

SECTION **CHG**  
CHARGING SYSTEM

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# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

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

INFOID:000000006067101

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:**

- 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 the "SRS AIR BAG".
- Do not 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:**

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT 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 Necessary for Steering Wheel Rotation after Battery Disconnect

INFOID:000000006064406

#### **NOTE:**

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

For vehicle with steering lock unit, if the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.

If turning the steering wheel is required with the battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

#### OPERATION PROCEDURE

1. Connect both battery cables.

#### **NOTE:**

Supply power using jumper cables if battery is discharged.

2. Turn the push-button ignition switch to ACC position.  
(At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.

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### < PRECAUTION >

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5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
6. Perform self-diagnosis check of all control units using CONSULT-III.

### Precaution for Power Generation Voltage Variable Control System

INFOID:000000006064408

#### **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.**

# PREPARATION


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## PREPARATION

### PREPARATION

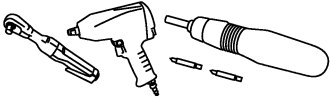
#### Special Service Tools

INFOID:000000006067102

Tool number (Kent-Moore No.) Tool name	Description
<p>— (J-44373 Model MCR620) Starting/Charging System Tester</p>  <p>SEL403X</p>	<p>Tests starting and charging systems. For operating instructions, refer to Technical Service Bulletin.</p>

#### Commercial Service Tools

INFOID:000000006067103

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

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## COMPONENT PARTS

< SYSTEM DESCRIPTION >

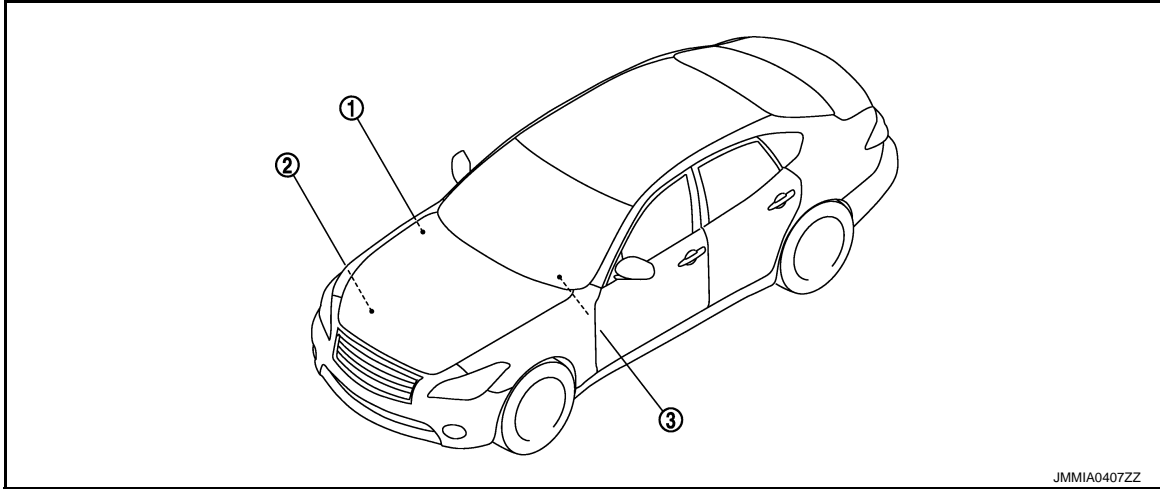
# SYSTEM DESCRIPTION

## COMPONENT PARTS

### CHARGING SYSTEM

#### CHARGING SYSTEM : Component Parts Location

INFOID:000000006064418



- |   |                      |                               |
|---|----------------------|-------------------------------|
| <p>1. IPDM E/R<br/>Refer to <a href="#">PCS-5, "IPDM E/R : Component Parts Location"</a>.</p> | <p>2. Alternator</p> | <p>3. Charge warning lamp</p> |
|---|----------------------|-------------------------------|

#### CHARGING SYSTEM : Component Description

INFOID:000000006064419

Component part	Description	
Alternator	"B" terminal	Refer to <a href="#">CHG-21, "Description"</a> .
	"S" terminal	Refer to <a href="#">CHG-25, "Description"</a> .
	"L" terminal	Refer to <a href="#">CHG-22, "Description"</a> .
	"C" terminal	Used for the power generation voltage variable control system. Refer to <a href="#">CHG-8, "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description"</a> .
Combination meter (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>	
IPDM E/R	Used for the power generation voltage variable control system. Refer to <a href="#">CHG-8, "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description"</a> .	

## POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

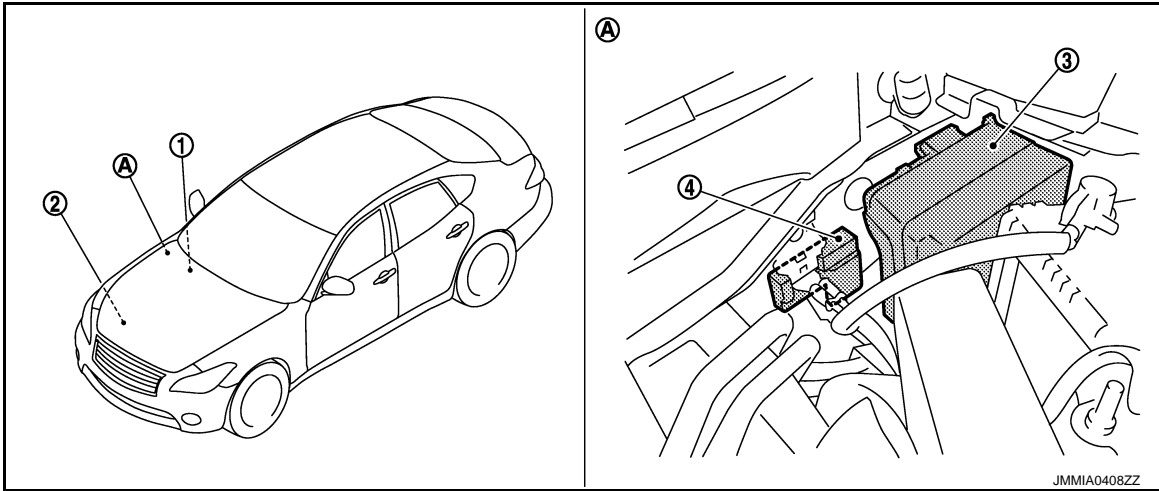
### POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : Component

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

## Parts Location

INFOID:000000006064422



- 1. ECM  
Refer to [EC-24. "ENGINE CONTROL SYSTEM : Component Parts Location"](#) (VQ37VHR) or [EC-548. "ENGINE CONTROL SYSTEM : Component Parts Location"](#) (VK56VD).
- 2. Alternator
- 3. IPDM E/R  
Refer to [PCS-5. "IPDM E/R : Component Parts Location"](#).
- 4. Battery current sensor (with battery temperature sensor)
- A. Engine room dash panel (RH)

## POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : Component Description

INFOID:000000006064423

Component part	Description
Battery current sensor (with battery temperature sensor)	<a href="#">EC-31. "Battery Current Sensor (With Battery Temperature Sensor)"</a> (VQ37VHR) <a href="#">EC-555. "Battery Current Sensor (With Battery Temperature Sensor)"</a> (VK56VD)
ECM	Battery current sensor detects the charging/discharging current of the battery. ECM judges the battery condition based on this signal. ECM judges whether to perform the power generation voltage variable control according to the battery condition. 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 to IPDM E/R.
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.
Alternator (IC voltage regulator)	IC voltage regulator controls the power generation voltage by the target power generation voltage based on the received power generation command signal. When there is no power generation command signal, the alternator performs the normal power generation according to the characteristic of the IC voltage regulator.

