SECTION CHG
CHARGING SYSTEM

CONTENTS

BASIC INSPECTION

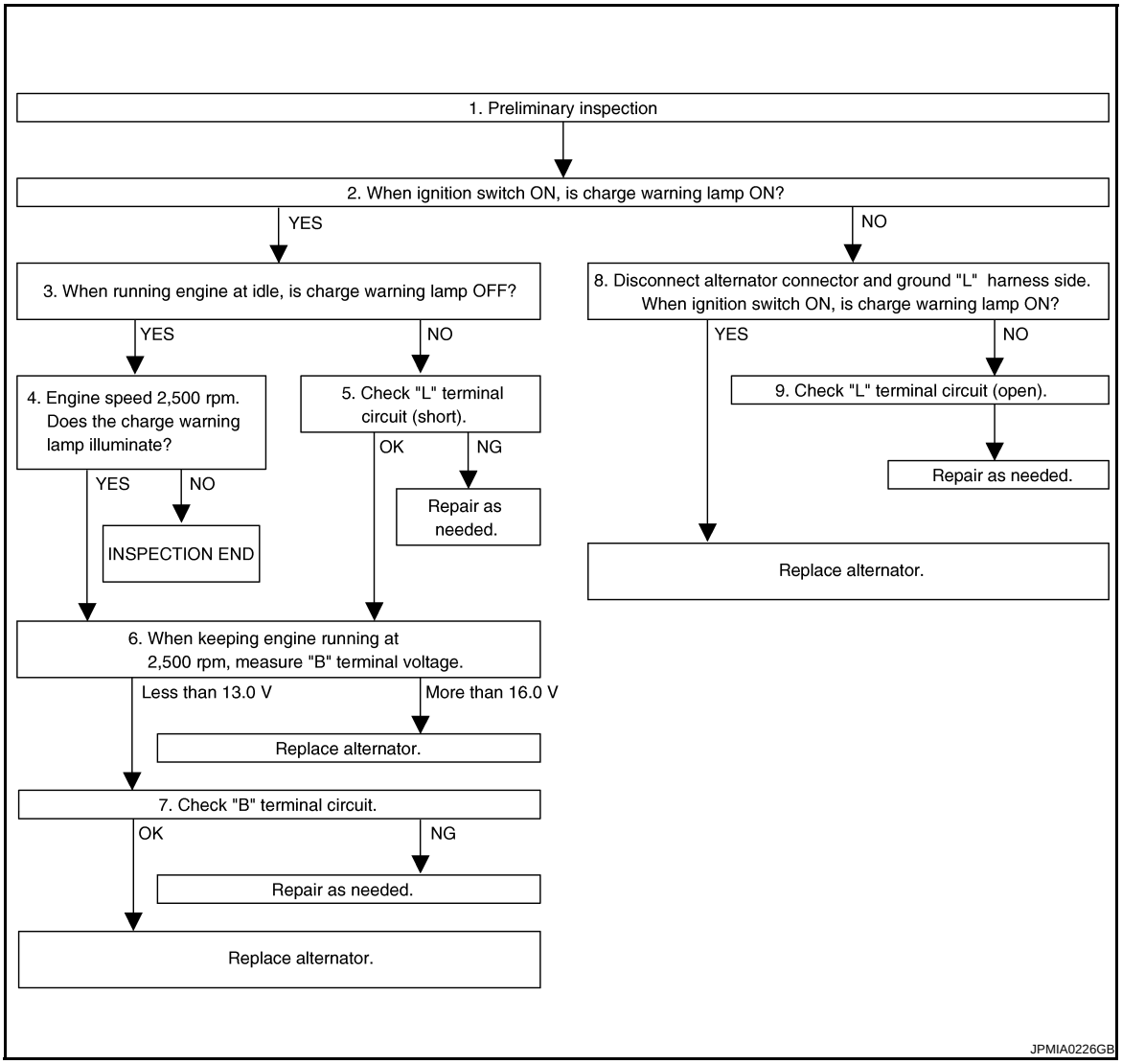
DIAGNOSIS AND REPAIR WORKFLOW

K9K MODELS

K9K MODELS : Work Flow

INFOID:0000000001191192

OVERALL SEQUENCE



DETAILED FLOW

1.PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to CHG-22, "Inspection Procedure" .

>> GO TO 2.

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

Turn the ignition switch ON.

Does the charge warning lamp illuminate?

YES >> GO TO 3.
NO >> GO TO 8.

3.INSPECTION WITH CHARGE WARNING LAMP (IDLING)

Start the engine and run it at idle.

Does the charge warning lamp turn OFF?

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

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

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

Does the charge warning lamp illuminate?

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

5. "L" TERMINAL CIRCUIT (SHORT) INSPECTION

Check "L" terminal circuit (short). Refer to CHG-13, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair as needed.

6. MEASURE "B" TERMINAL VOLTAGE

Engine start. When keeping engine running at 2,500 rpm, measure "B" terminal voltage.

What voltage does the measurement result show?

Less than 13.0 V>>GO TO 7.
More than 16.0 V>>Replace alternator.

7. "B" TERMINAL CIRCUIT INSPECTION

Check "B" terminal circuit. Refer to CHG-10, "Diagnosis Procedure" .

Is the inspection result normal?

YES >> Replace alternator.
NO >> Repair as needed.

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

1. Disconnect alternator connector and ground "L" harness side.
2. Turn the ignition switch ON.

Does the charge warning lamp illuminate?

YES >> Replace alternator.
NO >> GO TO 9.

9. CHECK "L" TERMINAL CIRCUIT (OPEN)

Check "L" terminal circuit (open). Refer to CHG-11, "Diagnosis Procedure".

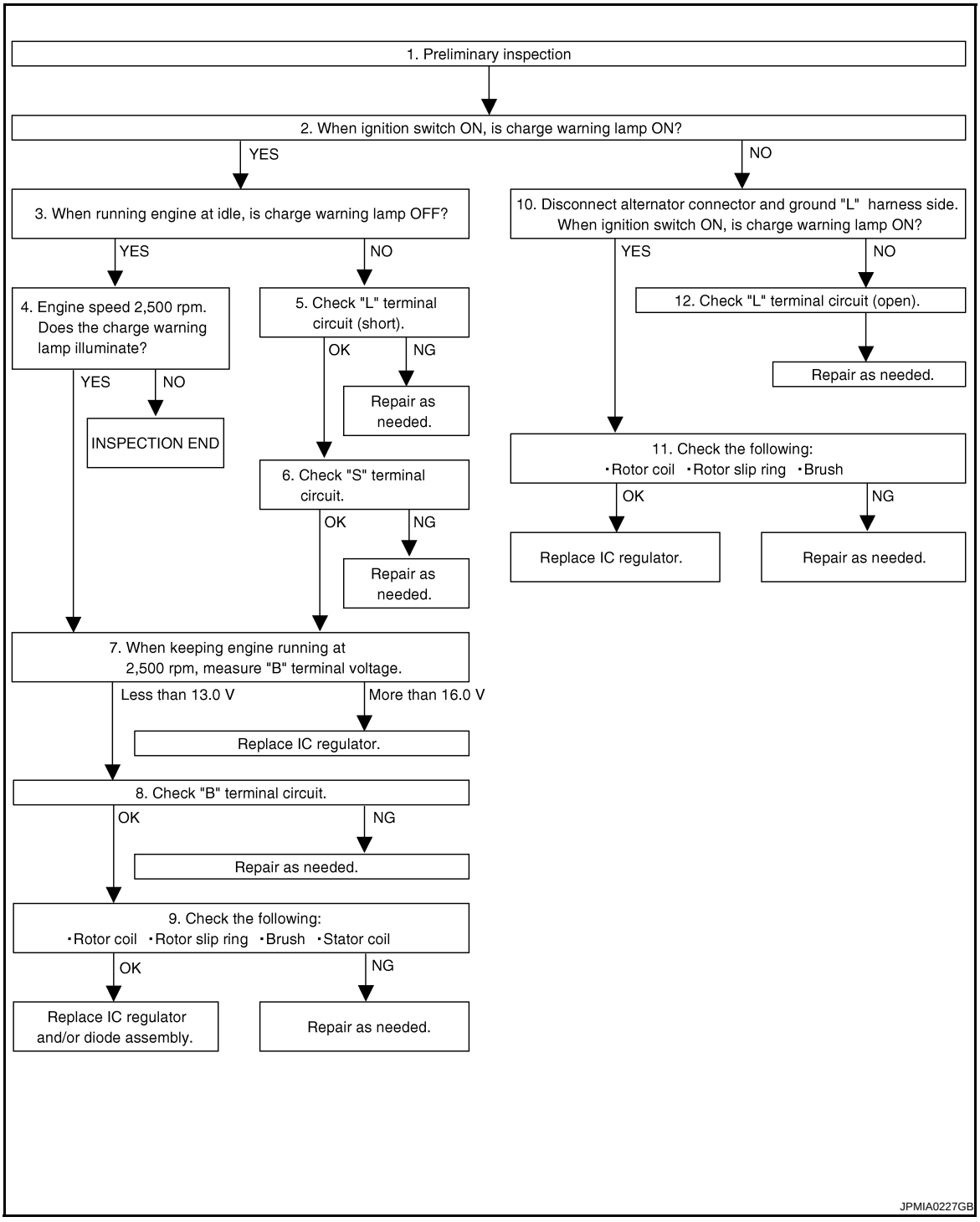
>> Repair as needed.

