

SECTION **CHG**  
CHARGING SYSTEM

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# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORK FLOW

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

INFOID:000000009722537

#### 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.

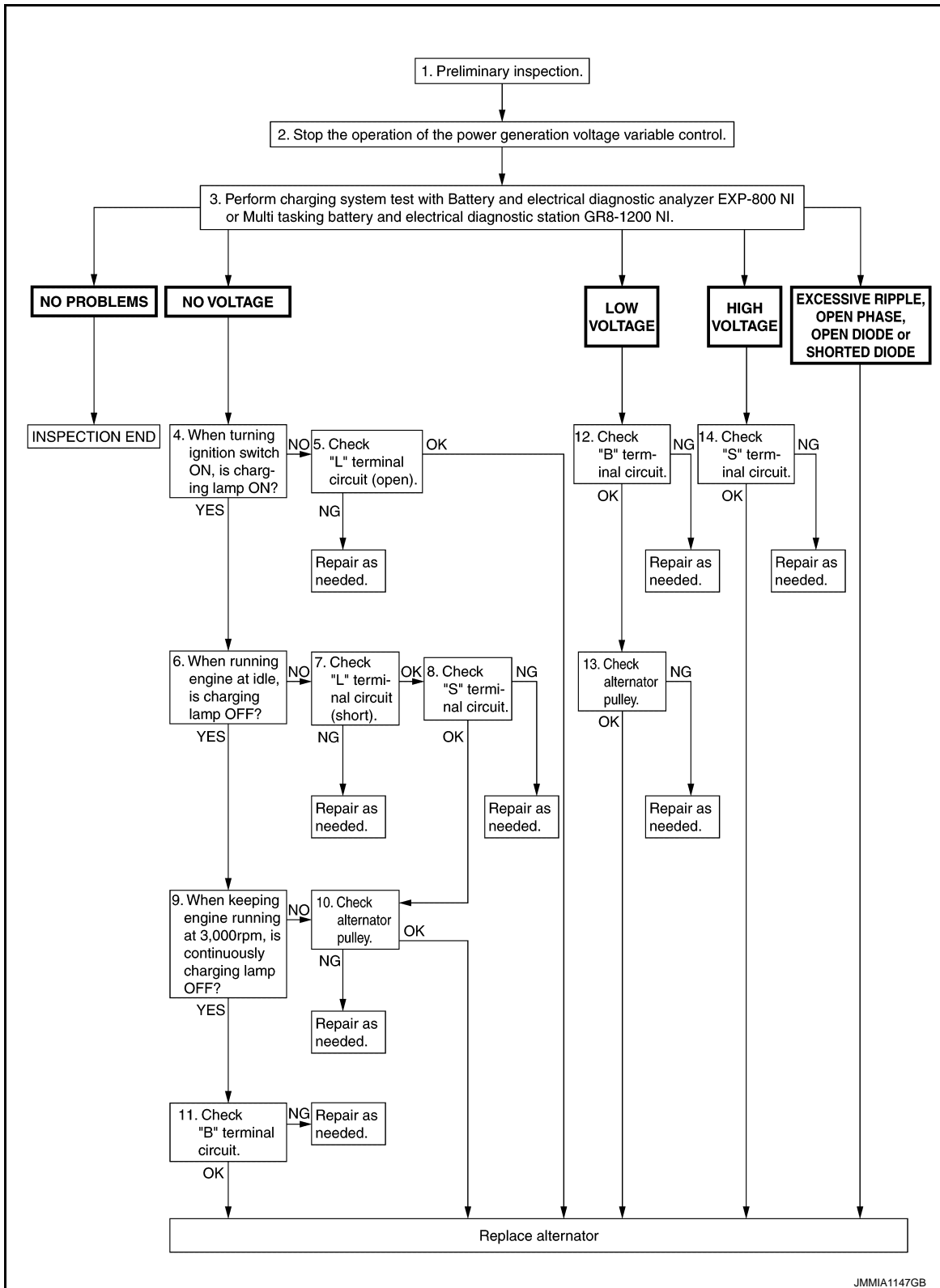
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# DIAGNOSIS AND REPAIR WORK FLOW

< 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-30, "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-15, "Diagnosis Procedure"](#).

Is the “L” terminal circuit normal?

YES >> Replace alternator. Refer to [CHG-33, "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-17, "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-18, "Diagnosis Procedure"](#).

Is the “S” terminal circuit normal?

YES >> GO TO 10.

NO >> Repair as needed.

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# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

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## 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-34, "Inspection"](#).

Is alternator pulley normal?

YES >> Replace alternator. Refer to [CHG-33, "Removal and Installation"](#).

NO >> Repair as needed.

## 11. "B" TERMINAL CIRCUIT INSPECTION

---

Check "B" terminal circuit. Refer to [CHG-14, "Diagnosis Procedure"](#).

Is "B" terminal circuit normal?

YES >> Replace alternator. Refer to [CHG-33, "Removal and Installation"](#).

NO >> Repair as needed.

## 12. "B" TERMINAL CIRCUIT INSPECTION

---

Check "B" terminal circuit. Refer to [CHG-14, "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-34, "Inspection"](#).

Is alternator pulley normal?

YES >> Replace alternator. Refer to [CHG-33, "Removal and Installation"](#).

NO >> Repair as needed.

## 14. "S" TERMINAL CIRCUIT INSPECTION

---

Check "S" terminal circuit. Refer to [CHG-18, "Diagnosis Procedure"](#).

Is the "S" terminal circuit normal?

YES >> Replace alternator. Refer to [CHG-33, "Removal and Installation"](#).

NO >> Repair as needed.