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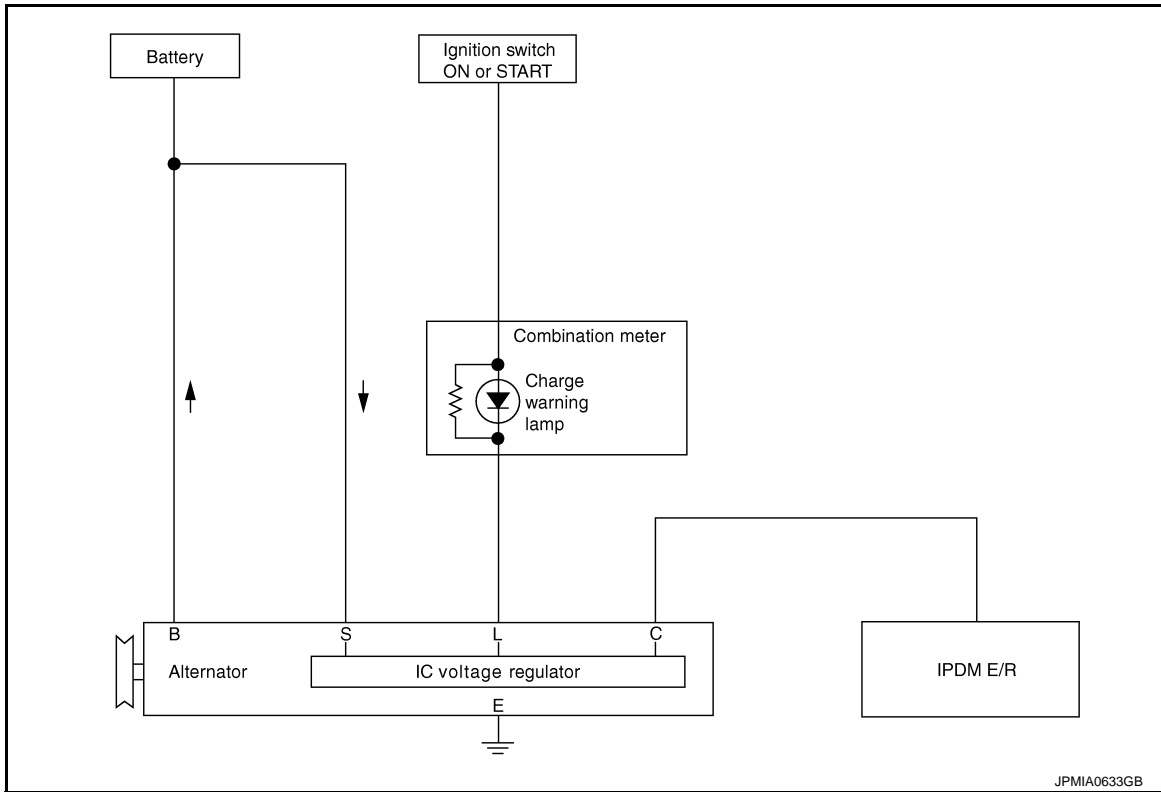
< SYSTEM DESCRIPTION >

## SYSTEM

### CHARGING SYSTEM

#### CHARGING SYSTEM : System Diagram

INFOID:000000006064416



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#### CHARGING SYSTEM : System Description

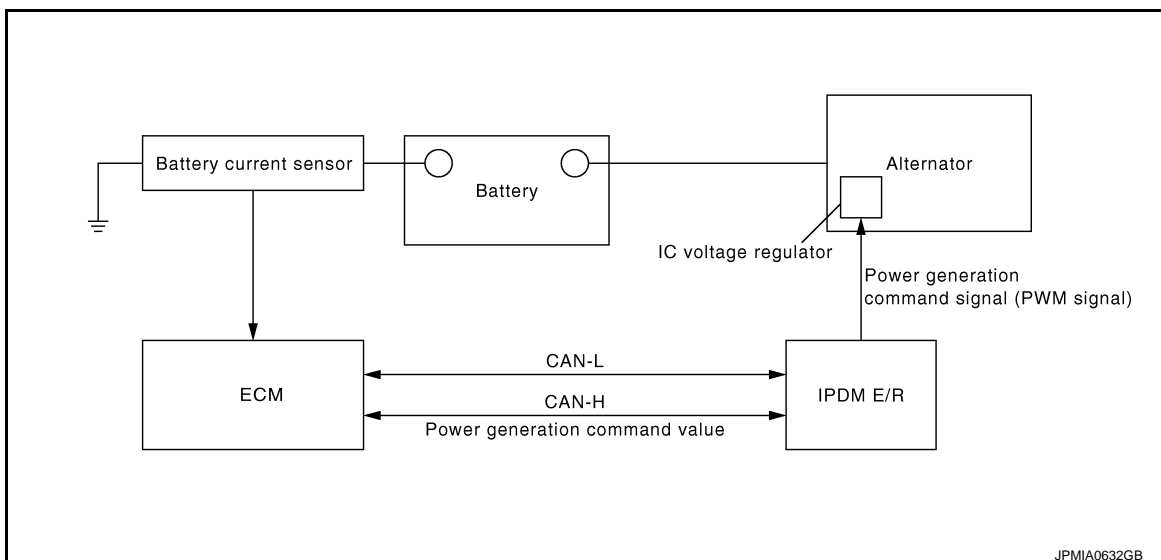
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The alternator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged. The voltage output is controlled by the IC voltage regulator.

### POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

#### POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Diagram

INFOID:000000006064420



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



# SYSTEM

## < SYSTEM DESCRIPTION >

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### scription

INFOID:000000006064421

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.

