procedure"](#).

#### Is the "S" terminal circuit normal?

YES >> GO TO 10.

NO >> Repair as needed.

## DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

---

### 9. INSPECTION WITH CHARGE WARNING LAMP (ENGINE AT 3,000 RPM)

---

Increase and maintain the engine speed at 3,000 rpm.

Does the charge warning lamp remain off?

YES >> GO TO 11.

NO >> GO TO 10.

### 10. INSPECTION OF ALTERNATOR PULLEY

---

Check alternator pulley. Refer to [CHG-30, "VQ37VHR : Inspection"](#).

Is alternator pulley normal?

YES >> Replace alternator. Refer to [CHG-28, "VQ37VHR : Removal and Installation"](#).

NO >> Repair as needed.

### 11. "B" TERMINAL CIRCUIT INSPECTION

---

Check "B" terminal circuit. Refer to [CHG-23, "Diagnosis Procedure"](#).

Is "B" terminal circuit normal?

YES >> Replace alternator. Refer to [CHG-28, "VQ37VHR : Removal and Installation"](#).

NO >> Repair as needed.

### 12. "B" TERMINAL CIRCUIT INSPECTION

---

Check "B" terminal circuit. Refer to [CHG-23, "Diagnosis Procedure"](#).

Is "B" terminal circuit normal?

YES >> GO TO 13.

NO >> Repair as needed.

### 13. INSPECTION OF ALTERNATOR PULLEY

---

Check alternator pulley. Refer to [CHG-30, "VQ37VHR : Inspection"](#).

Is alternator pulley normal?

YES >> Replace alternator. Refer to [CHG-28, "VQ37VHR : Removal and Installation"](#).

NO >> Repair as needed.

### 14. "S" TERMINAL CIRCUIT INSPECTION

---

Check "S" terminal circuit. Refer to [CHG-26, "Diagnosis Procedure"](#).

Is the "S" terminal circuit normal?

YES >> Replace alternator. Refer to [CHG-28, "VQ37VHR : Removal and Installation"](#).

NO >> Repair as needed.

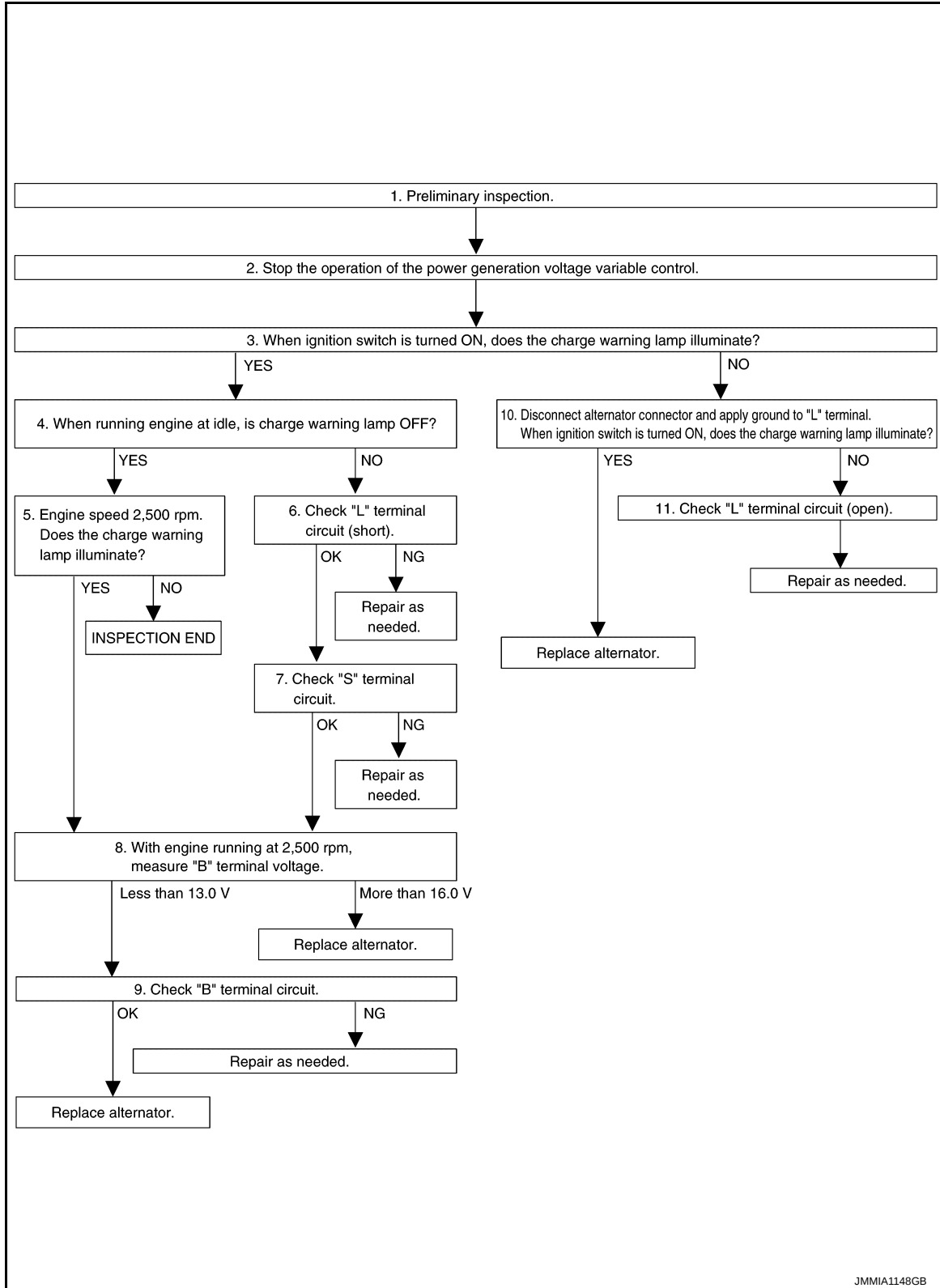
# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