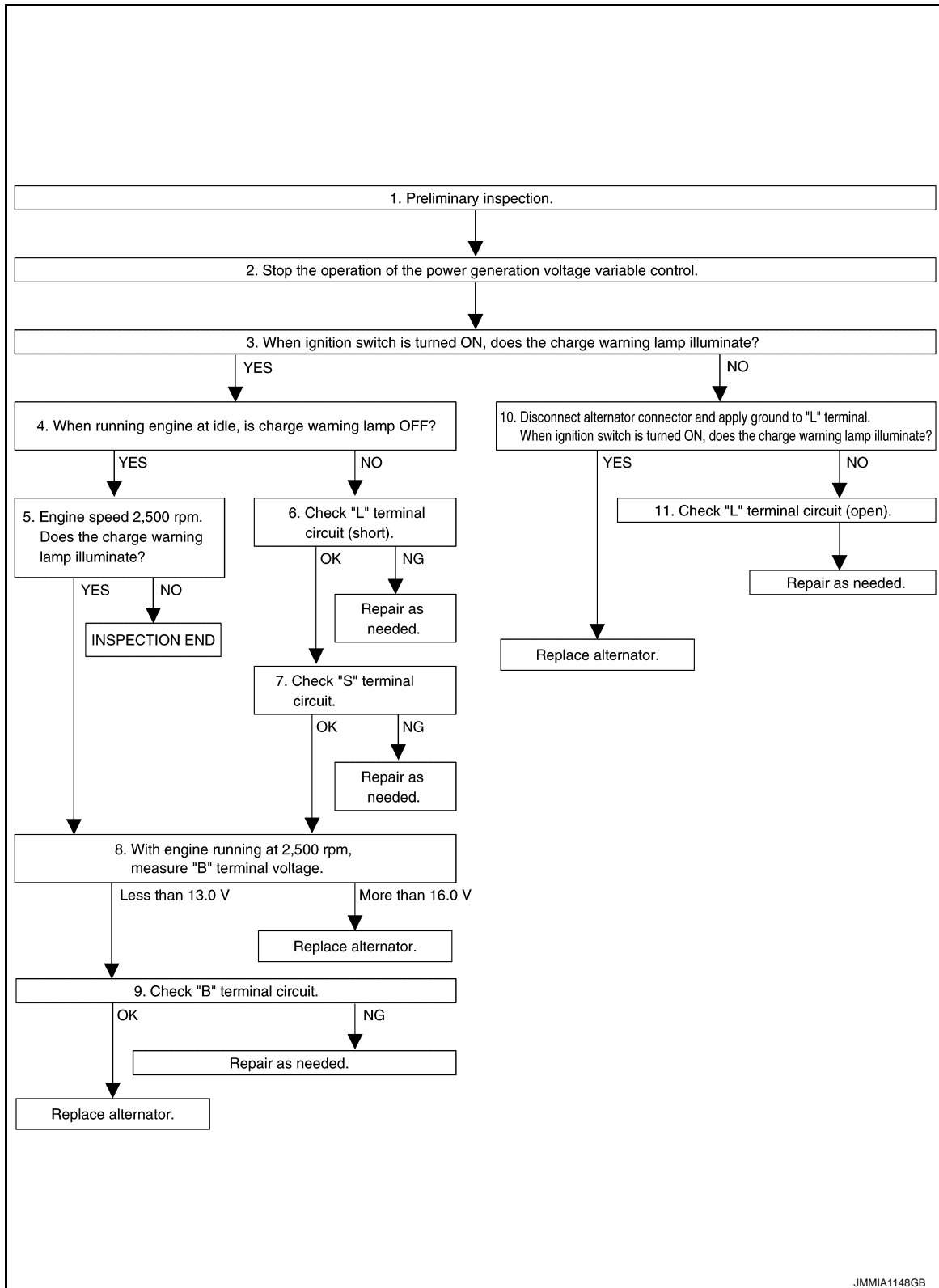
# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

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

INFOID:000000009722538

## OVERALL SEQUENCE



## DETAILED FLOW

### 1. PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to [CHG-30, "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-17, "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-18, "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-33, "Removal and Installation"](#).

### 9. "B" TERMINAL CIRCUIT INSPECTION

---

Check "B" terminal circuit. Refer to [CHG-14, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace alternator. Refer to [CHG-33, "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-33. "Removal and Installation"](#).

NO >> GO TO 11.

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

---

Check "L" terminal circuit (open). Refer to [CHG-15. "Diagnosis Procedure"](#).

>> Repair as needed.