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# CHARGING SYSTEM

< WIRING DIAGRAM >

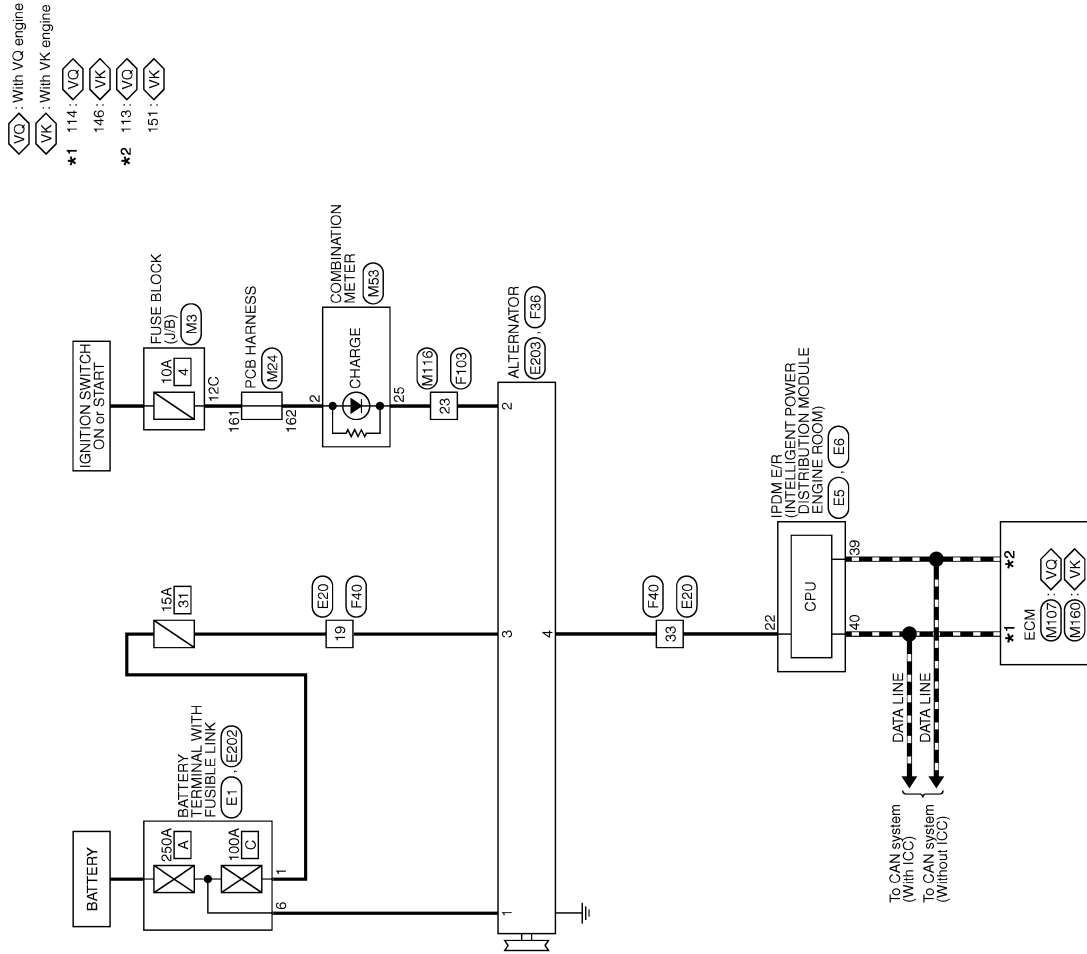
## WIRING DIAGRAM

### CHARGING SYSTEM

Wiring Diagram

INFOID:000000006064424

### CHARGING SYSTEM



# CHARGING SYSTEM

< WIRING DIAGRAM >

## CHARGING SYSTEM

Connector No.	E1
Connector Name	BATTERY TERMINAL WITH FUSIBLE LINK
Connector Type	L02FBR-MC



Terminal No.	Color of Wire	Signal Name [Specification]
1	R	-
2	W	-

Connector No.	E5
Connector Name	IPW/LE INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH20FW-CS12-MA-IV



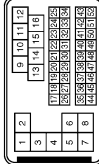
Terminal No.	Color of Wire	Signal Name [Specification]
4	W	-
5	P	-
6	R	-
7	Y	-
8	L	-
10	V	-
11	B	-
12	G	-
13	GR	-
16	V	-
18	Y	-
22	BR	-
23	SB	-
24	O	-
25	LG	-
30	BR	-
31	W	-
32	L	-
34	P	-
36	GR	-

Connector No.	E6
Connector Name	IPW/LE INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH08FW-NH



Terminal No.	Color of Wire	Signal Name [Specification]
39	P	-
40	L	-
41	B	-
42	V	-
43	SB	-
44	GR	-
45	G	-
46	BR	-

Connector No.	E20
Connector Name	WIRE TO WIRE
Connector Type	SAA38MB-RS2-SH28



Terminal No.	Color of Wire	Signal Name [Specification]
1	L/W	-
2	SHIELD	-
3	L/B	-
4	SHIELD	-
5	L/W	-
6	W	-
7	L/B	-
8	P	-
9	G	-
10	G	-
11	W	-
11	Y	- [With VK engine]
12	V	- [With VG engine]
13	L	-
14	LG	- [With VK engine]

Terminal No.	Color of Wire	Signal Name [Specification]
14	V	- [With VG engine]
15	SR	-
16	GR	-
19	W	-
20	BR	-
21	G	-
22	O	-
23	L	-
24	GR	-
25	Y	-
28	V	-
29	Y	-
30	B	-
31	LG	-
32	W	-
33	BR	-
34	O	-
37	SHIELD	-
38	G	-
39	Y	-
40	R	-
41	W	-
42	L	-
43	B	-
46	SHIELD	-
47	R	-
48	L	-
49	G	-
50	B	-
51	Y	-
52	W	-

Connector No.	E202
Connector Name	BATTERY TERMINAL WITH FUSIBLE LINK
Connector Type	-



Terminal No.	Color of Wire	Signal Name [Specification]
6	B/GR	-

Connector No.	E203
Connector Name	ALTERNATOR
Connector Type	-



Terminal No.	Color of Wire	Signal Name [Specification]
1	B/GR	B

Connector No.	F36
Connector Name	ALTERNATOR
Connector Type	HS303FE



Terminal No.	Color of Wire	Signal Name [Specification]
2	G	L
3	W	S [With VK engine]
3	L	S [With VG engine]
4	P	C

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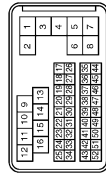
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# CHARGING SYSTEM

< WIRING DIAGRAM >

## CHARGING SYSTEM

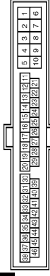
Connector No.	F40
Connector Name	WIRE TO WIRE
Connector Type	SAA38FB-RSS-SH28



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

39	L/Y	- [With VK engine]
40	P	- [With VK engine]
41	W/L	- [With VK engine]
42	R	- [With VK engine]
43	O/L	- [With VK engine]
44	W	- [With VK engine]
45	O	- [With VK engine]
46	LG	- [With VK engine]
47	W	- [With VK engine]
48	B	- [With VK engine]
49	SHIELD	-
50	L/G	- [With VK engine]
51	L/G	- [With VK engine]
52	W	- [With VK engine]
53	W	- [With VK engine]
54	O	- [With VK engine]

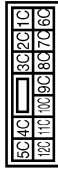
Connector No.	F103
Connector Name	WIRE TO WIRE
Connector Type	TKS6FW-NS1.0



Terminal No.	Color of Wire	Signal Name [Specification]
2	L	-
3	G	-
4	R	- [With VK engine]
5	B	- [With VK engine]
6	GR	- [With VK engine]
7	LG	- [With VK engine]
8	Y	-
9	W	-
10	SB	- [With VK engine]
11	BR	- [With VK engine]
12	Y	- [With VK engine]
13	L	-

12	P	-
13	V	-
14	SB	-
15	R	-
16	W	-
17	GR	-
18	LG	-
19	L	-
20	B	-
21	B	-
22	G	-
23	G	-
24	BR	-
25	O	-

Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS12FW-CS



Terminal No.	Color of Wire	Signal Name [Specification]
6C	R	-
7C	B	-
9C	L	-
10C	LG	-
11C	LG	-
12C	BG	-

Connector No.	M24
Connector Name	PCB HARNESS
Connector Type	TH4DFW-NH



Terminal No.	Color of Wire	Signal Name [Specification]
151	BG	-
152	BG	-

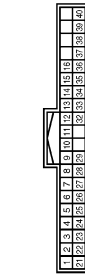
163	G	-
164	V	-
165	V	-
166	R	-
167	LG	-
168	R	-
169	R	-
170	B	-
172	B	-
174	W	-
175	B	-
176	L	-
177	P	-
178	Y	-
179	L	-
180	LG	-
182	BR	-
183	G	-
184	V	-
185	P	- [With BOSE system]
185	V	- [Without BOSE system]
186	R	-
187	L	-
188	Y	-
189	B	-
190	V	-
191	G	-
192	B	-
193	SB	-
194	BR	-
196	R	-
199	B	-
200	SB	-

# CHARGING SYSTEM

< WIRING DIAGRAM >

## CHARGING SYSTEM

Connector No.	M53
Connector Name	COMBINATION METER
Connector Type	TH4DFW-1H



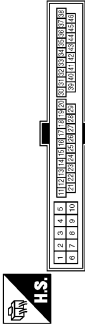
Terminal No.	Color of Wire	Signal Name [Specification]
1	W	BATTERY POWER SUPPLY
2	BG	IGNITION SIGNAL
3	GR	VEHICLE SPEED SIGNAL (2-PULSE)
4	R	VEHICLE SPEED SIGNAL (8-PULSE)
5	B	ILLUMINATION CONTROL SIGNAL
6	B	METER CONTROL SWITCH GROUND
7	SB	ENTER SWITCH SIGNAL
8	LG	SELECT SWITCH SIGNAL
9	G	ILLUMINATION CONTROL SWITCH SIGNAL (+)
10	GR	ILLUMINATION CONTROL SWITCH SIGNAL (-)
11	L	TRIP RESET SWITCH SIGNAL
12	B	GROUND
14	L	CAN-H
15	P	CAN-L
16	R	AIR BAG SIGNAL
23	B	GROUND
24	B	FUEL LEVEL SENSOR GROUND
25	W	ALTERNATOR SIGNAL
26	V	PARKING BRAKE SWITCH SIGNAL
27	V	WASHER LEVEL SWITCH SIGNAL
28	G	SECURITY SIGNAL
29	L	WASHER LEVEL SWITCH SIGNAL
32	G	PADDLE SHIFTER SHIFT DOWN SIGNAL
33	BG	PADDLE SHIFTER SHIFT UP SIGNAL
34	G	FUEL LEVEL SENSOR SIGNAL
35	W	SEAT BELT BUCKLE SWITCH SIGNAL (DRIVER SIDE)
36	G	PASSENGER SEAT BELT WARNING SIGNAL
37	G	NON-MANUAL MODE SIGNAL
38	V	MANUAL MODE SHIFT DOWN SIGNAL
39	L	MANUAL MODE SHIFT UP SIGNAL
40	W	MANUAL MODE SIGNAL