Work Flow (Without EXP-800 NI or GR8-1200 NI)

INFOID:000000009755480

## OVERALL SEQUENCE



## DETAILED FLOW

### 1. PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to [CHG-20, "Inspection Procedure"](#).

# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

---

>> GO TO 2.

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

---

Stop the operation of the power generation voltage variable control in either of the following procedures.

- After selecting "ENGINE" of "SELECT SYSTEM" using CONSULT, set the DUTY value of "ALTERNATOR DUTY" to 0 % by selecting "ALTERNATOR DUTY" of "Active Test". Continue "Active Test" until the end of inspection. (When the DUTY value is 0 or 100 %, the normal power generation is performed according to the characteristic of the IC regulator of the alternator.)
- Turn the ignition switch OFF, and disconnect the battery current sensor connector. [However, DTC (P1550 - P1554) of the engine might remain. After finishing the inspection, connect the battery current sensor connector and erase the self-diagnostic results history of the engine using CONSULT.]

>> GO TO 3.

### 3. INSPECTION WITH CHARGE WARNING LAMP (IGNITION SWITCH IS TURNED ON)

---

When ignition switch is turned ON

Does the charge warning lamp illuminate?

YES >> GO TO 4.

NO >> GO TO 10.

### 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 8.

NO >> INSPECTION END

### 6. "L" TERMINAL CIRCUIT (SHORT) INSPECTION

---

Check "L" terminal circuit (short). Refer to [CHG-25, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair as needed.

### 7. "S" TERMINAL CIRCUIT INSPECTION

---

Check "S" terminal circuit. Refer to [CHG-26, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair as needed.

### 8. 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 9.

More than 16.0 V >> Replace alternator. Refer to [CHG-28, "VO37VHR : Removal and Installation"](#).

### 9. "B" TERMINAL CIRCUIT INSPECTION

---

Check "B" terminal circuit. Refer to [CHG-23, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace alternator. Refer to [CHG-28, "VO37VHR : Removal and Installation"](#).

NO >> Repair as needed.