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# CHARGING SYSTEM

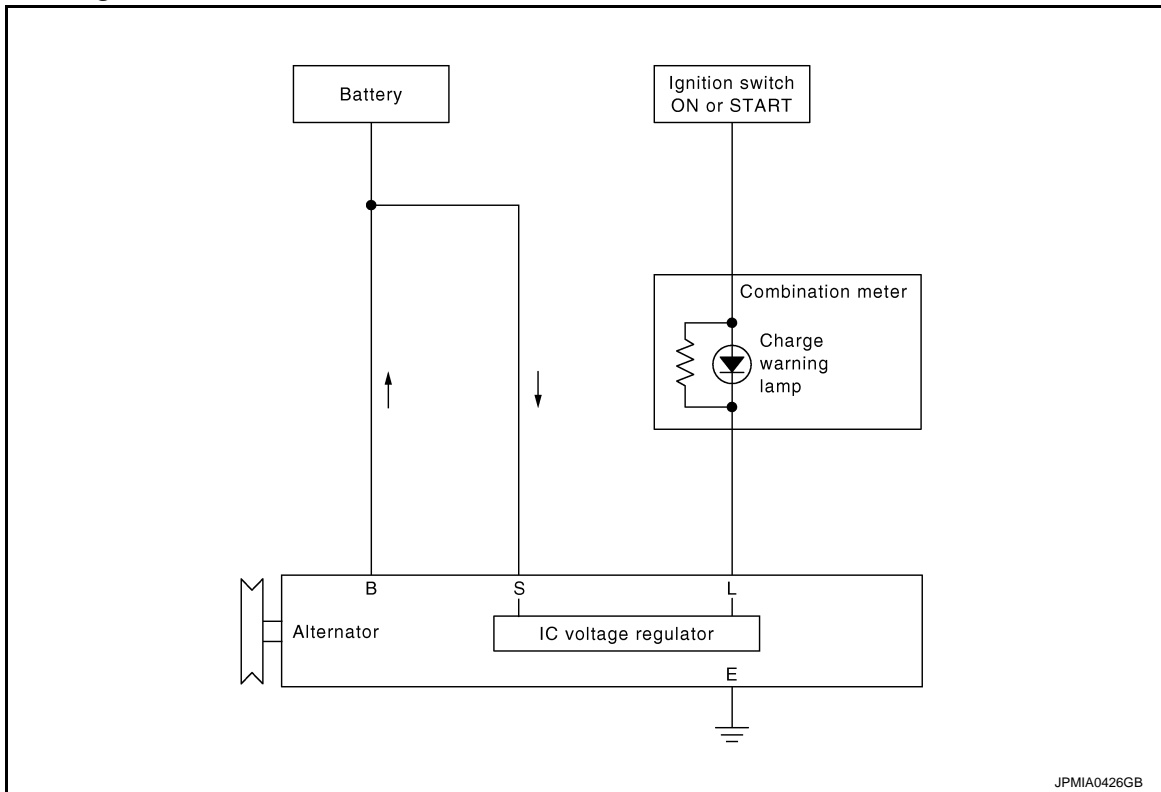
< SYSTEM DESCRIPTION >

## SYSTEM DESCRIPTION

### CHARGING SYSTEM

#### System Diagram

INFOID:000000009722539



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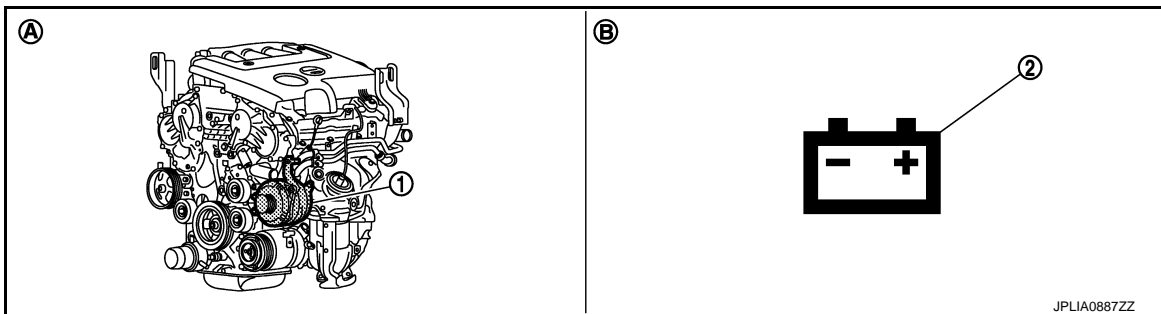
#### System Description

INFOID:000000009722540

The voltage output is controlled by the IC voltage regulator.

#### Component Parts Location

INFOID:000000009722541



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- |                             |                        |
|-----------------------------|------------------------|
| 1. Alternator               | 2. Charge warning lamp |
| A. Cylinder block left side | B. Combination meter   |

#### Component Description

INFOID:000000009722542

# CHARGING SYSTEM

## < SYSTEM DESCRIPTION >

Component part	Description	A
Alternator	The alternator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged.	B
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>	C
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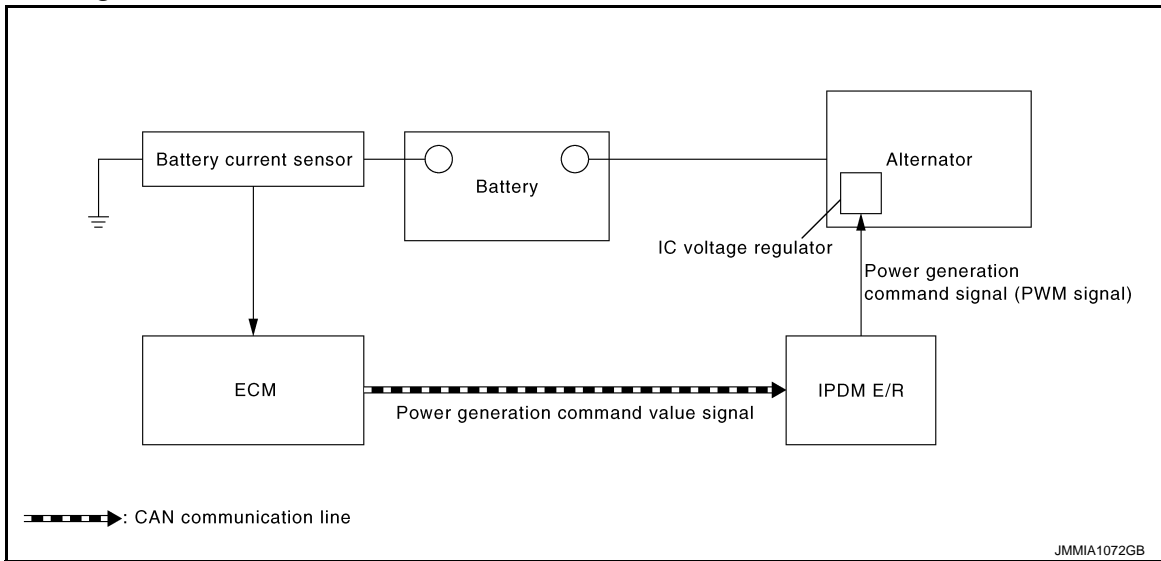
# POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

< SYSTEM DESCRIPTION >

## POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

### System Diagram

INFOID:000000009722543



### System Description

INFOID:000000009722544

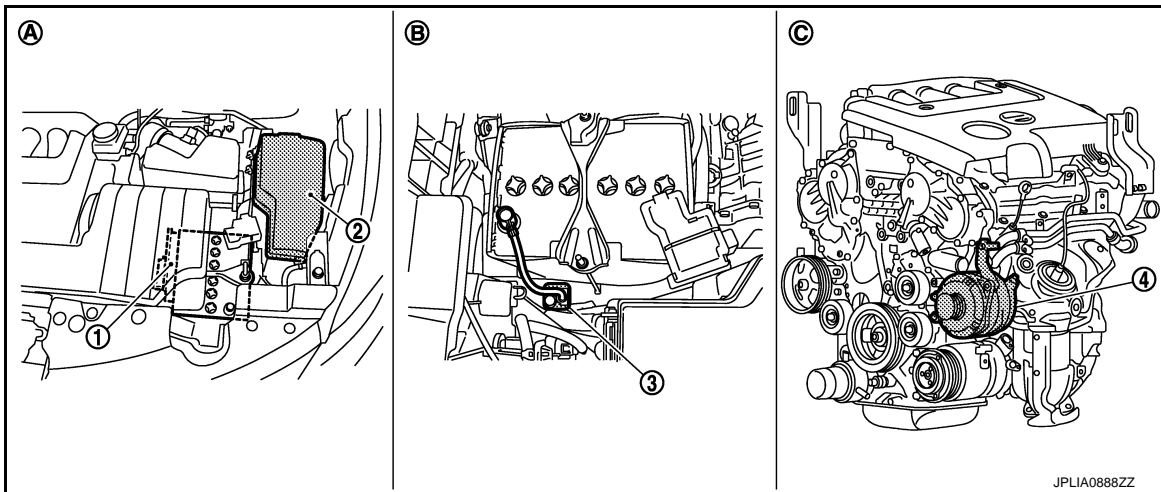
By performing the power generation voltage variable control, the engine load due to the power generation of the alternator is reduced and fuel consumption is decreased.