M9R/HR16DE/MR20DE MODELS

M9R/HR16DE/MR20DE MODELS : Work Flow

INFOID:0000000001191193

OVERALL SEQUENCE



DETAILED FLOW

1.PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to CHG-22, "Inspection Procedure" .

>> GO TO 2.

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

Turn the ignition switch ON.

Does the charge warning lamp illuminate?

YES >> GO TO 3.
NO >> GO TO 10.

3. INSPECTION WITH CHARGE WARNING LAMP (IDLING)

Start the engine and run it at idle.

Does the charge warning lamp turn OFF?

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

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

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

Does the charge warning lamp illuminate?

YES >> GO TO 7.
NO >> INSPECTION END

5. "L" TERMINAL CIRCUIT (SHORT) INSPECTION

Check "L" terminal circuit (short). Refer to CHG-13, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair as needed.

6. "S" TERMINAL CIRCUIT INSPECTION

Check "S" terminal circuit. Refer to CHG-14, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair as needed.

7. MEASURE "B" TERMINAL VOLTAGE

Start engine. When keeping engine running at 2,500 rpm, measure "B" terminal voltage.

What voltage does the measurement result show?

Less than 13.0 V>>GO TO 8.
More than 16.0 V>>Replace IC regulator.

8. "B" TERMINAL CIRCUIT INSPECTION

Check "B" terminal circuit. Refer to CHG-10, "Diagnosis Procedure" .

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair as needed.

9. DISASSEMBLE AND CHECK ALTERNATOR

Check the following conditions.

- Rotor coil
- Rotor slip ring
- Brush
- Stator coil

Refer to the following.

- M9R models: CHG-26, "M9R MODELS : Inspection"
- HR16DE models: CHG-29, "HR16DE MODELS : Inspection"
- MR20DE models: CHG-33, "MR20DE MODELS : Inspection"

Are these normal?

YES >> Replace IC regulator and/or diode assembly.
NO >> Repair as needed.

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

1. Disconnect alternator connector and ground "L" harness side.
2. Turn the ignition switch ON.

Does the charge warning lamp illuminate?

YES >> GO TO 11.
NO >> GO TO 12.

11. DISASSEMBLE AND CHECK ALTERNATOR

Check the following conditions.
- Rotor coil
- Rotor slip ring
- Brush

Refer to the following.
- M9R models: CHG-26, "M9R MODELS : Inspection"
- HR16DE models: CHG-29, "HR16DE MODELS : Inspection"
- MR20DE models: CHG-33, "MR20DE MODELS : Inspection"

Are these normal?

YES >> Replace IC regulator.
NO >> Repair as needed.

12. CHECK “L” TERMINAL CIRCUIT (OPEN)

Check “L” terminal circuit (open). Refer to CHG-11, "Diagnosis Procedure".

>> Repair as needed.