### 10. INSPECTION WITH CHARGE WARNING LAMP (IGNITION SWITCH IS ON)

---

## DIAGNOSIS AND REPAIR WORK FLOW

### < BASIC INSPECTION >

1. Disconnect alternator connector and apply ground to "L" terminal.
2. Turn the ignition switch ON.

#### Does the charge warning lamp illuminate?

- YES >> Replace alternator. Refer to [CHG-28, "VQ37VHR : Removal and Installation"](#).  
NO >> GO TO 11.

### **11.**CHECK "L" TERMINAL CIRCUIT (OPEN)

Check "L" terminal circuit (open). Refer to [CHG-24, "Diagnosis Procedure"](#).

>> Repair as needed.

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# CHARGING SYSTEM PRELIMINARY INSPECTION

< BASIC INSPECTION >

## CHARGING SYSTEM PRELIMINARY INSPECTION

### Inspection Procedure

INFOID:000000009239683

#### 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 FUSE

Check for blown fuse and fusible link.

| Unit              | Power source (Power supply terminals) | Fuse No. |
|-------------------|---------------------------------------|----------|
| Alternator        | Battery ("S" terminal)                | 69       |
| Combination meter | Ignition switch ON ("L" terminal)     | 11       |

Is the inspection result normal?

YES >> GO TO 3.

NO >> Be sure to eliminate the cause of malfunction before installing new fuse.

#### 3.CHECK "E" TERMINAL CONNECTION

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair "E" terminal connection.

#### 4.CHECK DRIVE BELT TENSION

Check drive belt tension. Refer to [EM-19, "Checking"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair as needed.

# POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM OPERATION INSPECTION

< BASIC INSPECTION >

## POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM OPERATION INSPECTION

### Inspection Procedure

INFOID:000000009239684

#### CAUTION:

When performing this inspection, always use a charged battery that has completed the battery inspection. (When the charging rate of the battery is low, the response speed of the voltage change will become slow. This can cause an incorrect inspection.)

### 1.CHECK ECM (CONSULT)

Perform ECM self-diagnosis with CONSULT. Refer to [EC-74, "CONSULT Function"](#).

#### Self-diagnostic results content

No malfunction detected>> GO TO 2.

Malfunction detected>> Check applicable parts, and repair or replace corresponding parts.

### 2.CHECK OPERATION OF POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

1. Connect CONSULT and start the engine.
2. The selector lever is in "P" or "N" position and all of the electric loads and A/C, etc. are turned OFF.
3. Select "ALTERNATOR DUTY" at "Active Test" of "ENGINE", and then check the value of "BATTERY VOLT" monitor when DUTY value of "ALTERNATOR DUTY" is set to 40.0 %.

#### "BATTERY VOLT"

2 seconds after setting the  
DUTY value of "ALTERNATOR DUTY" to 40.0 % : 12 - 13.6 V

4. Check the value of "BATTERY VOLT" monitor when DUTY value of "ALTERNATOR DUTY" is set to 80.0%.

#### "BATTERY VOLT"

20 seconds after setting  
the DUTY value of "ALTERNATOR DUTY" to 80.0 % : +0.5 V or more against  
the value of "BATTERY VOLT" monitor when  
DUTY value is 40.0 %

Is the measurement value within the specification?

YES >> INSPECTION END

NO >> GO TO 3.

### 3.CHECK IPDM E/R (CONSULT)

Perform IPDM E/R self-diagnosis with CONSULT. Refer to [PCS-12, "CONSULT Function \(IPDM E/R\)"](#).

#### Self-diagnostic results content

No malfunction detected>> GO TO 4.

Malfunction detected>> Check applicable parts, and repair or replace corresponding parts.

### 4.CHECK HARNESS BETWEEN ALTERNATOR AND IPDM E/R

1. Turn ignition switch OFF.
2. Disconnect alternator connector and IPDM E/R connector.
3. Check continuity between alternator harness connector and IPDM E/R harness connector.

| Alternator |          | IPDM E/R  |          | Continuity |
|------------|----------|-----------|----------|------------|
| Connector  | Terminal | Connector | Terminal |            |
| F83        | 4        | E124      | 71       | Existed    |

4. Check continuity between alternator harness connector and ground.

# POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM OPERATION INSPECTION

## < BASIC INSPECTION >

| Alternator |          | Ground | Continuity  |
|------------|----------|--------|-------------|
| Connector  | Terminal |        |             |
| F83        | 4        |        | Not existed |

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to [PCS-37, "Removal and Installation"](#).