**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.

### Component Parts Location

INFOID:000000009722545



- |                                |             |                             |
|--------------------------------|-------------|-----------------------------|
| 1. ECM                         | 2. IPDM E/R | 3. Battery current sensor   |
| 4. Alternator                  |             |                             |
| A. Engine room dash panel (LH) | B. Battery  | C. Cylinder block left side |

# POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

< SYSTEM DESCRIPTION >

## Component Description

INFOID:000000009722546

Component part	Description
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.
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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# B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### B TERMINAL CIRCUIT

#### Description

INFOID:000000009722547

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

#### Diagnosis Procedure

INFOID:000000009722548

#### 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.

Terminals			Voltage (Approx.)
(+)	(-)		
Alternator "B" terminal	Terminal	(-)	Battery voltage
F59	1	Ground	

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.)
(+)	(-)		
Battery positive terminal	Alternator "B" terminal	Terminal	Less than 0.2 V
	F59	1	

Is the inspection result normal?

YES >> "B" terminal circuit is normal. Refer to [CHG-3. "Work Flow \(With EXP-800 NI or GR8-1200 NI\)"](#) or [CHG-7. "Work Flow \(Without EXP-800 NI or GR8-1200 NI\)"](#).

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

# L TERMINAL CIRCUIT (OPEN)

< DTC/CIRCUIT DIAGNOSIS >

## L TERMINAL CIRCUIT (OPEN)

### Description

INFOID:000000009722549

The "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.

### Diagnosis Procedure

INFOID:000000009722550

#### 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 harness connector	Terminal	Ground	Condition	
			Ignition switch position	Charge warning lamp
F60	3		ON	illuminate

Does it illuminate?

YES >> "L" terminal circuit is normal. Refer to [CHG-3, "Work Flow \(With EXP-800 NI or GR8-1200 NI\)"](#) or [CHG-7, "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 harness connector		Combination meter harness connector		Continuity
Connector No.	Terminal No.	Connector No.	Terminal No.	
F60	3	M34	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.

Combination meter harness connector		Fuse block		Continuity
Connector No.	Terminal No.	Connector No.	Terminal No.	
M34	2	M3	12C	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair the harness.

## L TERMINAL CIRCUIT (OPEN)

< DTC/CIRCUIT DIAGNOSIS >

### 5. CHECK POWER SUPPLY CIRCUIT

1. Connect the battery cable to the negative terminal.
2. Check voltage between combination meter harness connector and ground.

Terminals		(-)	Condition	Voltage (Approx.)
(+)	Terminal			
Combination meter harness connector				
M34	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-47. "Wiring Diagram - IGNITION POWER SUPPLY -](#)  
".



# L TERMINAL CIRCUIT (SHORT)

< DTC/CIRCUIT DIAGNOSIS >

## L TERMINAL CIRCUIT (SHORT)

### Description

INFOID:000000009722551

The "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.

### Diagnosis Procedure

INFOID:000000009722552

#### 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-3. "Work Flow \(With EXP-800 NI or GR8-1200 NI\)"](#) or [CHG-7. "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 harness connector		Ground	Continuity
Connector No.	Terminal No.		
M34	25		Not existed

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair the harness.

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# S TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## S TERMINAL CIRCUIT

### Description

INFOID:000000009722553

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:000000009722554

#### 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.

Terminals		Voltage (Approx.)
(+)	(-)	
Alternator harness connector	Terminal	Battery voltage
F60	4	
	Ground	

Is the inspection result normal?

YES >> Refer to [CHG-3, "Work Flow \(With EXP-800 NI or GR8-1200 NI\)"](#) or [CHG-7, "Work Flow \(Without EXP-800 NI or GR8-1200 NI\)"](#).

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

# CHARGING SYSTEM

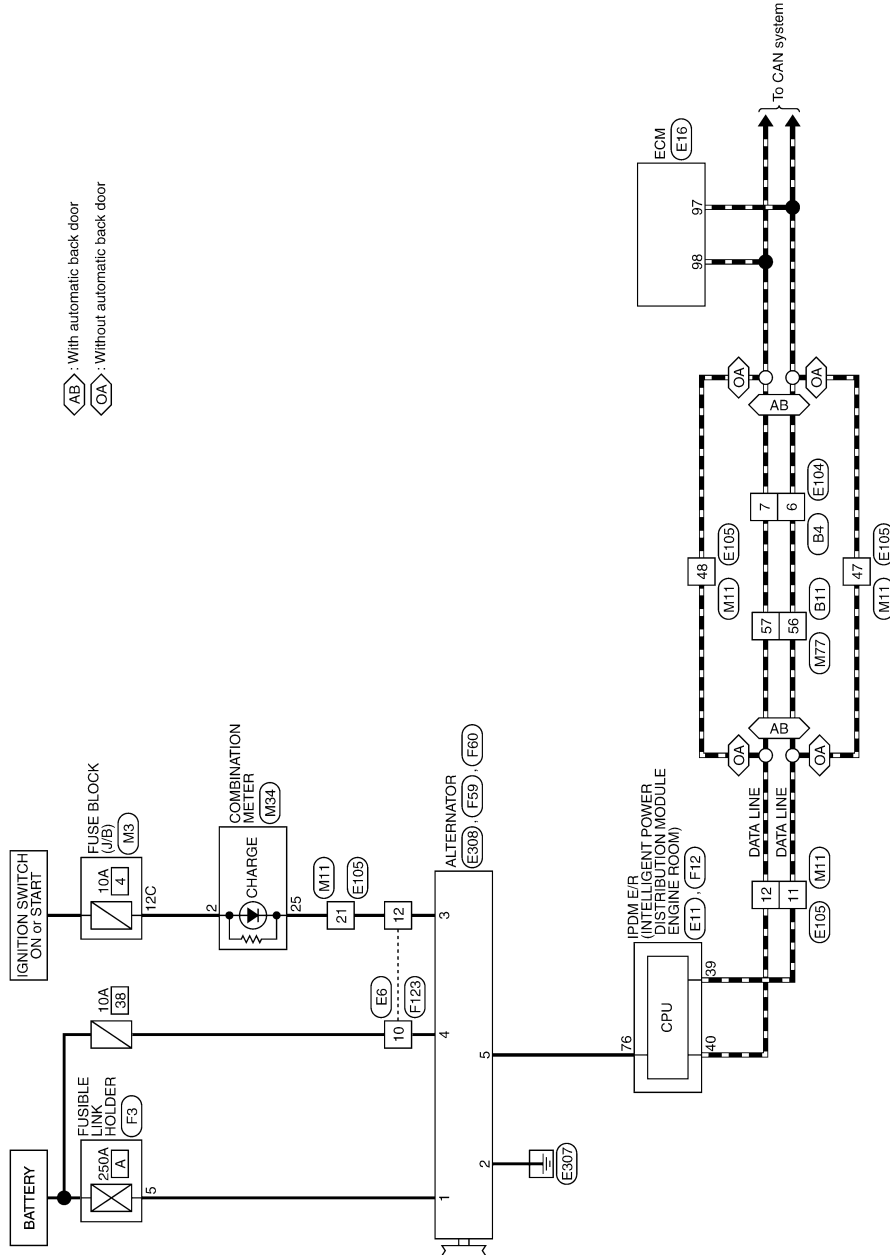
< DTC/CIRCUIT DIAGNOSIS >

## CHARGING SYSTEM

### Wiring Diagram - CHARGING SYSTEM -

INFOID:000000009722555

### CHARGING SYSTEM



<AB> : With automatic back door  
 <OA> : Without automatic back door

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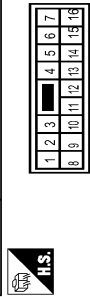
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# CHARGING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