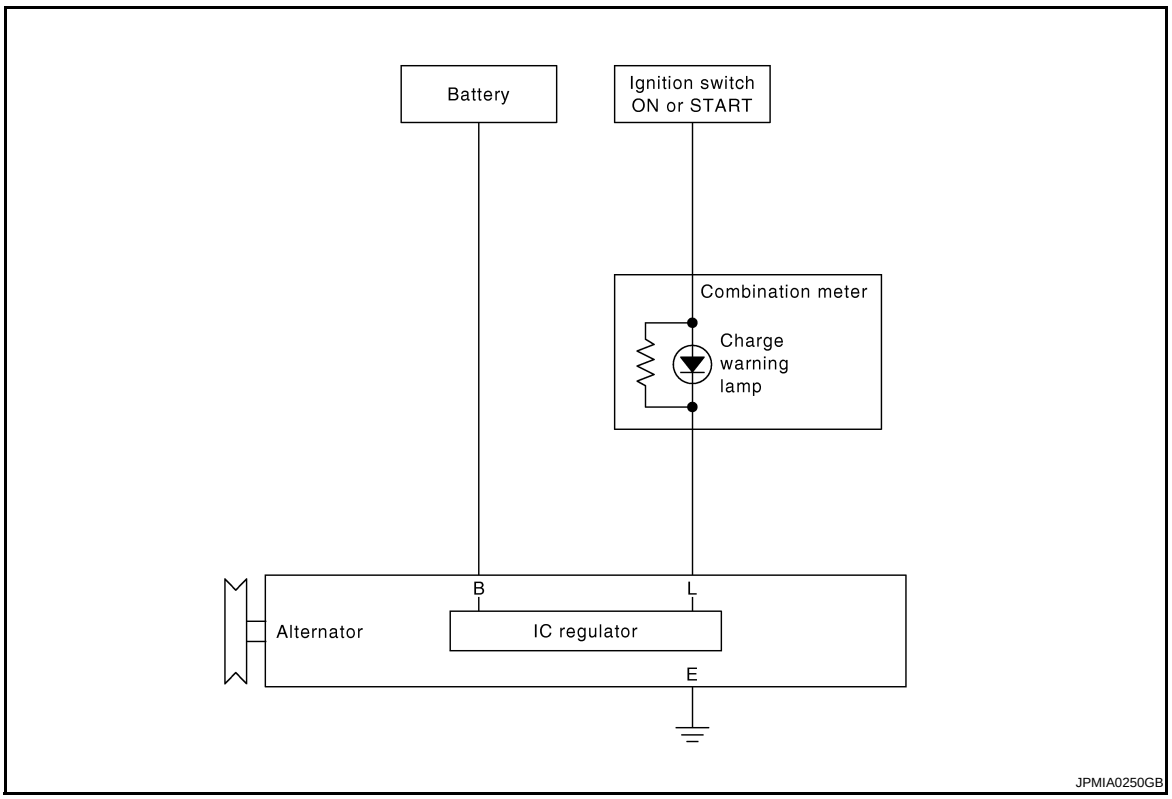
FUNCTION DIAGNOSIS

CHARGING SYSTEM

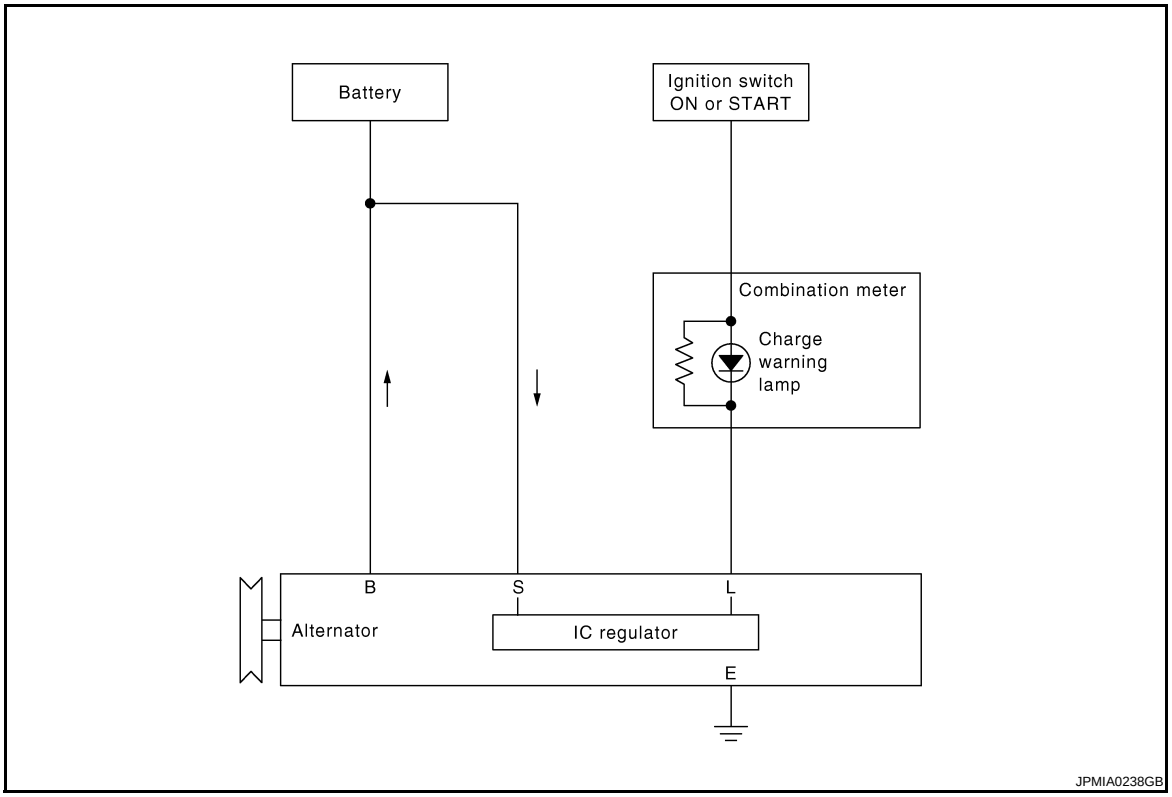
System Diagram

INFOID:0000000001191194

K9K models



M9R/HR16DE/MR20DE models



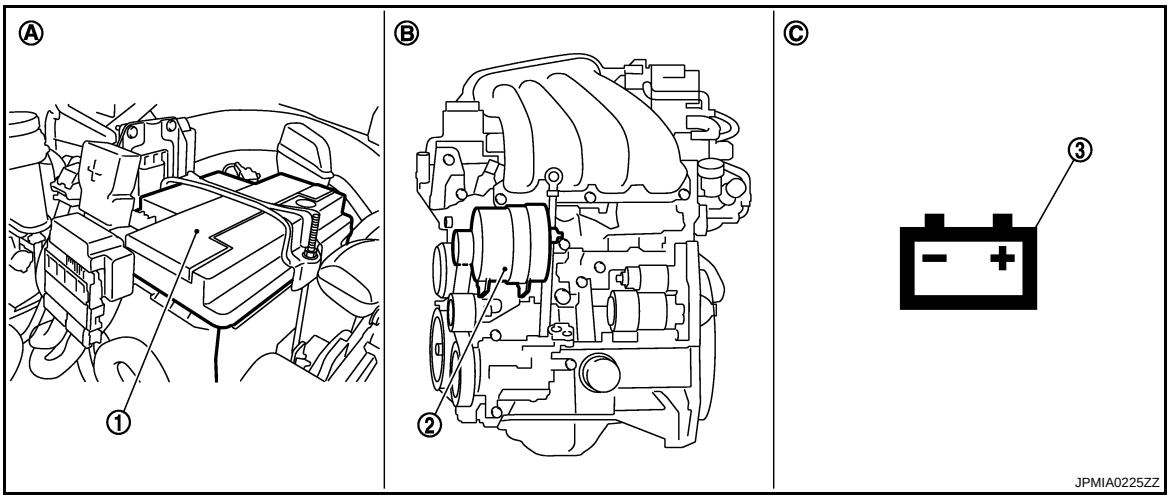
System Description

INFOID:0000000001191195

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 regulator.

Component Parts Location

INFOID:0000000001191196



1. Battery
2. Alternator
3. Charge warning lamp
A. Engine room (left side)
B. Engine
C. Combination meter

Component Description

INFOID:0000000001191197

Component part		Description
Alternator	“B” terminal	Refer to CHG-10, "Description".
	“S” terminal (M9R/HR16DE/MR20DE models only)	Refer to CHG-14, "Description".
	“L” terminal	Refer to CHG-13, "Description".
Combination meter (Charge warning lamp)		The IC regulator warning function activates to illuminate the charge warning lamp, if any of the following symptoms occur while alternator is operating: • Excessive voltage is produced. • No voltage is produced.

COMPONENT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:0000000001191198

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

Diagnosis Procedure

INFOID:0000000001191199

1.CHECK "B" TERMINAL CONNECTION

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair "B" terminal connection.

2.CHECK "B" TERMINAL CIRCUIT

Check voltage between alternator "B" terminal and ground.

Terminals			Voltage (Approx.)
(+)		(–)	
Alternator "B" terminal	Terminal		
F59 (K9K) F14 (M9R/HR16DE/MR20DE)	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	F59 (K9K) F14 (M9R/HR16DE/MR20DE)	1	Less than 0.2 V

Is the inspection result normal?

YES >> "B" terminal circuit is normal. Refer to CHG-3, "K9K MODELS : Work Flow" (K9K models) or CHG-5, "M9R/HR16DE/MR20DE MODELS : Work Flow" (M9R/HR16DE/MR20DE models).
NO >> Check harness between battery and alternator for poor continuity.

L TERMINAL CIRCUIT (OPEN)

Description

INFOID:0000000001191200

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:0000000001191201

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.

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.

- K9K models

Alternator harness connector	Terminal	Ground	Condition	
			Ignition switch position	Charge warning lamp
F60	4		ON	Illuminate

- M9R/HR16DE/MR20DE models

Alternator harness connector	Terminal	Ground	Condition	
			Ignition switch position	Charge warning lamp
F15	3		ON	Illuminate

Does it illuminate?

YES >> “L” terminal circuit is normal. Refer to CHG-3, "K9K MODELS : Work Flow" (K9K models) or CHG-5, "M9R/HR16DE/MR20DE MODELS : Work Flow" (M9R/HR16DE/MR20DE models).
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.

- K9K models

Alternator harness connector		Combination meter harness connector		Continuity
Connector No.	Terminal No.	Connector No.	Terminal No.	
F60	4	M34	25	Existed

- M9R/HR16DE/MR20DE models

Alternator harness connector		Combination meter harness connector		Continuity
Connector No.	Terminal No.	Connector No.	Terminal No.	
F15	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 M34 terminal 2 and 10A fuse [No.4, located in the fuse block(J/B)].

Does continuity exist?

YES >> GO TO 5.
NO >> Repair the harness.

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.)
(+)		(–)		
Combination meter harness connector	Terminal			
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-44, "Wiring Diagram - IGNITION POWER SUPPLY - ".

L TERMINAL CIRCUIT (SHORT)

Description

INFOID:0000000001191202

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:0000000001191203

1.CHECK “L” TERMINAL CIRCUIT (SHORT)

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

Does charge warning lamp illuminate?

YES >> GO TO 2.
NO >> Refer to CHG-3, "K9K MODELS : Work Flow" (K9K models) or CHG-5, "M9R/HR16DE/MR20DE MODELS : Work Flow" (M9R/HR16DE/MR20DE models).

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.		
M34	25		Not existed

Is the inspection result normal?

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

S TERMINAL CIRCUIT

Description

INFOID:0000000001191204

The output voltage of the alternator is controlled by the IC 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 regulator.