NO >> Repair harness or connector between IPDM E/R and alternator.

## B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

### DTC/CIRCUIT DIAGNOSIS

#### B TERMINAL CIRCUIT

##### Diagnosis Procedure

INFOID:000000009239686

#### 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. Confirm repair by performing complete Charging system test using EXP-800 NI or GR8-1200 NI (if available). Refer to the applicable Instruction Manual for proper testing procedures.

#### 2.CHECK "B" TERMINAL CIRCUIT

Check voltage between alternator "B" terminal and ground.

| (+)        |          | (-)    | Voltage (Approx.) |
|------------|----------|--------|-------------------|
| Alternator |          |        |                   |
| Connector  | Terminal |        |                   |
| E131       | 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 | E131       | 1        | Less than 0.2 V   |

Is the inspection result normal?

YES >> "B" terminal circuit is normal. Refer to [CHG-13, "Work Flow \(With EXP-800 NI or GR8-1200 NI\)"](#) or [CHG-17, "Work Flow \(Without EXP-800 NI or GR8-1200 NI\)"](#).

NO >> Check harness between battery and alternator for poor continuity.

CHG

## L TERMINAL CIRCUIT (OPEN)

< DTC/CIRCUIT DIAGNOSIS >

### L TERMINAL CIRCUIT (OPEN)

#### Diagnosis Procedure

INFOID:000000009239688

#### 1.CHECK "L" TERMINAL CONNECTION

1. Turn ignition switch OFF.
2. Check if "L" terminal is clean and tight.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair "L" terminal connection. Confirm repair by performing complete Charging system test using EXP-800 NI or GR8-1200 NI (if available). Refer to the applicable Instruction Manual for proper testing procedures.

#### 2.CHECK "L" TERMINAL CIRCUIT (OPEN)

1. Disconnect alternator connector.
2. Apply ground to alternator harness connector terminal.
3. Check condition of the charge warning lamp with the ignition switch in the ON position.

| Alternator |          | Ground | Condition                |                     |
|------------|----------|--------|--------------------------|---------------------|
| Connector  | Terminal |        | Ignition switch position | Charge warning lamp |
| F83        | 2        |        | ON                       | Illuminate          |

Does it illuminate?

YES >> "L" terminal circuit is normal. Refer to [CHG-13, "Work Flow \(With EXP-800 NI or GR8-1200 NI\)"](#) or [CHG-17, "Work Flow \(Without EXP-800 NI or GR8-1200 NI\)"](#).

NO >> GO TO 3.

#### 3.CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

1. Disconnect the battery cable from the negative terminal.
2. Disconnect the combination meter connector.
3. Check continuity between alternator harness connector and combination meter harness connector.

| Alternator |          | Combination meter |          | Continuity |
|------------|----------|-------------------|----------|------------|
| Connector  | Terminal | Connector         | Terminal |            |
| F83        | 2        | M57               | 11       | Existed    |

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair the harness or connector.

## L TERMINAL CIRCUIT (SHORT)

< DTC/CIRCUIT DIAGNOSIS >

### L TERMINAL CIRCUIT (SHORT)

#### Diagnosis Procedure

INFOID:000000009239690

#### 1.CHECK "L" TERMINAL CIRCUIT (SHORT)

1. Turn ignition switch OFF.
2. Disconnect alternator connector.
3. Turn ignition switch ON.

Does charge warning lamp illuminate?

YES >> GO TO 2.

NO >> Refer to [CHG-13, "Work Flow \(With EXP-800 NI or GR8-1200 NI\)"](#) or [CHG-17, "Work Flow \(Without EXP-800 NI or GR8-1200 NI\)"](#).