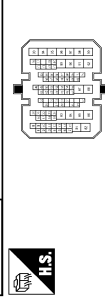
## CHARGING SYSTEM

Connector No.	E4
Connector Name	WIRE TO WIRE
Connector Type	TK18BMW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	
2	W	
3	W	
4	R	
5	O	
6	P	
7	L	
8	B	
9	LG	
10	V	
11	L	
12	BR	
13	P	
14	BR	
15	O	
16	G	

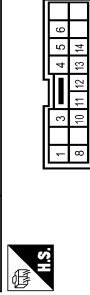
Connector No.	E11
Connector Name	WIRE TO WIRE
Connector Type	TR18BMW-C518



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SHIELD	
2	B	
3	R/L	

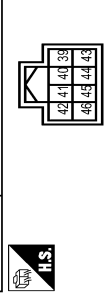
Terminal No.	Color Of Wire	Signal Name [Specification]
56	P	
57	L	
58	R	
59	R	
60	SHIELD	
61	B	
62	Y	
63	R/L	
64	LG	
65	Y	
66	BR	
67	R	
68	GR	
69	BR	
70	Y	
71	W/R	
72	B/R	
73	Y	
74	LG	
75	L	
76	SB	
77	G	
78	R	
79	W	
80	W	
81	R	
82	L	
83	BR	
84	O	
85	G	
86	SB	
87	R	
88	G	
89	GR	
90	Y	
91	G	
92	BR	
93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

Connector No.	E6
Connector Name	WIRE TO WIRE
Connector Type	TK18MG3-1V



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	
2	W	
3	W	
4	R	
5	GR	
6	V	
7	P	
8	P	
9	W	
10	W	
11	G	
12	BR	
13	SB	
14	B	

Connector No.	E11
Connector Name	WIRE TO INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Type	TR18BEW-NH



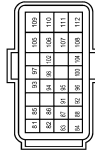
Terminal No.	Color Of Wire	Signal Name [Specification]
1	SHIELD	
2	B	
3	R	
4	B	
5	SB	
6	Y	
7	W	
8	Y	
9	W	
10	W	
11	L	
12	L	
13	L	
14	L	
15	L	
16	L	
17	L	
18	L	

# CHARGING SYSTEM

## < DTC/CIRCUIT DIAGNOSIS >

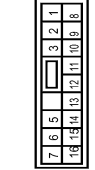
### CHARGING SYSTEM

Connector No.	E16
Connector Name	ECM
Connector Type	HR24EB-R28-L-LH



Terminal No.	Color Of Wire	Signal Name [Specification]
81	W	ACCELERATOR PEDAL POSITION SENSOR 1
82	BR	ACCELERATOR PEDAL POSITION SENSOR 2
83	BR	SENSOR POWER SUPPLY
84	B	SENSOR GROUND
85	Y	ASCOD STEERING SWITCH
86	SB	EVAP CONTROL SYSTEM PRESSURE SENSOR
87	GR	SENSOR POWER SUPPLY
88	O	DATA LINK CONNECTOR
91	L	SENSOR POWER SUPPLY
92	BR	SENSOR GROUND
93	BR	IGNITION SWITCH
94	GR	ENGINE SPEED OUTPUT SIGNAL
95	Y	FUEL TANK TEMPERATURE SENSOR
96	GR	SENSOR GROUND
97	P	CMV COMMUNICATION LINE(CAN-L)
98	L	CMV COMMUNICATION LINE(CAN-H)
100	L	SENSOR GROUND
102	R	PMP SIGNAL
104	SB	SENSOR GROUND
105	V	POWER SUPPLY FOR ECM
106	SB	STOP LAMP SWITCH
107	B	ECM GROUND
108	B	ECM GROUND
109	W	EVAP CANISTER VENT CONTROL VALVE
110	G	ASCOD BRAKE SWITCH
111	B	ECM GROUND
112	B	ECM GROUND

Connector No.	E104
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	O	
2	SB	
3	L	
4	R	
5	L	
6	P	
7	L	
8	B/W	
9	SB	
10	GR	
11	R	
12	W	
13	P	
14	V	
15	Y	
16	Y	
17	L	
18	L	

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH70MW-CS10-M3



Terminal No.	Color Of Wire	Signal Name [Specification]
3	Y	
5	LG	
6	GR	
8	G	

Connector No.	E308
Connector Name	ALTERNATOR
Connector Type	E-LA6



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

Connector No.	F3
Connector Name	FUSIBLE LINK HOLDER
Connector Type	Z4340-JAAMD



Terminal No.	Color Of Wire	Signal Name [Specification]
5	B/R	

Terminal No.	Color Of Wire	Signal Name [Specification]
11	P	
12	Y	
13	Y	
14	O	
15	BR	
20	Y	
21	BR	
22	P	
24	L	
25	O	
28	SB	
29	W	
30	Y	
35	R	
36	L	
37	L	
42	P	
44	L	
48	SB	
50	GR	
51	LG	
52	V	
53	GR	
54	BR	
55	Y	
56	W/L	
60	V	
61	BR	
62	LG	
64	SHIELD	
66	W	
67	BR	
68	Y	
69	SB	
70	GR	
71	SB	
72	Y	
73	L	
74	W	
75	BR	
76	GR	
77	O	
78	V	
79	Y	
80	R	
81	W	
82	LG	

JRMWE5853GB

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# CHARGING SYSTEM

## < DTC/CIRCUIT DIAGNOSIS >

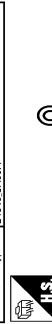
### CHARGING SYSTEM

Connector No.	F12
Connector Name	FUSE BLOCK POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Type	TH20FW-CS12-M4