Diagnosis Procedure

INFOID:0000000001191205

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.

2.CHECK “S” TERMINAL CIRCUIT

Check voltage between alternator harness connector and ground.

Terminals			Voltage (Approx.)
(+)		(–)	
Alternator harness connector	Terminal		
F15	4	Ground	Battery voltage

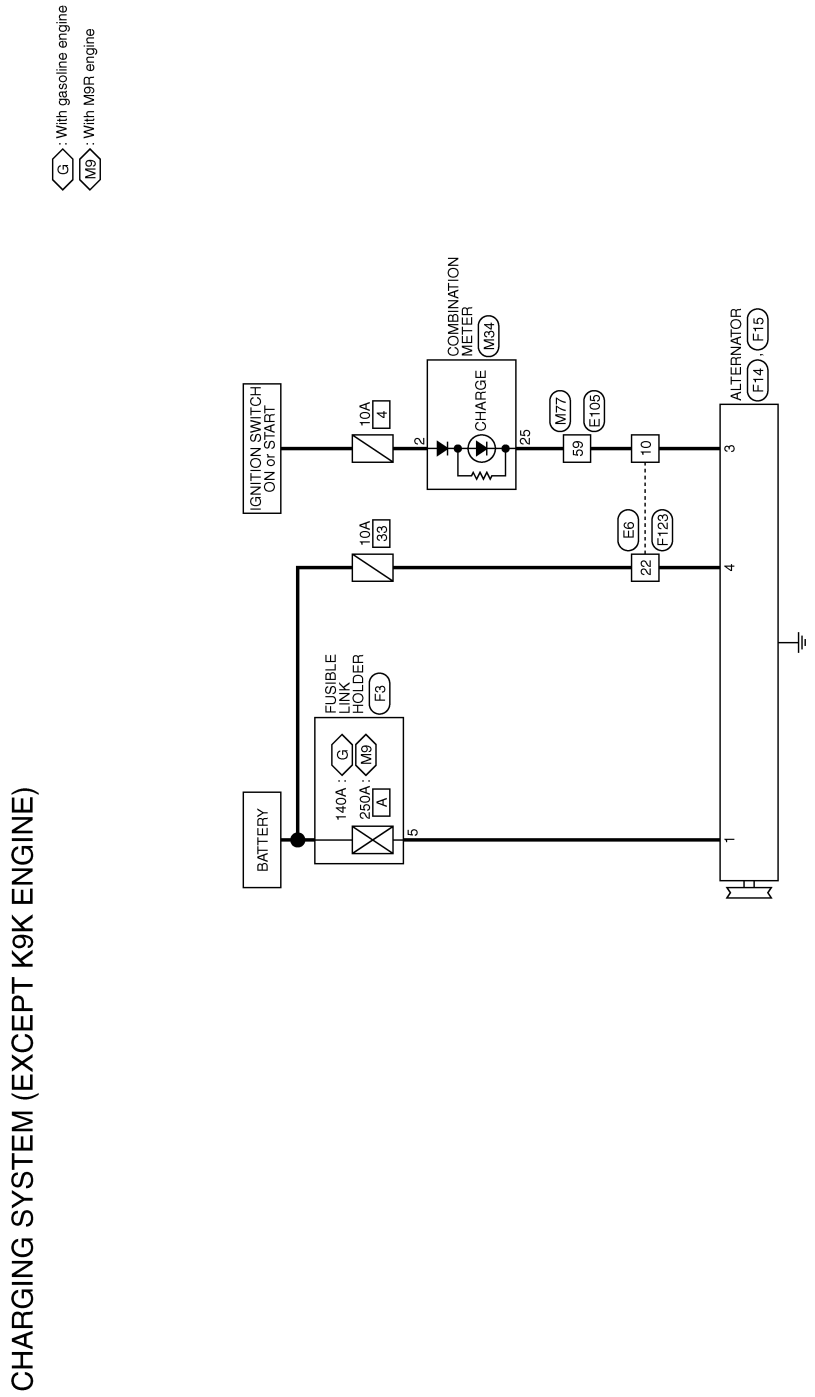
Is the inspection result normal?

YES >> Refer to CHG-5, "M9R/HR16DE/MR20DE MODELS : Work Flow" .
NO >> Check harness for open between alternator and fuse.

CHARGING SYSTEM

Wiring Diagram - CHARGING SYSTEM (EXCEPT K9K ENGINE MODELS) -

INFOID:0000000001191206



CHARGING SYSTEM (EXCEPT K9K ENGINE)

Connector No.	E6
Connector Name	WIRE TO WIRE
Connector Type	TK24MW-1V

H.S.

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24

Terminal No.	Color of Wire	Signal Name [Specification]
10	L	–
22	Y/R	–

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH60MW-NS16-TM4

H.S.

1	6
2	7
3	8
4	9
5	10

71	76
72	77
73	78
74	79
75	80

Terminal No.	Color of Wire	Signal Name [Specification]
59	L	–

Connector No.	F3
Connector Name	FUSIBLE LINK HOLDER
Connector Type	24340 79906

H.S.

5

Terminal No.	Color of Wire	Signal Name [Specification]
5	B/Y	–

Connector No.	F14
Connector Name	ALTERNATOR
Connector Type	–

H.S.

1

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

Connector No.	F15
Connector Name	ALTERNATOR
Connector Type	HS03FB

H.S.

5 4 3

Terminal No.	Color of Wire	Signal Name [Specification]
3	L	L
4	Y/R	S

Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK24FW-1V

H.S.

11	10	9	8	7	6	5	4	3	2	1
24	23	22	21	20	19	18	17	16	15	14	13	12

Terminal No.	Color of Wire	Signal Name [Specification]
10	L	–
22	Y/R	–

Connector No.	M34
Connector Name	COMBINATION METER
Connector Type	SAB40FW

H.S.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

Terminal No.	Color of Wire	Signal Name [Specification]
2	GR	IGN
25	L	ALTERNATOR

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH60FW-NS16-TM4

H.S.

71	76
72	77
73	78
74	79
75	80

Terminal No.	Color of Wire	Signal Name [Specification]
59	L	–

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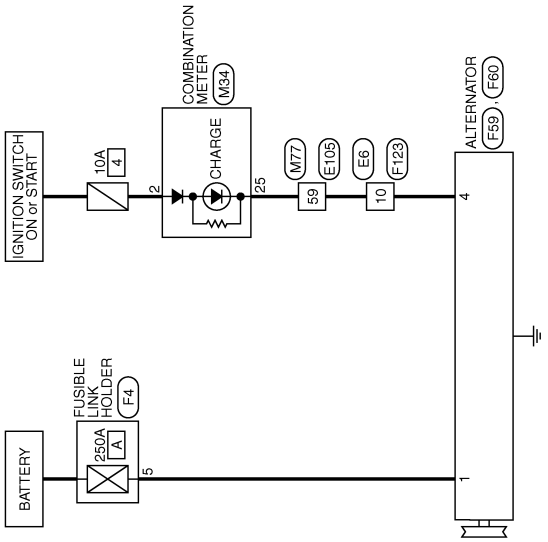
Wiring Diagram - CHARGING SYSTEM (K9K ENGINE MODELS) -

INFOID:0000000001191207

CHARGING SYSTEM (WITH K9K ENGINE)



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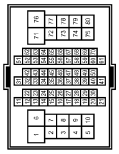
CHARGING SYSTEM (WITH K9K ENGINE)

Connector No.	E6
Connector Name	WIRE TO WIRE
Connector Type	TK24MW-1V

Terminal No.	Color of Wire	Signal Name [Specification]
10	L	–

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-NS16-TM4



Terminal No.	Color of Wire	Signal Name [Specification]
59	L	–

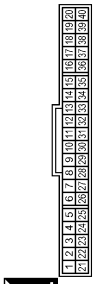
Connector No.	F4
Connector Name	FUSIBLE LINK HOLDER
Connector Type	24348 51E09