Connector No.	M107
Connector Name	ECM
Connector Type	RK24FGY-R26-R-RH-Z



Terminal No.	Color of Wire	Signal Name [Specification]
97	R	APSI
98	Y	APSZ
99	G	AVCCI-APSI
100	W	GND-APSI
101	SB	ASOD SW
102	P	FTPRES
103	L	AVCC2-APSZ
104	BR	GND-APSZ [With ICC]
104	B	GND-APSZ [Without ICC]
105	LG	POPPRES
106	P	TF
107	BG	AVCC2 POPRES/ETPRES
108	V	GND ASOD SW
109	BR	NEUT RI
110	V	TACIO
112	V	GND POPRES/ETPRES
113	P	VEHCAN-LI
114	L	VEHCAN-HI
117	V	K-LINE
121	G	GDCV
122	P	BRAKE
123	B	GND
124	B	GND
125	SB	VBR
126	BR	BNC SW
127	B	GND
128	B	GND

Connector No.	M116
Connector Name	WIRE TO WIRE
Connector Type	TK38MM-NS10



Terminal No.	Color of Wire	Signal Name [Specification]
2	SB	-
3	Y	-
4	B	- [With VK engine]
4	SB	- [With VQ engine]
5	B	-
7	W	-
8	Y	-
9	W	- [With VK engine]
9	SB	- [With VQ engine]
10	SB	-
11	L	-
12	P	-
13	V	-
14	R	-
15	Y	-
16	SB	-
17	BR	-
18	LG	-
21	LG	-
22	B	-
23	W	-
24	W	-
25	BG	-

JCMWA5582GB

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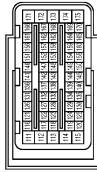
CHG

# CHARGING SYSTEM

< WIRING DIAGRAM >

## CHARGING SYSTEM

Connector No.	M180
Connector Name	ECM
Connector Type	MA859E-ME810-LH



172	SB	POWER SUPPLY FOR ECM
173	R	THROTTLE CONTROL MOTOR POWER SUPPLY
174	B	ECM GROUND
175	B	ECM GROUND

Terminal No.	Color of Wire	Signal Name (Specification)
111	W	FUEL INJECTOR DRIVER POWER SUPPLY
112	W	VINJZA
114	B	ECM GROUND
115	B	ECM GROUND
120	G	EVAP CANISTER VENT CONTROL VALVE
122	V	VTEACTOR MOTOR RELAY ABS/ESP SIGNAL LINE (CONTROL MODULE)
123	BG	THROTTLE CONTROL MOTOR RELAY
125	P	FUEL PUMP CONTROL MODULE (FPOM)
126	Y	ACCELERATOR PEDAL POSITION SENSOR Z
128	SB	ASCD STEERING SWITCH
128	SB	IGCC STEERING SWITCH
129	BR	SENSOR GROUND (WITH ICC)
129	B	SENSOR GROUND (WITHOUT ICC)
130	Y	SENSOR GROUND
131	L	SENSOR POWER SUPPLY
133	BG	SENSOR POWER SUPPLY
134	P	FUEL TEMPERATURE SENSOR
136	R	ACCELERATOR PEDAL POSITION SENSOR L
137	G	SENSOR POWER SUPPLY
138	P	BATTERY CURRENT SENSOR
139	BG	BATTERY TEMPERATURE SENSOR
140	W	SENSOR GROUND
141	G	IGNITION SWITCH
142	GR	FUEL PUMP CONTROL MODULE (FPOM) CHECK
143	P	FUEL TANK PRESSURE SENSOR
144	LG	REFRIGERANT PRESSURE SENSOR
146	L	CAN COMMUNICATION LINE
147	BR	ASCD BRAKE SWITCH (WITHOUT ICC)
147	BR	ICC BRAKE SWITCH (WITH ICC)
150	V	SENSOR GROUND
151	P	CAN COMMUNICATION LINE
156	W	POWER SUPPLY FOR ECM (BACK-UP)
158	P	STOP LAMP SWITCH
181	Y	ECM COMMUNICATION LINE
183	W	ECM RELAY (SELF SHUT-OFF)
186	BG	ECM COMMUNICATION LINE
189	V	ENGINE SPEED SIGNAL OUTPUT
171	SB	POWER SUPPLY FOR ECM

JCMWA5583GB

# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

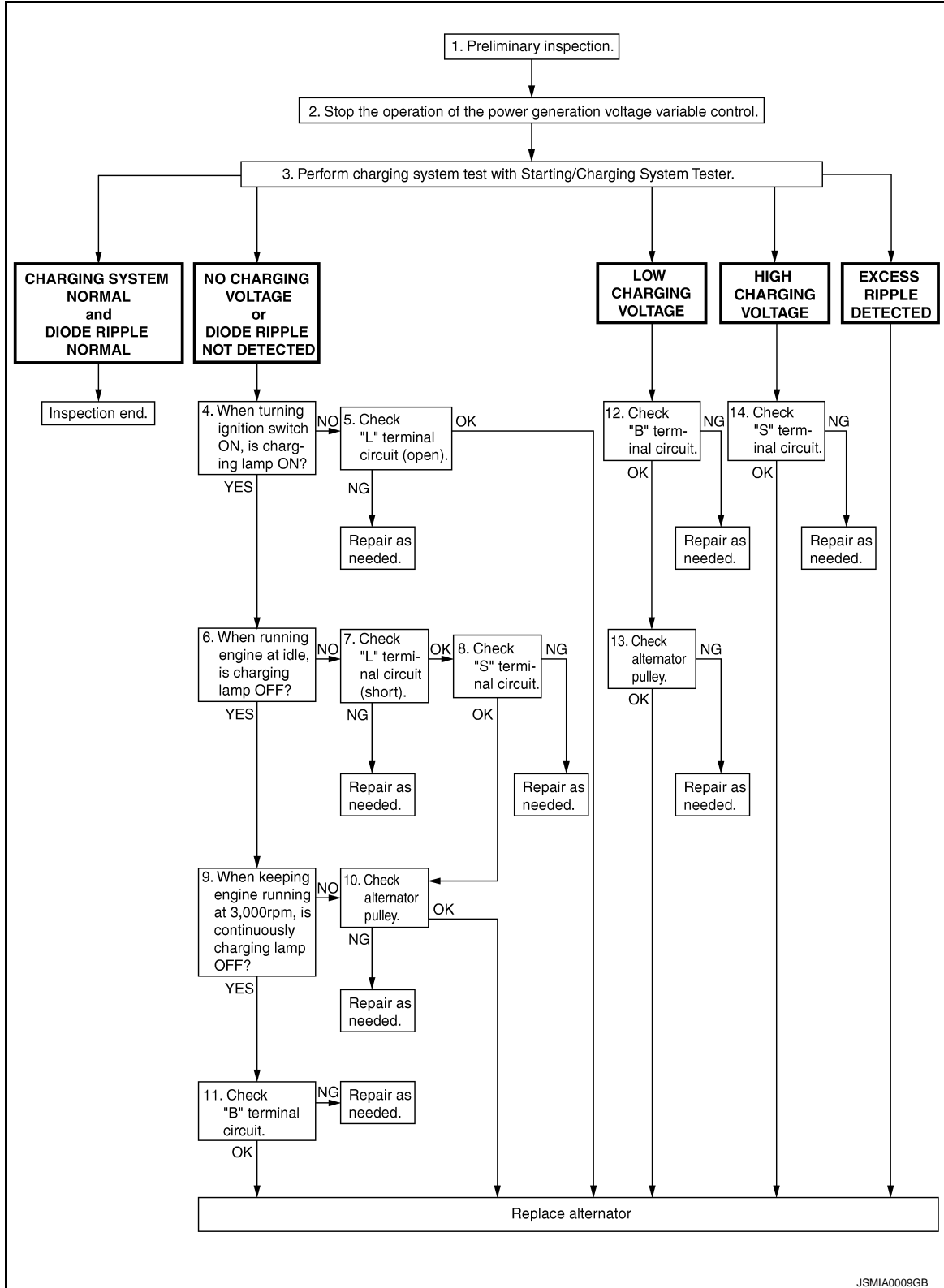
## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000006067104