Terminal No.	Color Of Wire	Signal Name [Specification]
48	R/B	-
49	R/B	-
51	L/G	-
52	Y/G	-
53	R/W	-
54	G/W	-
55	W/L	-
56	R/Y	-
57	O	-
58	Y	-
69	W/B	-
70	O	-
72	R/B	-
75	L/G	-
76	SB	-
77	GB	-
80	B	-

Connector No.	F59
Connector Name	ALTERNATOR
Connector Type	2434B-JA09A



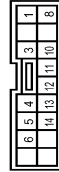
Terminal No.	Color Of Wire	Signal Name [Specification]
1	B/R	-

Connector No.	F60
Connector Name	ALTERNATOR
Connector Type	HS03EB



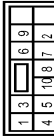
Terminal No.	Color Of Wire	Signal Name [Specification]
3	G/B	-
4	Y/B	-
5	SB	-

Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK10EY-1V



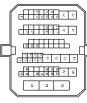
Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
3	G/R	-
4	G/B	-
5	R	-
6	L/R	-
8	P	-
10	Y/B	-
11	BR/W	-
12	BR	-
14	G	-

Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Type	HS12FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
10C	SB	-
10D	O	-
6C	BR	-
7C	B	-
8C	G	-
9C	GR	-

Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH10FW-CS10-M3



Terminal No.	Color Of Wire	Signal Name [Specification]
3	P	-
5	BR	-
6	G	-
8	R	-
11	L	-
12	L	-
13	V	-
14	Y	-
15	R	-
20	W	- [Without colour display]
20	Y	- [With colour display]
21	BR	-

24	L/G	-
24	Y	-
25	-	-
28	BR	-
29	L	-
30	R	-
38	R	-
39	L	-
40	B	-
47	P	-
48	L	-
49	W	-
50	GR	-
51	L/G	-
52	V	-
54	SB	-
55	P	-
56	L/G	-
60	V	-
61	GR	-
62	BR	-
63	V	-
64	SHIELD	-
66	W	-
67	R	-
68	W	-
69	P	-
70	G	-
72	BR	-
73	B	-
74	W	-
75	BR	-
76	R	-
77	G	-
78	Y	-
79	G	-
80	R	-
81	W	-
82	W	-
83	BG	-

# CHARGING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

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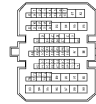
## CHARGING SYSTEM

Connector No.	M24
Connector Name	COMBINATION METER
Connector Type	TH46FW-NH



Terminal No.	Wire	Signal Name [Specification]
1	W	BATTERY POWER SUPPLY
2	LG	RESIGNAL
3	B	GROUND
4	B	GROUND
5	SB	ILLUMINATION CONTROL SIGNAL
6	SB	TRIP RESET SIGNAL
7	W	SW ILL POWER
8	LG	METER CONTROL SWITCH GROUND
9	L	ENTER SWITCH SIGNAL
10	R	SELECT SWITCH SIGNAL
11	V	ILLUMINATION CONTROL SWITCH SIGNAL (C) (Without automatic drive positioner)
12	GR	ILLUMINATION CONTROL SWITCH SIGNAL (C)
13	BR	AIR BAG SIGNAL
14	L	AMBIENT SENSOR SIGNAL
15	P	AMBIENT SENSOR POWER
16	Y	AMBIENT SENSOR GROUND
17	Y	CAM-H
18	P	GROUND
19	B	FUEL LEVEL SENSOR GROUND
20	W	ALTERNATOR SIGNAL
21	G	PARKING BRAKE SWITCH SIGNAL
22	V	BRAKE FLUID LEVEL SWITCH SIGNAL
23	R	WASHER LEVEL SWITCH SIGNAL
24	P	VEHICLE SPEED SIGNAL (2-PULSE)
25	V	VEHICLE SPEED SIGNAL (6-PULSE)
26	LG	OVERDRIVE CONTROL SWITCH SIGNAL
27	G	FUEL LEVEL SENSOR SIGNAL
28	R	SEAT BELT Buckle Switch Signal (Passenger Side)
29	R	SEAT BELT Buckle Switch Signal (Driver Side)

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-GS19



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

46	G		R
47	SB		V
48	Y		W
49	GR		R
50	GR		G
51	SHIELD		B
52	BR		V
53	R		G
54	LG		BR
55	R		P
56	R		V
57	L		W
58	SB		SB
59	B		L
60	B		LG
61	P		Y
62	P		Y
63	L		L
64	Y		Y
65	R		R
66	V		V
67	Y		Y
68	G		G
69	W		W
70	BG		B
71	SHIELD		SHIELD
72	P		P
73	LG		LG
74	R		R
75	P		P
76	SB		SB
77	SB		SB
78	B		B
79	W		W
80	L		L
81	L		L
82	GR		GR
83	GR		GR
84	W		W
85	Y		Y

46	G		R	
47	SB		V	
48	Y		W	
49	GR		G	
50	GR		B	
51	SHIELD		V	
52	BR		G	
53	R		LG	
54	LG		BR	
55	R		P	
56	R		V	
57	L		W	
58	SB		SB	
59	B		L	
60	B		LG	
61	P		Y	
62	P		Y	
63	L		L	
64	Y		Y	
65	R		R	
66	V		V	
67	Y		Y	
68	G		G	
69	W		W	
70	BG		B	
71	SHIELD		SHIELD	
72	P		P	
73	LG		LG	
74	R		R	
75	P		P	
76	SB		SB	
77	SB		SB	
78	B		B	
79	W		W	
80	L		L	
81	L		L	
82	GR		GR	
83	GR		GR	
84	W		W	
85	Y		Y	

CHG

# CHARGING SYSTEM

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### CHARGING SYSTEM

#### Symptom Table

INFOID:000000009722556

Symptom	Reference
Discharged battery	Refer to <a href="#">CHG-3, "Work Flow (With EXP-800 NI or GR8-1200 NI)"</a> or <a href="#">CHG-7, "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.	



# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

#### FOR USA AND CANADA

#### FOR USA AND CANADA : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000009722557

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.

#### FOR USA AND CANADA : Precaution for Power Generation Voltage Variable Control System

INFOID:000000009722558

#### **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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## PRECAUTIONS

< PRECAUTION >

### FOR USA AND CANADA : Precautions for Removing of Battery Terminal

INFOID:0000000110077080

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.