Terminal No.	Color of Wire	Signal Name [Specification]
5	B/Y	–

Connector No.	F59
Connector Name	ALTERNATOR
Connector Type	–

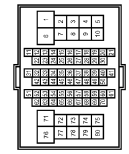
Terminal No.	Color of Wire	Signal Name [Specification]
1	B/Y	B

Connector No.	M34
Connector Name	COMBINATION METER
Connector Type	SAB40FW



Terminal No.	Color of Wire	Signal Name [Specification]
2	GR	IGN
25	L	ALTERNATOR

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-NS16-TM4



Terminal No.	Color of Wire	Signal Name [Specification]
59	L	–

Connector No.	F60
Connector Name	ALTERNATOR
Connector Type	FEA02FB

Terminal No.	Color of Wire	Signal Name [Specification]
4	L	L

Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK24FW-1V

Terminal No.	Color of Wire	Signal Name [Specification]
10	L	–

JCMWA0684GB

SYMPTOM DIAGNOSIS

CHARGING SYSTEM

Symptom Table

INFOID:0000000001191208

Symptom	Reference
Discharged battery	Refer to CHG-3, "K9K MODELS : Work Flow" (K9K models) or CHG-5, "M9R/HR16DE/MR20DE MODELS : Work Flow" (M9R/HR16DE/MR20DE models).
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 charge warning lamp turns ON when increasing the engine speed.	

PRECAUTION

PRECAUTIONS

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

INFOID:0000000001583064

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 AIRBAG” and “SEAT BELT” of this Service Manual.

WARNING:

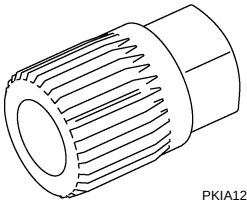
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal 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 AIRBAG”.**
- **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.**

PREPARATION

PREPARATION

Special Service Tools

INFOID:0000000001191210

Tool number Tool name	Description
KV10118200 (included in the adapter kit: Mot. 1732) Alternator pulley adapter  PKIA1241E	Removing and installing alternator pulley

ON-VEHICLE MAINTENANCE

CHARGING SYSTEM PRELIMINARY INSPECTION

Inspection Procedure

INFOID:0000000001191211

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.

- K9K models

Unit	Power source (Power supply terminals)	Fuse No.
Combination meter	Ignition switch ON (“L” terminal)	4

- M9R/HR16DE/MR20DE models

Unit	Power source (Power supply terminals)	Fuse No.
Alternator	Battery (“S” terminal)	33
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.

- K9K models: EM-260, "Inspection and Adjustment"
- M9R models: EM-348, "Checking"
- HR16DE models: EM-16, "Checking"
- MR20DE models: EM-135, "Checking"

Is the inspection result normal?

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

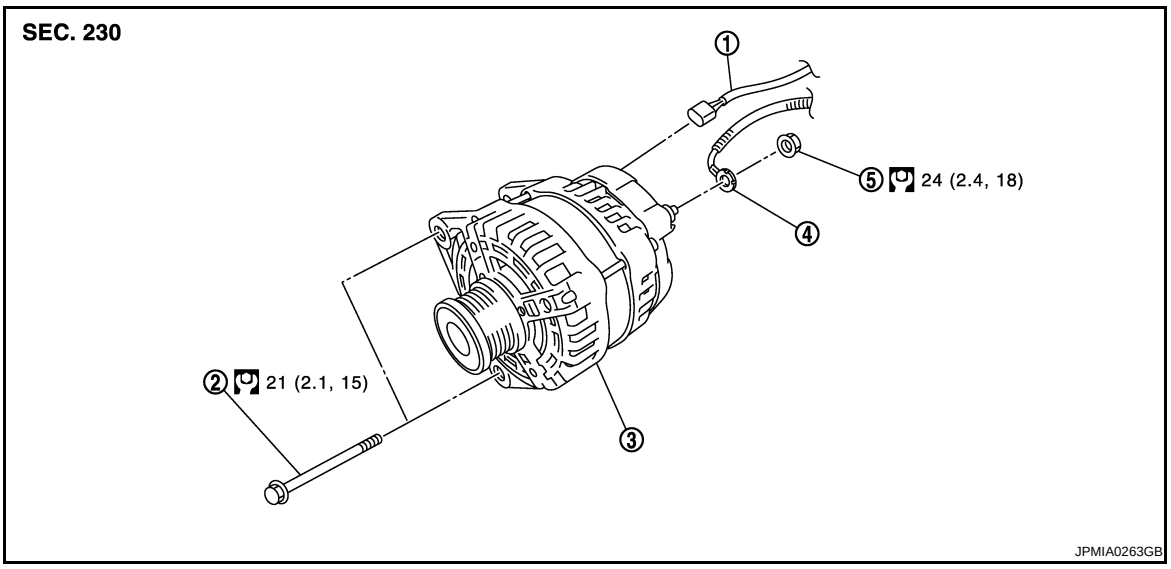
ON-VEHICLE REPAIR

ALTERNATOR

K9K MODELS

K9K MODELS : Exploded View

INFOID:0000000001191212



1. Alternator connector
2. Alternator mounting bolt
3. Alternator
4. “B” terminal harness
5. “B” terminal nut

Refer to GI-4, "Components" for symbols in the figure.

K9K MODELS : Removal and Installation

INFOID:0000000001191213

REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove RH fender protector partially.
3. Remove fuel injection pipe protector.
4. Remove drive belt. Refer to EM-260, "Removal and Installation".
5. Disconnect alternator connector.
6. Remove “B” terminal nut and “B” terminal harness.
7. Remove upper alternator mounting bolt.
8. Release lower alternator mounting bolt, then push it aside.
9. Remove alternator with lower mounting bolt.
   NOTE:
   Pull alternator to the front side from upside. Turn, then pull lower side of alternator with lower mounting bolt.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Be sure to tighten “B” terminal nut carefully.

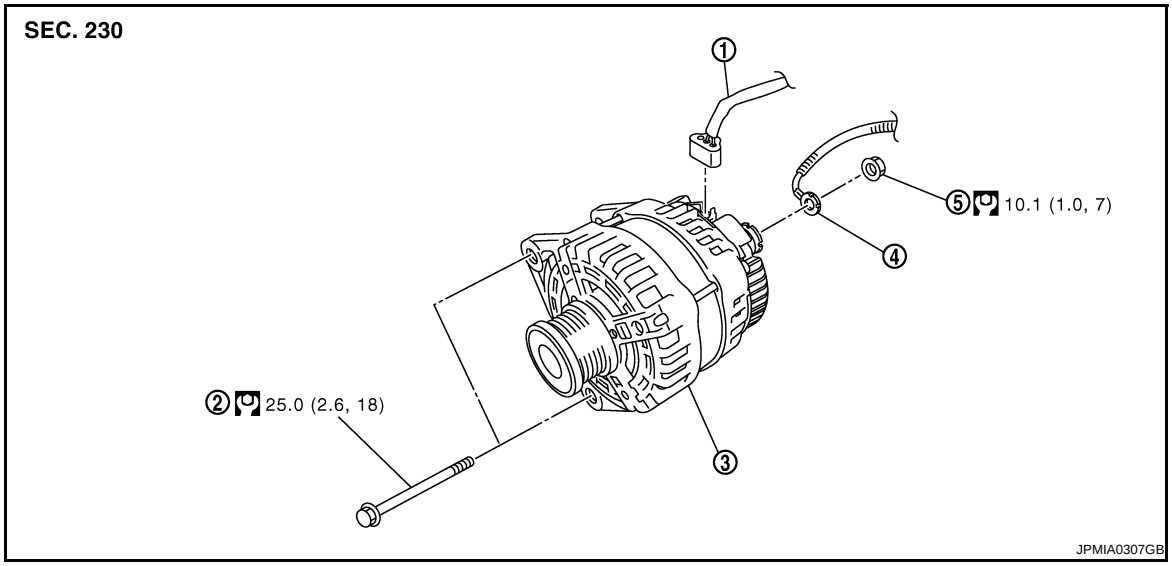
- Install alternator, and check tension of belt. Refer to EM-260, "Inspection and Adjustment".