#### OVERALL SEQUENCE



DETAILED FLOW

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JSMIA0009GB

# DIAGNOSIS AND REPAIR WORKFLOW

## < BASIC INSPECTION >

---

### 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-18, "Inspection Procedure"](#).

>> 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-III, 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-III.]

>> GO TO 3.

### 3. DIAGNOSIS WITH STARTING/CHARGING SYSTEM TESTER

---

Perform the charging system test using Starting/Charging System Tester (SST: J-44373). For details and operating instructions, refer to Technical Service Bulletin.

#### Test result

CHARGING SYSTEM NORMAL>>Charging system is normal and will also show "DIODE RIPPLE" test result.

NO CHARGING VOLTAGE>>GO TO 4.

LOW CHARGING VOLTAGE>>GO TO 12.

HIGH CHARGING VOLTAGE>>GO TO 14.

DIODE RIPPLE NORMAL>>Diode ripple is OK and will also show "CHARGING VOLTAGE" test result.

EXCESS RIPPLE DETECTED>>Replace the alternator. Perform "DIODE RIPPLE" test again using Starting/Charging System Tester (SST: J-44373) to confirm repair.

DIODE RIPPLE NOT DETECTED>>GO TO 4.

### 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-22, "Diagnosis Procedure"](#).

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

YES >> Replace alternator.

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-24, "Diagnosis Procedure"](#).

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

YES >> GO TO 8.

NO >> Repair as needed.



# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

---

## 8. "S" TERMINAL CIRCUIT INSPECTION

---

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

Is the "S" terminal circuit normal?

YES >> GO TO 10.

NO >> Repair as needed.

---

## 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"](#) (VQ37VHR) or [CHG-32. "VK56VD : Inspection"](#) (VK56VD).

Is alternator pulley normal?

YES >> Replace alternator.

NO >> Repair as needed.

---

## 11. "B" TERMINAL CIRCUIT INSPECTION

---

Check "B" terminal circuit. Refer to [CHG-21. "Diagnosis Procedure"](#).

Is "B" terminal circuit normal?

YES >> Replace alternator.

NO >> Repair as needed.

---

## 12. "B" TERMINAL CIRCUIT INSPECTION

---

Check "B" terminal circuit. Refer to [CHG-21. "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"](#) (VQ37VHR) or [CHG-32. "VK56VD : Inspection"](#) (VK56VD).

Is alternator pulley normal?

YES >> Replace alternator.

NO >> Repair as needed.

---

## 14. "S" TERMINAL CIRCUIT INSPECTION

---

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

Is the "S" terminal circuit normal?

YES >> Replace alternator.

NO >> Repair as needed.

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# CHARGING SYSTEM PRELIMINARY INSPECTION

< BASIC INSPECTION >

## CHARGING SYSTEM PRELIMINARY INSPECTION

### Inspection Procedure

INFOID:000000006064437

#### 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)	31
Combination meter	Ignition switch ON ("L" terminal)	4

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 the following.

- VQ37VHR: [EM-22. "Checking"](#)
- VK56VD: [EM-175. "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:000000006064438

#### 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-III)

Perform ECM self-diagnosis with CONSULT-III. Refer to the following.

- VQ37VHR: [EC-73, "CONSULT-III Function"](#)
- VK56VD: [EC-601, "CONSULT-III 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-III 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-III)

Perform IPDM E/R self-diagnosis with CONSULT-III. Refer to [PCS-13, "CONSULT-III 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 harness connector		IPDM E/R harness connector		Continuity
Connector	Terminal	Connector	Terminal	
F36	4	E5	22	Existed

# POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM OPERATION INSPECTION

## < BASIC INSPECTION >

4. Check continuity between alternator harness connector and ground.

Alternator harness connector		Ground	Continuity
Connector	Terminal		
F36	4		Not existed

Is the inspection result normal?

YES >> Replace IPDM E/R.

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

# B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### B TERMINAL CIRCUIT

#### Description

INFOID:0000000006064428

"B" terminal circuit supplies power to charge the battery and to operate the vehicle's electrical system.

#### Diagnosis Procedure

INFOID:0000000006064429

#### 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 Starting/Charging system test. Refer to Technical Service Bulletin.

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

Check voltage between alternator "B" terminal and ground.

Terminals			Voltage (Approx.)
(+)	(-)		
Alternator "B" terminal	Terminal		
E203	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.

Terminals			Voltage (Approx.)
(+)	(-)		
	Alternator "B" terminal	Terminal	
Battery positive terminal	E203	1	Less than 0.2 V

Is the inspection result normal?

YES >> "B" terminal circuit is normal. Refer to [CHG-15, "Work Flow"](#).

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

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# L TERMINAL CIRCUIT (OPEN)

< DTC/CIRCUIT DIAGNOSIS >

## L TERMINAL CIRCUIT (OPEN)

### Description

INFOID:000000006064430

The "L" terminal circuit controls the charge warning lamp. The charge warning lamp turns ON 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 turns OFF. If the charge warning lamp illuminates with the engine running, a malfunction is indicated.

### Diagnosis Procedure

INFOID:000000006064431

#### 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 Starting/Charging system test. Refer to Technical Service Bulletin.

#### 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 harness connector	Terminal	Ground	Condition	
			Ignition switch position	Charge warning lamp
F36	2		ON	illuminate

Does it illuminate?

YES >> "L" terminal circuit is normal. Refer to [CHG-15. "Work Flow"](#).

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 harness connector		Combination meter harness connector		Continuity
Connector No.	Terminal No.	Connector No.	Terminal No.	
F36	2	M53	25	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair the harness or connector.

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

Check continuity between combination meter harness connector and fuse block (J/B).

Combination meter harness connector		Fuse block (J/B)		Continuity
Connector No.	Terminal No.	Connector No.	Terminal No.	
M53	2	M3	12C	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair the harness.

#### 5. CHECK POWER SUPPLY CIRCUIT

1. Connect the battery cable to the negative terminal.

## L TERMINAL CIRCUIT (OPEN)

### < DTC/CIRCUIT DIAGNOSIS >

2. Check voltage between combination meter harness connector and ground.

Terminals		(-)	Condition	Voltage (Approx.)
(+)				
Combination meter harness connector	Terminal			
M53	2	Ground	When the ignition switch is in ON position	Battery voltage

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Inspect the power supply circuit. Refer to [PG-84, "Wiring Diagram - IGNITION POWER SUPPLY -](#)

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# L TERMINAL CIRCUIT (SHORT)

< DTC/CIRCUIT DIAGNOSIS >

## L TERMINAL CIRCUIT (SHORT)

### Description

INFOID:000000006064432

The "L" terminal circuit controls the charge warning lamp. The charge warning lamp turns ON 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 turns OFF. If the charge warning lamp illuminates with the engine running, a malfunction is indicated.