#### 2.CHECK HARNESS CONTINUITY (SHORT CIRCUIT)

1. Turn ignition switch OFF.
2. Disconnect the battery cable from the negative terminal.
3. Disconnect combination meter connector.
4. Check continuity between combination meter harness connector and ground.

| Combination meter |          | Ground | Continuity  |
|-------------------|----------|--------|-------------|
| Connector         | Terminal |        |             |
| M57               | 11       |        | Not existed |

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair or replace the harness.

CHG

## S TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

### S TERMINAL CIRCUIT

#### Diagnosis Procedure

INFOID:000000009239692

#### 1.CHECK "S" TERMINAL CONNECTION

1. Turn ignition switch OFF.
2. Check if "S" terminal is clean and tight.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair "S" terminal connection. Confirm repair by performing complete Charging system test using EXP-800 NI or GR8-1200 NI (if available). Refer to the applicable Instruction Manual for proper testing procedures.

#### 2.CHECK "S" TERMINAL CIRCUIT

Check voltage between alternator harness connector and ground.

| (+)        |          | (-)    | Voltage (Approx.) |
|------------|----------|--------|-------------------|
| Alternator |          |        |                   |
| Connector  | Terminal |        |                   |
| F83        | 3        | Ground | Battery voltage   |

Is the inspection result normal?

YES >> Refer to [CHG-13, "Work Flow \(With EXP-800 NI or GR8-1200 NI\)"](#) or [CHG-17, "Work Flow \(Without EXP-800 NI or GR8-1200 NI\)"](#).

NO >> Check harness for open between alternator and fuse.

CHARGING SYSTEM

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

CHARGING SYSTEM

Symptom Table

INFOID:0000000009239693

| Symptom                                                                            | Reference                                                                                                                                                  |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Discharged battery                                                                 | Refer to <a href="#">CHG-13, "Work Flow (With EXP-800 NI or GR8-1200 NI)"</a> or <a href="#">CHG-17, "Work Flow (Without EXP-800 NI or GR8-1200 NI)"</a> . |
| The charge warning lamp does not illuminate when the ignition switch is set to ON. |                                                                                                                                                            |
| The charge warning lamp does not turn OFF after the engine starts.                 |                                                                                                                                                            |
| The charging warning lamp turns ON when increasing the engine speed.               |                                                                                                                                                            |