M9R MODELS

M9R MODELS : Exploded View

INFOID:0000000001349268

REMOVAL

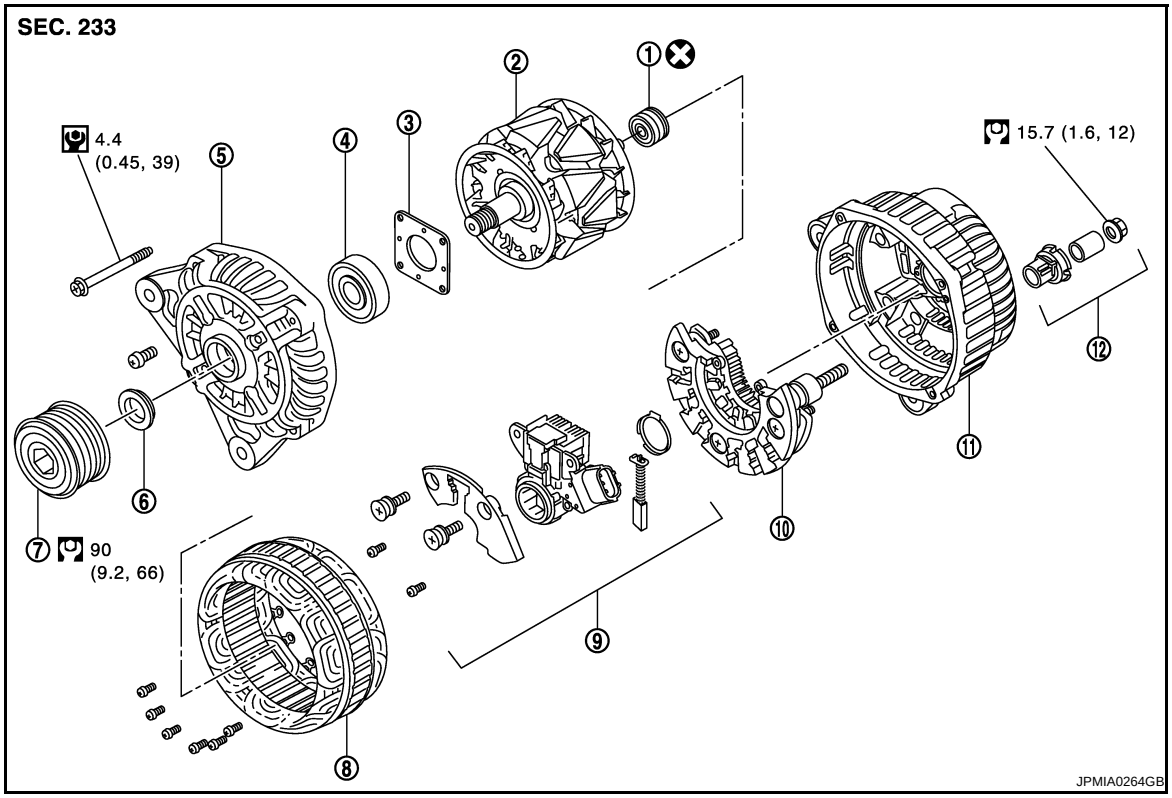


1. Alternator connector
2. Alternator mounting bolt
3. Alternator
4. “B” terminal harness
5. “B” terminal nut

Refer to GI-4, "Components" for symbols in the figure.

DISASSEMBLY

Type: A3TJ2481ZE



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

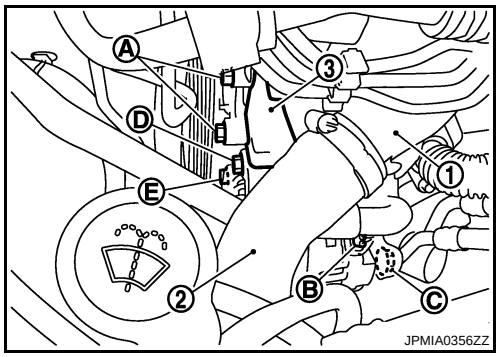
Refer to GI-4, "Components" for symbols in the figure.

M9R MODELS : Removal and Installation

INFOID:0000000001349269

REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove engine cover. Refer to EM-356, "Exploded View".
3. Remove RH fender protector partially.
4. Remove drive belt. Refer to EM-348, "Exploded View".
5. Remove air duct (inlet). Refer to EM-354, "Exploded View".
6. Remove cooling fan assembly and radiator mounting brackets. Refer to CO-75, "Exploded View".
7. Remove air inlet tube (1). Refer to EM-357, "Exploded View".
8. Get air inlet hose (2) out of alternator removal area.
9. Remove bracket mounting bolts (A), and reservoir tank hose bracket (3).
10. Disconnect alternator connector (B).
11. Remove “B” terminal nut (C) and “B” terminal harness.
12. Remove upper alternator mounting bolt (D).
13. Completely loosen lower alternator mounting bolt (E), and pull it out until the bolt head is in contact with the side member. And then, remove the alternator by pulling it forward.
    NOTE:
    The alternator can be removed together with the bolts by pulling it forward and using the alternator bracket bolt hole cutout.
14. Remove alternator upward from the vehicle.



JPMIA0356ZZ

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Be sure to tighten “B” terminal nut carefully.

- Temporarily tighten the alternator bolts in order from the lower to the upper, and then tighten them in order from the upper to the lower.
  CAUTION:
  For the alternator, the front side (pulley side) surface is the reference surface. Fit the reference surface to the alternator mounting part, and then tighten the bolts.
- Install alternator, and check tension of belt. Refer to EM-348, "Exploded View".

M9R MODELS : Disassembly and Assembly

INFOID:0000000001349270

DISASSEMBLY

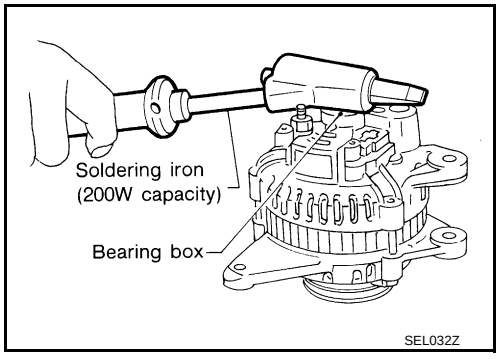
Rear Cover

NOTE:

Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. To facilitate removal of rear cover, heat only the bearing box section until the temperature increases to approximately 30°C (86°F) with a soldering iron (200W capacity).

CAUTION:

Never use a heat gun, as if can damage diode assembly.



SEL032Z

ASSEMBLY

Rear Bearing

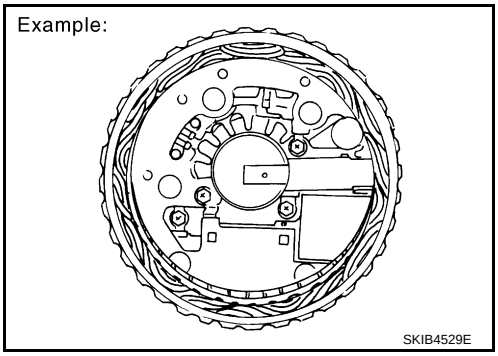
CAUTION:

- **Never reuse rear bearing. Replace with a new one.**

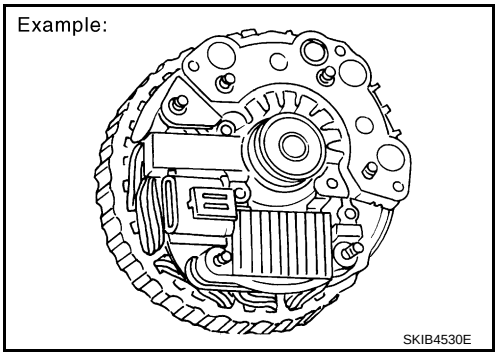
- **Never lubricate rear bearing outer race.**

Rear Cover Installation

1. Fit brush assembly, diode assembly, regulator assembly and stator.



2. Push brushed up with fingers and install them to rotor.
   NOTE:
   Take care not damage slip ring sliding surface.



M9R MODELS : Inspection

INFOID:0000000001349271

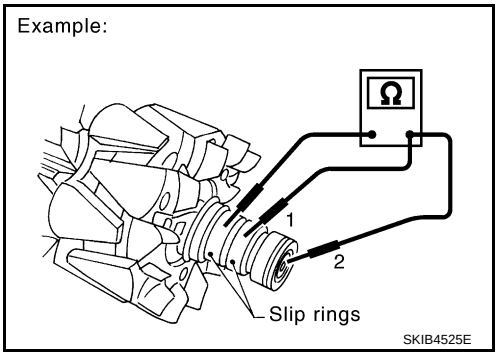
INSPECTION AFTER DISASSEMBLY

Rotor Check

1. Resistance test

Resistance	**Refer to SDS CHG-35, "Alternator".**

   - Replace the rotor if the measurement value is outside of the specified range.
2. Insulator test
   - Replace the rotor if continuity exists.
3. Check slip ring for wear.