### Diagnosis Procedure

INFOID:000000006064433

#### 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-15, "Work Flow"](#).

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

1. Turn the 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 harness connector		Ground	Continuity
Connector No.	Terminal No.		
M53	25		Not existed

Is the inspection result normal?

- YES >> Replace combination meter.  
NO >> Repair the harness.



# S TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## S TERMINAL CIRCUIT

### Description

INFOID:000000006064434

The output voltage of the alternator is controlled by the IC voltage regulator at the "S" terminal detecting the input voltage.

The "S" terminal circuit detects the battery voltage to adjust the alternator output voltage with the IC voltage regulator.

### Diagnosis Procedure

INFOID:000000006064435

#### 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 Starting/Charging system test. Refer to Technical Service Bulletin.

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

Check voltage between alternator harness connector and ground.

Terminals		Voltage (Approx.)
(+)	(-)	
Alternator harness connector	Terminal	Battery voltage
F36	3	

Is the inspection result normal?

YES >> Refer to [CHG-15, "Work Flow"](#).

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

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# CHARGING SYSTEM

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### CHARGING SYSTEM

#### Symptom Table

INFOID:000000006064436

Symptom	Reference
Discharged battery	Refer to <a href="#">CHG-15, "Work Flow"</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.	

# ALTERNATOR

< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

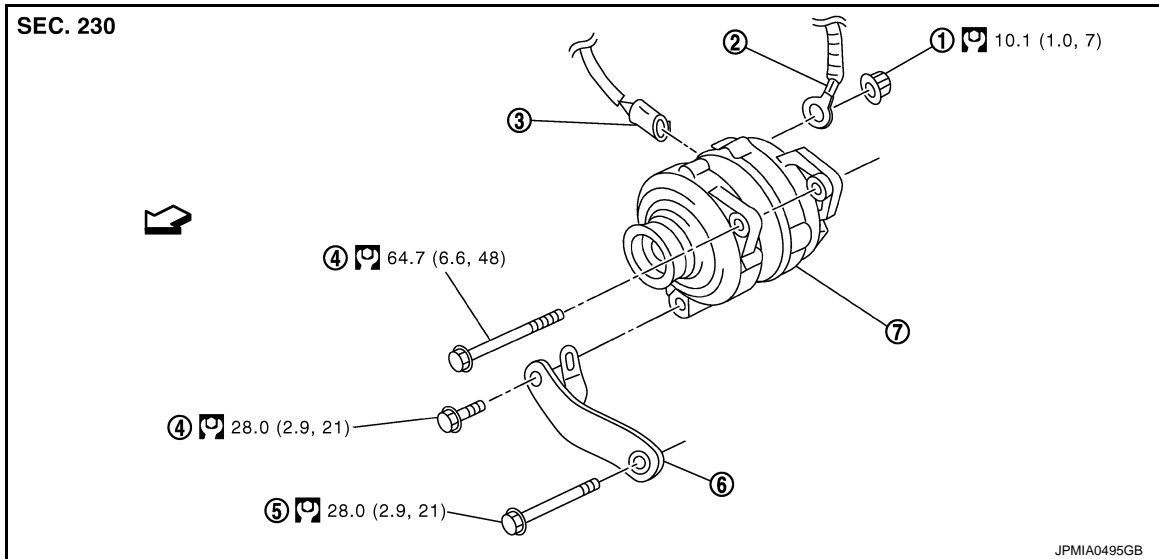
### ALTERNATOR

VQ37VHR

VQ37VHR : Exploded View

INFOID:000000006067105

### REMOVAL



- |                             |                                  |                         |
|-----------------------------|----------------------------------|-------------------------|
| 1. Terminal B nut           | 2. Terminal B harness            | 3. Alternator connector |
| 4. Alternator mounting bolt | 5. Alternator stay mounting bolt | 6. Alternator stay      |
| 7. Alternator               |                                  |                         |

↙ : Engine front

Refer to [GI-4. "Components"](#) for symbols in the figure.

### DISASSEMBLY

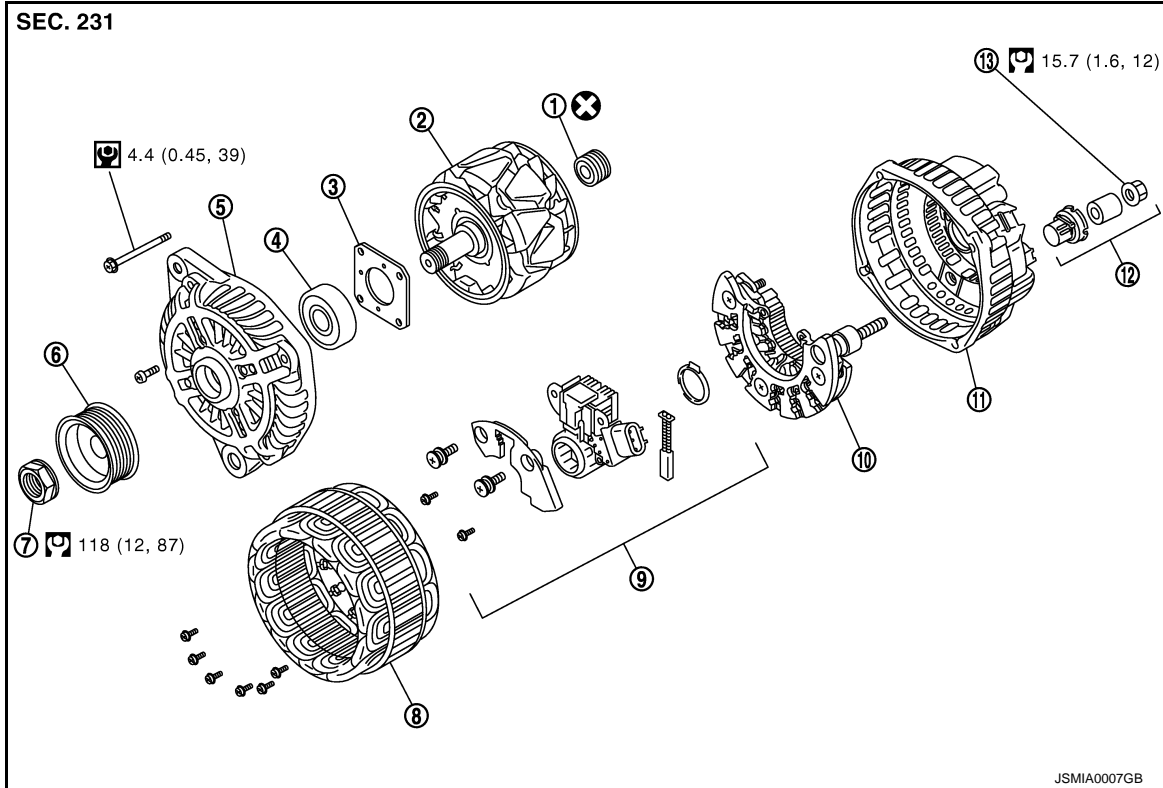
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# ALTERNATOR

## < REMOVAL AND INSTALLATION >

Type: A003TJ1991



- |                      |                           |                                  |
|----------------------|---------------------------|----------------------------------|
| 1. Rear bearing      | 2. Rotor assembly         | 3. Retainer                      |
| 4. Front bearing     | 5. Front bracket assembly | 6. Pulley                        |
| 7. Pulley nut        | 8. Stator assembly        | 9. IC voltage regulator assembly |
| 10. Diode assembly   | 11. Rear bracket assembly | 12. Terminal set                 |
| 13. "B" terminal nut |                           |                                  |

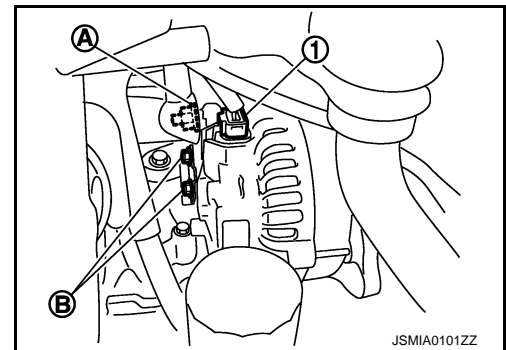
Refer to [GI-4, "Components"](#) for symbols in the figure.