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CHG

# ALTERNATOR

< REMOVAL AND INSTALLATION >

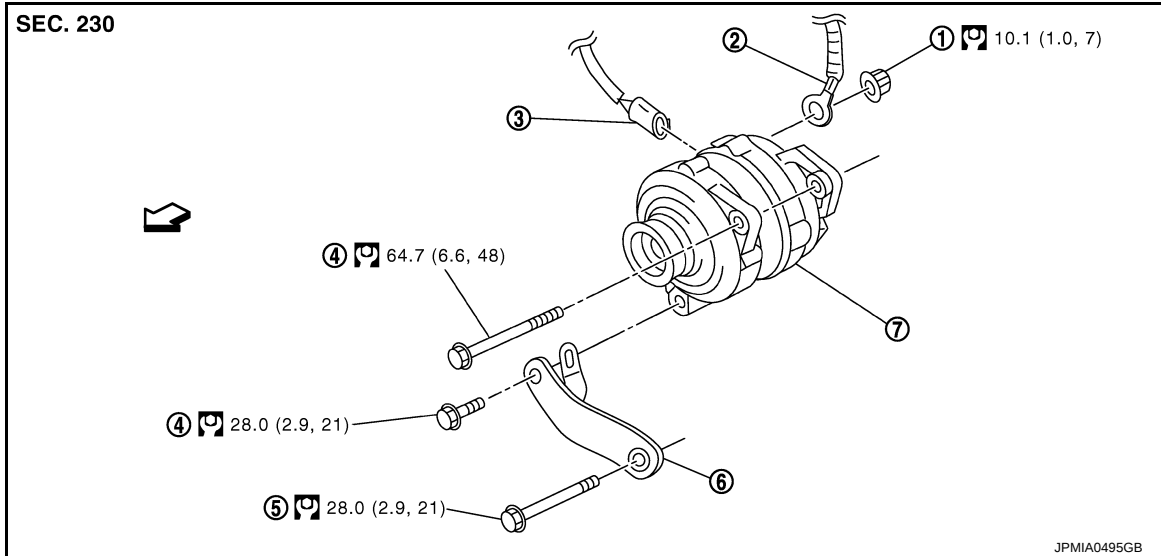
## REMOVAL AND INSTALLATION

### ALTERNATOR

#### VQ37VHR

#### VQ37VHR : Exploded View

INFOID:000000009239694



① "B" terminal nut

② "B" terminal harness

③ Alternator connector

④ Alternator mounting bolt

⑤ Alternator stay mounting bolt

⑥ Alternator stay

⑦ Alternator

↔ : Vehicle front

: N·m (kg-m, ft-lb)

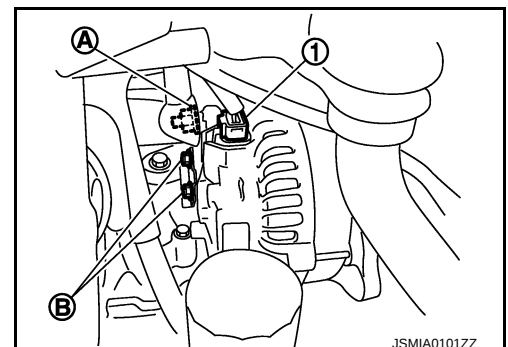
#### VQ37VHR : Removal and Installation

INFOID:000000009239695

#### REMOVAL

##### 2WD models

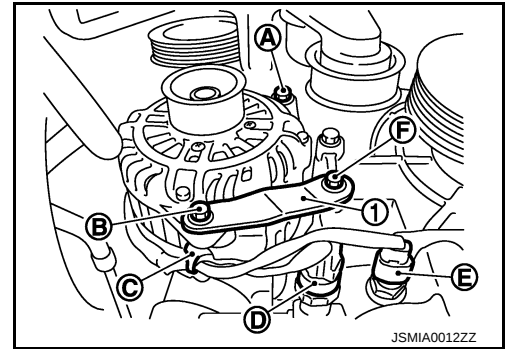
1. Disconnect the battery cable from the negative terminal. Refer to [PG-106, "Removal and Installation"](#).
2. Remove reservoir tank.
3. Remove engine under cover. Refer to [EXT-34, "FRONT UNDER COVER : Removal and Installation"](#)
4. Remove air duct (inlet). Refer to [EM-29, "Removal and Installation"](#)
5. Remove air cleaner case RH. Refer to [EM-29, "Removal and Installation"](#).
6. Remove drive belt. Refer to [EM-19, "Removal and Installation"](#)
7. Disconnect alternator connector ①.
8. Remove "B" terminal nut ①, and disconnect "B" terminal harness.
9. Remove the harness bracket bolts ②.



## ALTERNATOR

### < REMOVAL AND INSTALLATION >

10. Remove oil pressure switch harness clip ③ from alternator stay ①.
11. Disconnect oil pressure switch connector ④ and oil temperature sensor connector ⑤.
12. Remove alternator mounting bolt ⑥ and alternator stay mounting bolt ⑦, and then remove alternator stay.
13. Remove cooling fan shroud assembly. Refer to [CO-17, "Removal and Installation"](#).
14. Remove alternator mounting bolt ①.