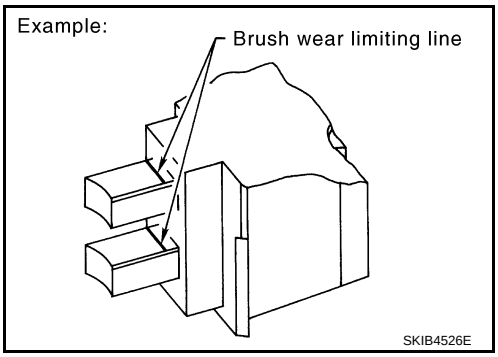


Slip ring minimum outer diameter	**: Refer to SDS CHG-35, "Alternator".**

   - Replace the rotor if the measurement value is outside of the specified range.

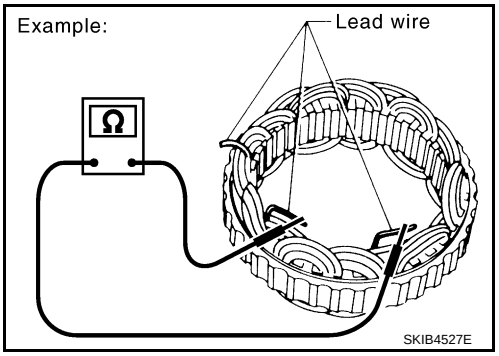
Brush Check

1. Check smooth movement of brush.
   - Check brush holder and clean if it is not smooth.
2. Check brush for wear.
   - Replace brush if it is worn down to the limit line.

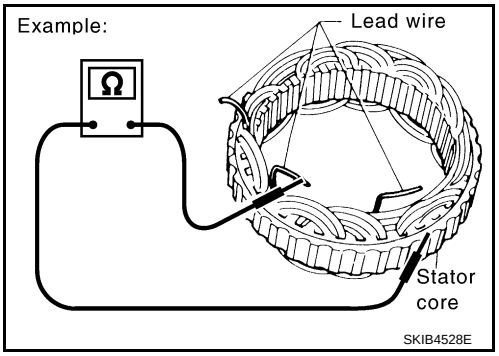


Stator Check

1. Continuity test
   - Replace the stator if continuity does not exist.



2. Ground test
   - Replace the stator if continuity exists.

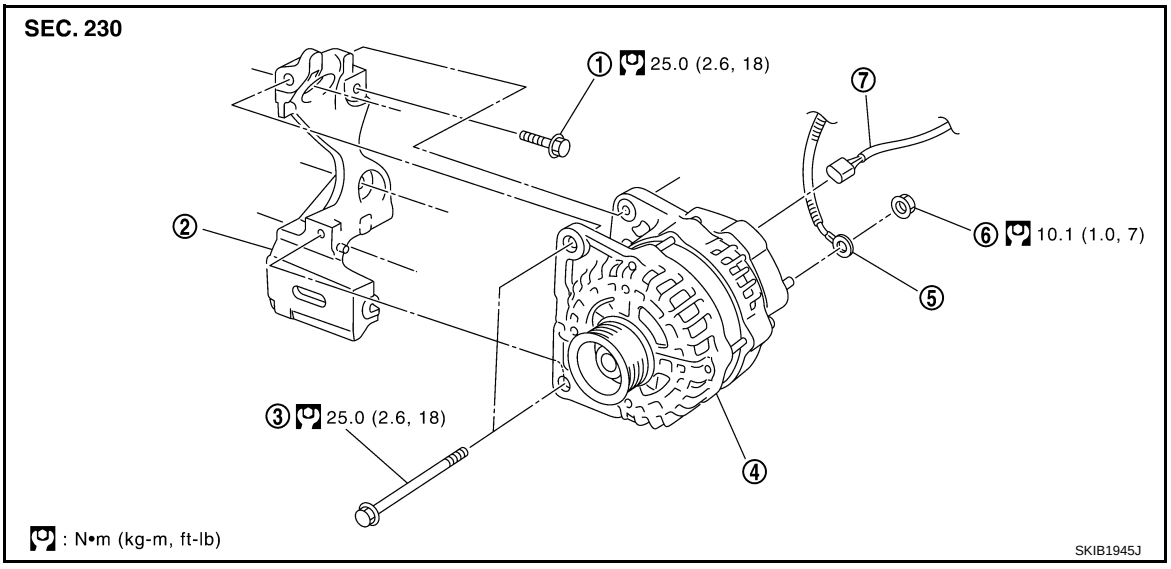


HR16DE MODELS

HR16DE MODELS : Exploded View

INFOID:0000000001191214

REMOVAL

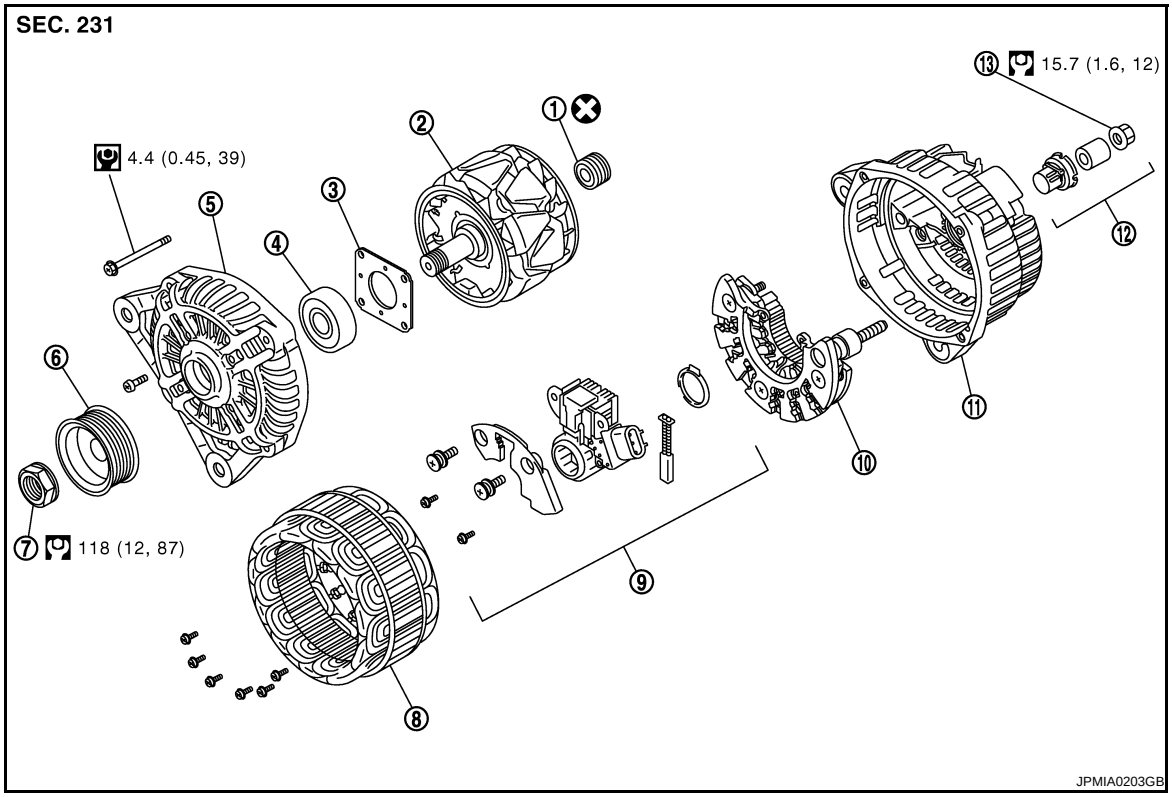


1. Alternator bracket mounting bolt
2. Alternator bracket
3. Alternator mounting bolt
4. Alternator
5. “B” terminal harness
6. “B” terminal nut
7. Alternator connector

Refer to GI-4, "Components" for symbols in the figure.