## VQ37VHR : Removal and Installation (2WD)

INFOID:000000006067106

### REMOVAL

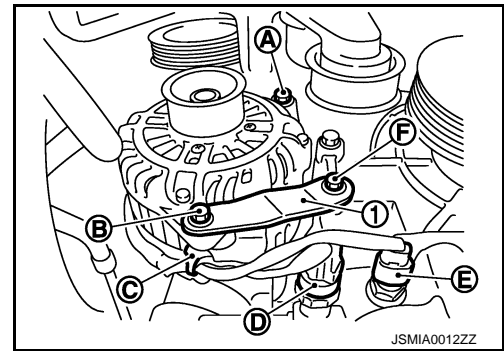
1. Disconnect the battery cable from the negative terminal. Refer to [PG-157, "Removal and Installation"](#).
2. Remove engine engine under cover. Refer to [EXT-28, "ENGINE UNDER COVER : Removal and Installation"](#)
3. Remove drive belt. Refer to [EM-22, "Removal and Installation"](#)
4. Disconnect alternator connector (1).
5. Remove terminal B nut (A), and then remove terminal B harness.
6. Remove the harness bracket bolts (B).



# ALTERNATOR

## < REMOVAL AND INSTALLATION >

7. Remove oil pressure switch harness clip (C) from alternator stay (1).
8. Disconnect oil pressure switch connector (D) and oil temperature sensor connector (E).
9. Remove alternator mounting bolt (B) and alternator stay mounting bolt (F), and then remove alternator stay.
10. Remove alternator mounting bolt (A).



11. Remove alternator assembly downward from the vehicle.

## INSTALLATION

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

### CAUTION:

- Be sure to tighten terminal B nut carefully.
- Install alternator, and check tension of belt. Refer to [EM-22, "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 make sure that the system operates normally. Refer to [CHG-19, "Inspection Procedure"](#).

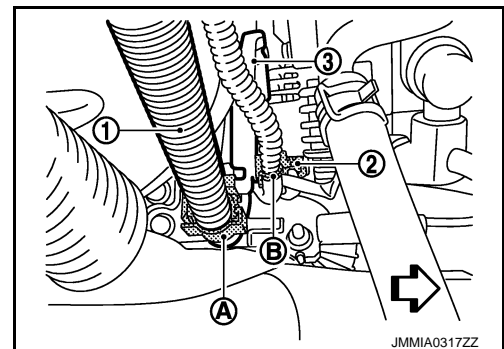
## VQ37VHR : Removal and Installation (AWD)

INFOID:000000006067107

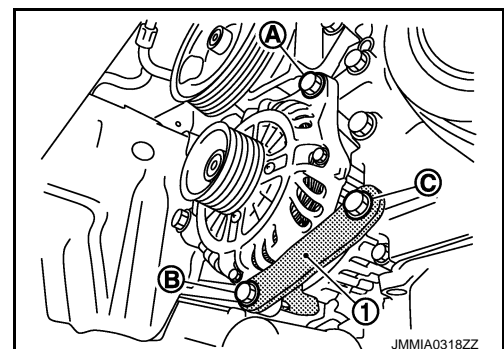
## REMOVAL

1. Disconnect the battery cable from the negative terminal. Refer to [PG-157, "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 terminal B harness (1) from harness clamp (A).
5. Remove harness clip (B) from harness bracket (3).
6. Disconnect alternator connector (2).

← : Vehicle front



7. Remove engine under cover. Refer to [EXT-28, "ENGINE UNDER COVER : Removal and Installation"](#).
8. Remove drive belt. Refer to [EM-22, "Removal and Installation"](#).
9. Remove alternator mounting bolt (B) and alternator stay mounting bolt (C), and then remove alternator stay (1).
10. Remove alternator mounting bolt (A).



# ALTERNATOR

## < REMOVAL AND INSTALLATION >

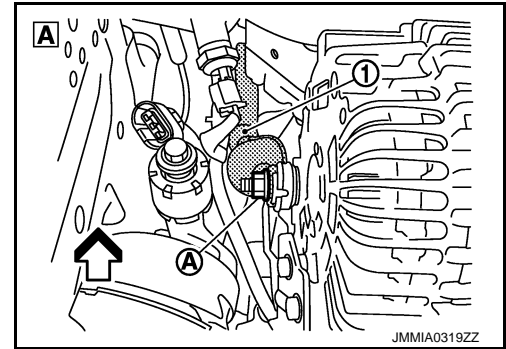
- Remove alternator from engine and laterally rotate to a position so that terminal B nut (A) is visible.

**CAUTION:**

**Be careful not to damage engine oil filter.**

- Remove terminal B nut, and then remove terminal B harness (1).

↶ : Vehicle front



- Remove alternator assembly downward from the vehicle.

## INSTALLATION

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

**CAUTION:**

- Be sure to tighten terminal B nut carefully.
- Install alternator, and check tension of belt. Refer to [EM-22, "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 make sure that the system operates normally. Refer to [CHG-19, "Inspection Procedure"](#).

## VQ37VHR : Inspection

INFOID:000000006067108

## ALTERNATOR PULLEY INSPECTION

Perform the following.

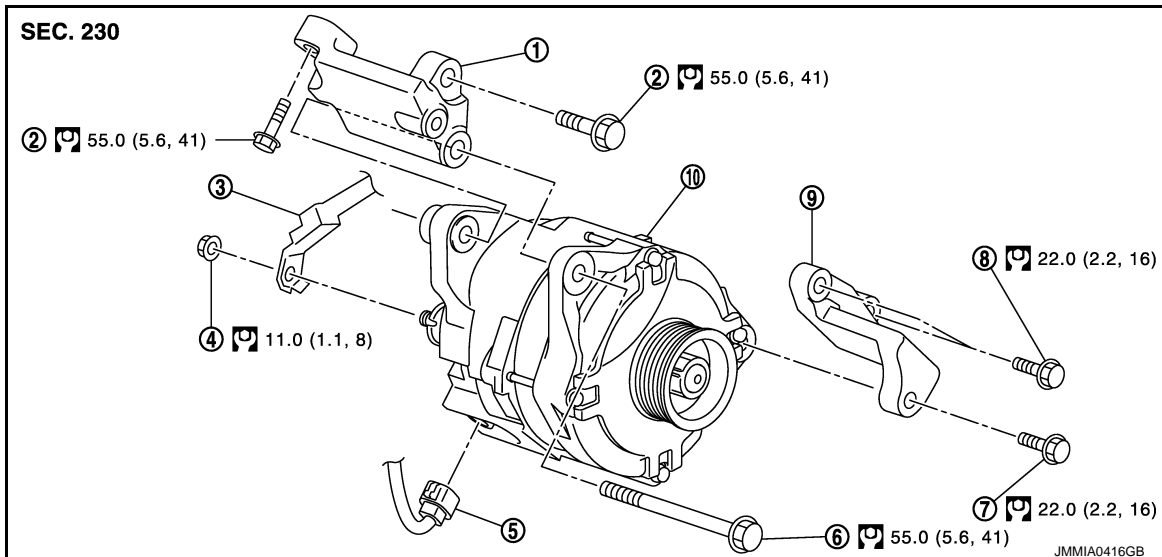
- Make sure that alternator pulley does not rattle.
- Make sure that alternator pulley nut is tight. Refer to [CHG-27, "VQ37VHR : Exploded View"](#).