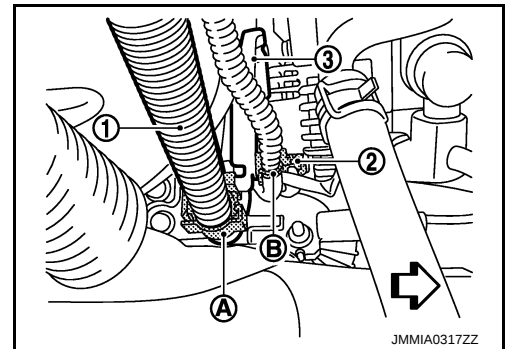


15. Remove alternator assembly upward from the vehicle.

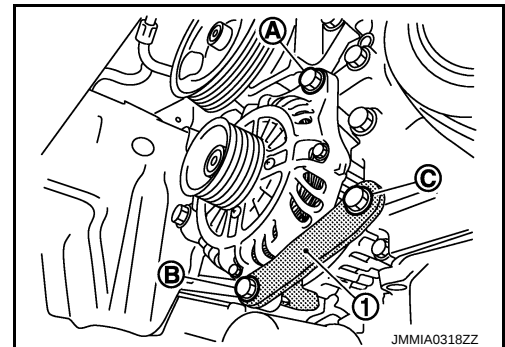
#### AWD models

1. Disconnect the battery cable from the negative terminal. Refer to [PG-106, "Removal and Installation"](#)
2. Remove air duct (inlet). Refer to [EM-29, "Removal and Installation"](#)
3. Remove air cleaner case RH. Refer to [EM-29, "Removal and Installation"](#).
4. Remove reservoir tank.
5. Remove "B" terminal harness ① from harness clamp ④.
6. Remove harness clip ⑤ from harness bracket ③.
7. Disconnect alternator connector ②.

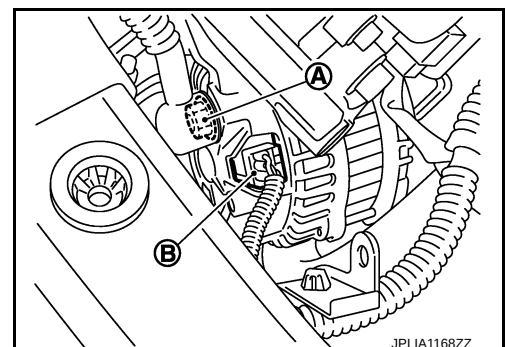
↶ : Vehicle front



8. Remove engine under cover. Refer to [EXT-34, "FRONT UNDER COVER : Removal and Installation"](#).
9. Remove drive belt. Refer to [EM-19, "Removal and Installation"](#).
10. Remove cooling fan shroud assembly. Refer to [CO-17, "Removal and Installation"](#).
11. Remove alternator mounting bolt ⑥ and alternator stay mounting bolt ⑦, and then remove alternator stay ①.
12. Remove alternator mounting bolt ①.



13. Pull and turn alternator, and then remove the "B" terminal nut ① and alternator connector ②.



## ALTERNATOR

### < REMOVAL AND INSTALLATION >

---

14. Remove alternator assembly upward from the vehicle.

### INSTALLATION

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

#### CAUTION:

- Never tighten “B” terminal nut carefully.
- Install alternator, and check tension of belt. Refer to [EM-19, "Checking"](#).
- For this model, the power generation voltage variable control 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 check that the system operates normally. Refer to [CHG-21, "Inspection Procedure"](#).

VQ37VHR : Inspection

INFOID:000000009755515

### ALTERNATOR PULLEY INSPECTION

Perform the following.

- Make sure that alternator pulley does not rattle.
  - Make sure that alternator pulley nut is tight.
- Use the following torque for tightening the pulley nut.



: 118 N·m (12 kg-m, 87 ft-lb)

## SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Alternator

INFOID:0000000009239703

|                                                           |         |                                            |
|-----------------------------------------------------------|---------|--------------------------------------------|
| Applied model                                             |         | VQ37VHR                                    |
| Type                                                      |         | A003TJ1991B                                |
|                                                           |         | MITSUBISHI make                            |
| Nominal rating                                            | [V - A] | 12 -130                                    |
| Ground polarity                                           |         | Negative                                   |
| Minimum revolution under no-load (When 13.5 V is applied) | [rpm]   | Less than 1,300                            |
| Hot output current (When 13.5 V is applied)               | [A/rpm] | More than 108/2,500<br>More than 124/5,000 |
| Regulated output voltage                                  | [V]     | 14.1 – 14.7*                               |

\*: Adjustment range of power generation voltage variable control is 11.4 - 15.6 V.

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