**NOTE:**

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

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

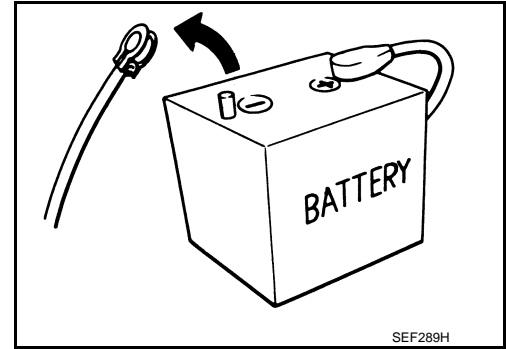
**NOTE:**

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

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

**NOTE:**

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



### FOR MEXICO

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

INFOID:000000009722559

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

**WARNING:**

Always observe the following items for preventing accidental activation.

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

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

**WARNING:**

Always observe the following items for preventing accidental activation.

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

### FOR MEXICO : Precaution for Power Generation Voltage Variable Control System

INFOID:000000009722560

**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.

# PRECAUTIONS

< PRECAUTION >

## FOR MEXICO : Precautions for Removing of Battery Terminal

INFOID:000000010077081

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.

**NOTE:**

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

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

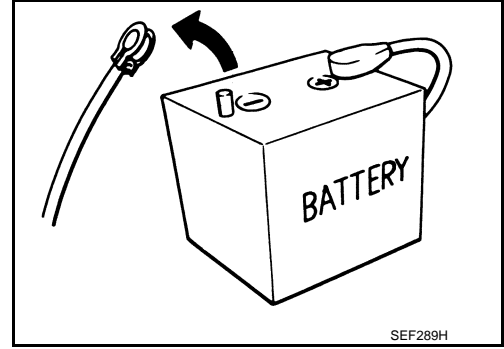
**NOTE:**

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

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

**NOTE:**

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



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# PREPARATION

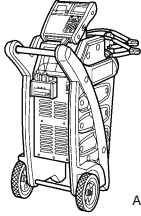
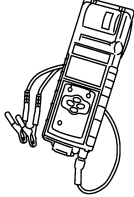
< PREPARATION >

## PREPARATION

### PREPARATION


#### Special Service Tools

INFOID:000000009722561

Tool number (Kent-Moore No.) Tool name	Description
<p>— (—) Model GR8-1200 NI Multitasking battery and electrical diagnostic station</p>  <p style="text-align: right; font-size: small;">AWIA1239ZZ</p>	<p>Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.</p>
<p>— (—) Model EXP-800 NI Battery and electrical diagnostic analyzer</p>  <p style="text-align: right; font-size: small;">JSMIA0806ZZ</p>	<p>Tests batteries and charging systems. For operating instructions, refer to diagnostic analyzer instruction manual.</p>

#### Commercial Service Tools

INFOID:000000009722562

Tool name	Description
<p>Power tool</p>  <p style="text-align: right; font-size: small;">PIIB1407E</p>	<p>Loosening bolts, nuts and screws</p>

# CHARGING SYSTEM PRELIMINARY INSPECTION

< PERIODIC MAINTENANCE >

## PERIODIC MAINTENANCE

### CHARGING SYSTEM PRELIMINARY INSPECTION

#### Inspection Procedure

INFOID:000000009722563

#### 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.

Unit	Power source (Power supply terminals)	Fuse No.
Alternator	Battery ("S" terminal)	38
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 [EM-17. "Checking"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair as needed.

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# POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM OPERATION INSPECTION

< PERIODIC MAINTENANCE >

## POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM OPERATION INSPECTION

### Inspection Procedure

INFOID:000000009722564

#### **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-129. "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 harness connector		IPDM E/R harness connector		Continuity
Connector	Terminal	Connector	Terminal	
F60	5	F12	76	Existed

4. Check continuity between alternator harness connector and ground.

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Alternator harness connector		Ground	Continuity
Connector	Terminal		
F60	5		Not existed

Is the inspection result normal?

YES >> Replace IPDM E/R.