## VK56VD

## VK56VD : Exploded View

INFOID:000000006067109

## REMOVAL



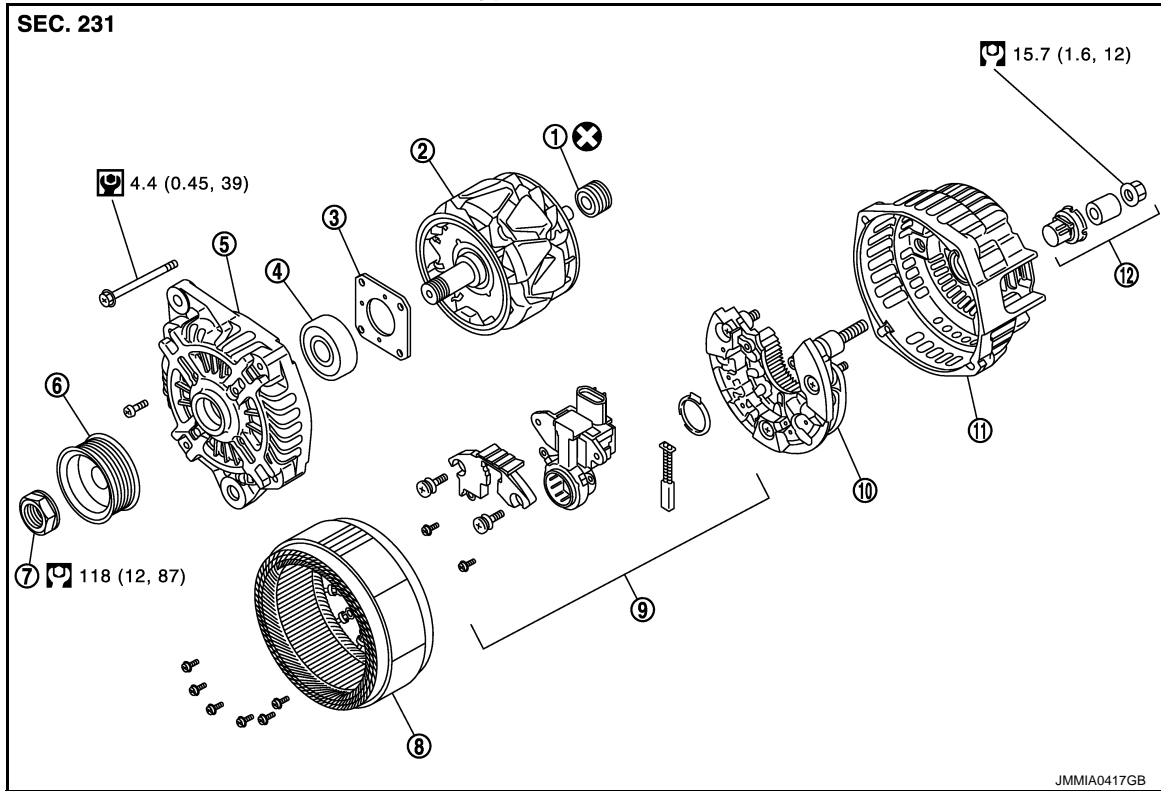
- |                                   |                                     |                                   |
|-----------------------------------|-------------------------------------|-----------------------------------|
| 1. Alternator bracket             | 2. Alternator bracket mounting bolt | 3. Terminal B harness             |
| 4. Terminal B nut                 | 5. Alternator connector             | 6. Alternator mounting bolt upper |
| 7. Alternator mounting bolt lower | 8. Alternator stay mounting bolt    | 9. Alternator stay                |
| 10. Alternator                    |                                     |                                   |

Refer to [GI-4, "Components"](#) for symbols in the figure.

# ALTERNATOR

## < REMOVAL AND INSTALLATION > DISASSEMBLY

Type: A002TX1591



- |                    |                           |                                  |
|--------------------|---------------------------|----------------------------------|
| 1. Rear bearing    | 2. Rotor assembly         | 3. Retainer                      |
| 4. Front bearing   | 5. Front bracket assembly | 6. Pulley                        |
| 7. Pulley nut      | 8. Stator assembly        | 9. IC voltage regulator assembly |
| 10. Diode assembly | 11. Rear bracket assembly | 12. Terminal set                 |

Refer to [GI-4, "Components"](#) for symbols in the figure.

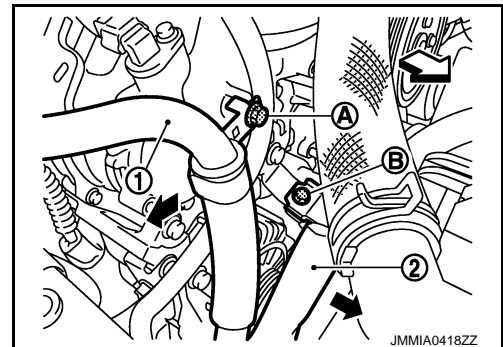
## VK56VD : Removal and Installation

INFOID:0000000006067110

### REMOVAL

1. Disconnect the battery cable from the negative terminal. Refer to [PG-157, "Removal and Installation"](#).
2. Remove air duct (inlet) and air cleaner case (bank 2). Refer to [EM-184, "Removal and Installation"](#).
3. Remove drive belt. Refer to [EM-176, "Removal and Installation"](#).
4. Remove mounting bolt (A) and (B). Move power steering suction hose (1) and power steering high pressure piping (2) and secure work space.

← : Vehicle front



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

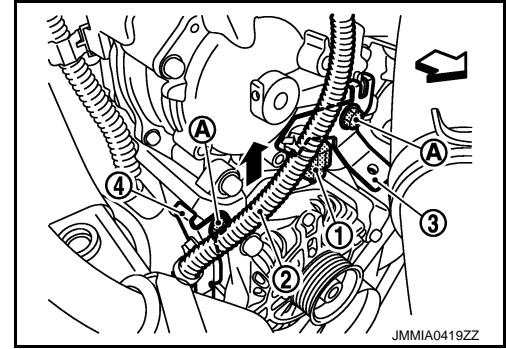
CHG

# ALTERNATOR

## < REMOVAL AND INSTALLATION >

5. Remove harness bracket mounting bolt (A).
6. Disconnect VDC harness connector (1)
7. Move harness (2) together with harness brackets (3) and (4), and secure work space.

← : Vehicle front



8. Remove engine under cover. Refer to [EXT-28, "ENGINE UNDER COVER : Removal and Installation"](#).
9. Disconnect alternator connector.
10. Remove terminal B nut, and then remove terminal B harness.
11. Remove alternator mounting bolt lower.
12. Remove alternator mounting bolt upper.
13. Remove alternator assembly upward from the vehicle.

## INSTALLATION

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

### CAUTION:

- Be sure to tighten terminal B nut carefully.
- Install alternator, and check tension of belt. Refer to [EM-175, "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 make sure that the system operates normally. Refer to [CHG-19, "Inspection Procedure"](#).

## VK56VD : Inspection

INFOID:000000006067111

## ALTERNATOR PULLEY INSPECTION

Perform the following.

- Make sure that alternator pulley does not rattle.
- Make sure that alternator pulley nut is tight. Refer to [CHG-30, "VK56VD : Exploded View"](#).



# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Alternator

INFOID:0000000006067112

Applied model		VQ37VHR	VK56VD
Type		A003TJ1991	A002TX1591
		MITSUBISHI make	
Nominal rating	[V - A]	12 -150	
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 31/1,300	More than 57/1,500
		More than 122/2,500	More than 126/2,500
		More than 144/5,000	More than 152/5,000
Regulated output voltage	[V]	14.1 - 14.7*	

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

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

CHG