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

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# ALTERNATOR

< REMOVAL AND INSTALLATION >

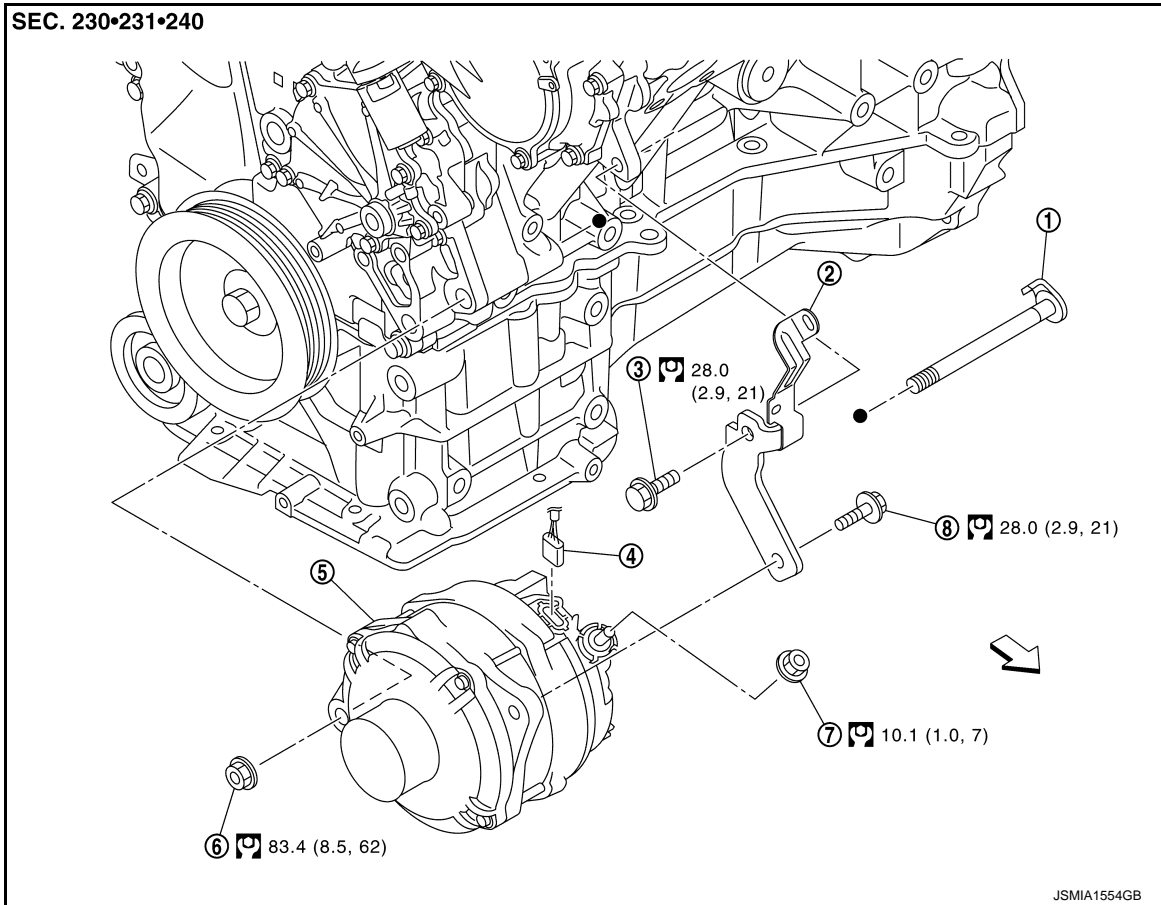
## REMOVAL AND INSTALLATION

### ALTERNATOR

Exploded View

INFOID:000000009722565

#### REMOVAL



- |                                     |                                     |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Alternator mounting bolt (lower) | 2. Alternator bracket               | 3. Alternator bracket mounting bolt |
| 4. Alternator connector             | 5. Alternator                       | 6. Alternator mounting nut (lower)  |
| 7. "B" terminal nut                 | 8. Alternator mounting bolt (upper) |                                     |

⬅ : Vehicle front

: N·m (kg-m, ft-lb)

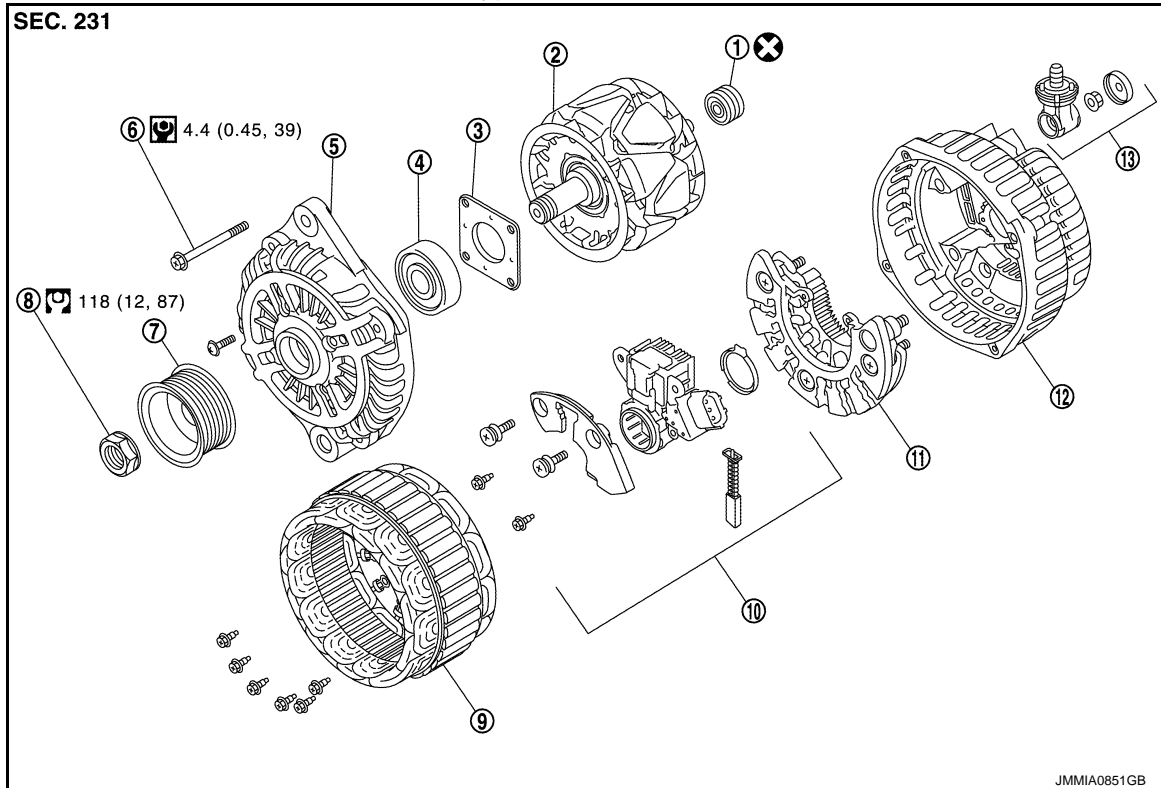
#### DISASSEMBLY



# ALTERNATOR

## < REMOVAL AND INSTALLATION >

Type: A003TJ1791



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

⊗ : Always replace after every disassembly.

⊞ : N·m (kg·m, ft·lb)

⊞ : N·m (kg·m, in·lb)

## Removal and Installation

INFOID:000000009722566

### REMOVAL

1. Disconnect the negative battery terminal.
2. Remove engine cover.
3. Remove front wheel and tire (RH).
4. Remove splash guard (RH) Refer to [EXT-26, "FENDER PROTECTOR : Exploded View"](#).
5. Remove air cleaner and air duct assembly. Refer to [EM-31, "Removal and Installation"](#).
6. Remove drive belt. Refer to [EM-17, "Removal and Installation"](#).
7. Remove A/C compressor. Refer to [HA-37, "COMPRESSOR : Removal and Installation"](#).
8. Remove idler pulley.
9. Disconnect the oil pressure switch.
10. Disconnect the alternator harness connectors.
11. Remove the alternator bolt and nuts, using power tools.
12. Slide the alternator out and remove.

### INSTALLATION

Installation is in the reverse order of removal.

**CAUTION:**

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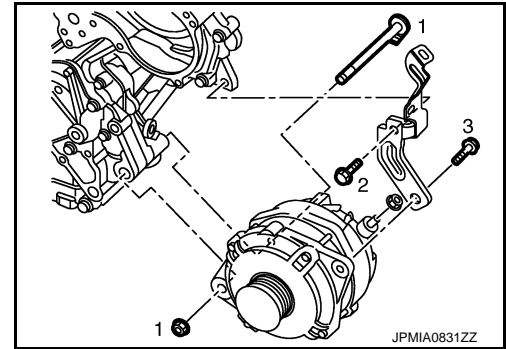
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# ALTERNATOR

## < REMOVAL AND INSTALLATION >

- Temporarily tighten all of alternator bolt and nuts. And then tighten them in numerical order shown in the figure.



- Be sure to tighten “B” terminal nut carefully.
- Install alternator and check tension of belt. Refer to [EM-30, "Exploded View"](#).
- 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-30, "Inspection Procedure"](#).

## Inspection

INFOID:000000009722567

### ALTERNATOR PULLEY INSPECTION

Perform the following.

- Make sure that alternator pulley does not rattle.
- Make sure that alternator pulley nut is tight.

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

Alternator

INFOID:000000009722568

Type		A003TJ1791
		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 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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