DISASSEMBLY

Type: A2TJ0291ZE



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

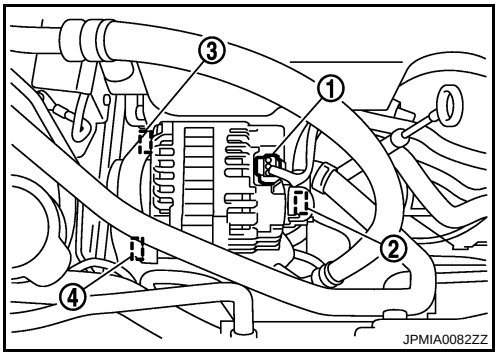
Refer to GI-4, "Components" for symbols in the figure.

HR16DE MODELS : Removal and Installation

INFOID:0000000001191215

REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove drive belt. Refer to EM-17, "Removal and Installation".
3. Disconnect alternator connector (1).
4. Remove “B” terminal nut (2) and “B” terminal harness.
5. Remove upper alternator mounting bolt (3) and alternator lower mounting bolt (4).
6. Remove alternator upward from the vehicle.



INSTALLATION

Install in the reverse order of removal.

CAUTION:

Be sure to tighten “B” terminal nut carefully.

- Temporarily tighten the alternator bolts in order from the lower to the upper, and then tighten them in order from the upper to the lower.

CAUTION:

For the alternator, the front side (pulley side) surface is the reference surface. Fit the reference surface to the alternator mounting part, and then tighten the bolts.

- Install alternator, and check tension of belt. Refer to EM-16, "Checking".

HR16DE MODELS : Disassembly and Assembly

INFOID:0000000001191216

DISASSEMBLY

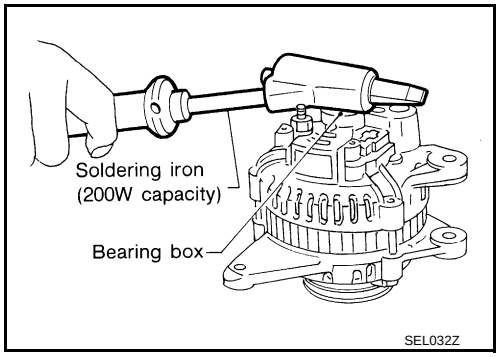
Rear Cover

NOTE:

Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. To facilitate removal of rear cover, heat only the bearing box section until the temperature increases to approximately 30°C (86°F) with a soldering iron (200W capacity).

CAUTION:

Never use a heat gun, as if can damage diode assembly.



ASSEMBLY

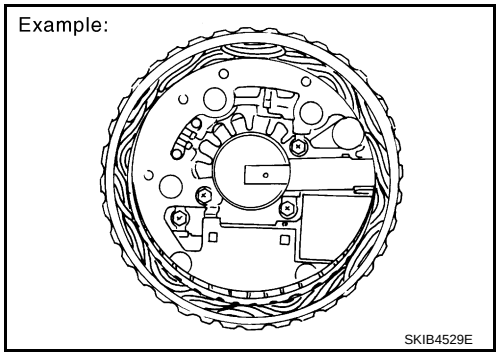
Rear Bearing

CAUTION:

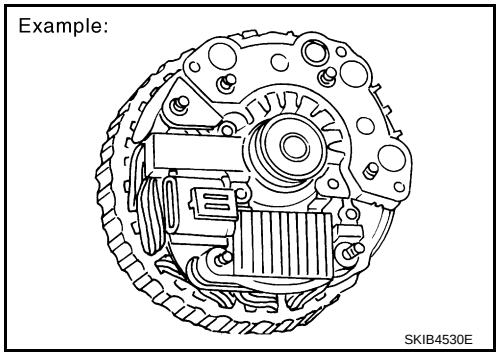
- **Never reuse rear bearing. Replace with a new one.**
- **Never lubricate rear bearing outer race.**

Rear Cover Installation

1. Fit brush assembly, diode assembly, regulator assembly and stator.



2. Push brushed up with fingers and install them to rotor.
   NOTE:
   Take care not damage slip ring sliding surface.



HR16DE MODELS : Inspection

INFOID:0000000001191217

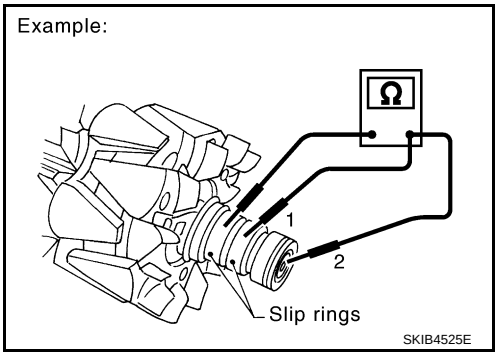
INSPECTION AFTER DISASSEMBLY

Rotor Check

1. Resistance test

Resistance	**Refer to SDS CHG-35, "Alternator".**

- Replace the rotor if the measurement value is outside of the specified range.



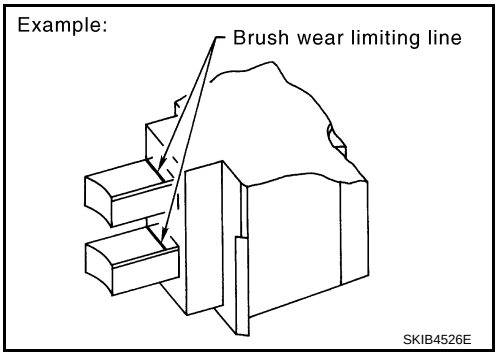
2. Insulator test
   - Replace the rotor if continuity exists.
3. Check slip ring for wear.

Slip ring minimum outer diameter	**: Refer to SDS CHG-35, "Alternator".**

- Replace the rotor if the measurement value is outside of the specified range.

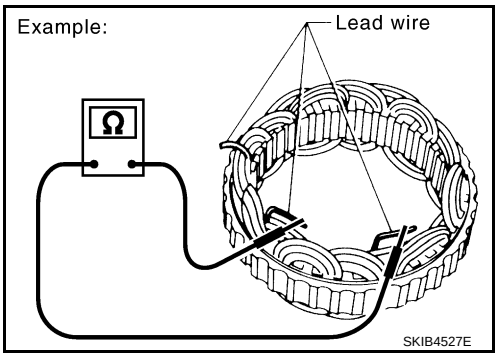
Brush Check

1. Check smooth movement of brush.
   - Check brush holder and clean if it is not smooth.
2. Check brush for wear.
   - Replace brush if it is worn down to the limit line.

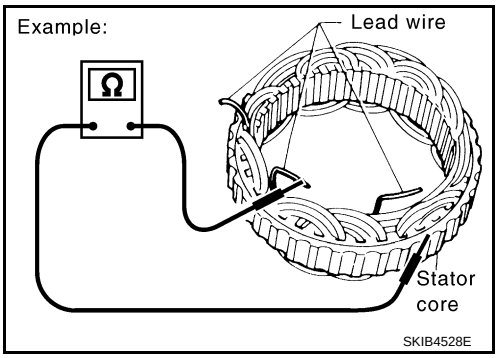


Stator Check

1. Continuity test
   - Replace the stator if continuity does not exist.



2. Ground test
   - Replace the stator if continuity exists.

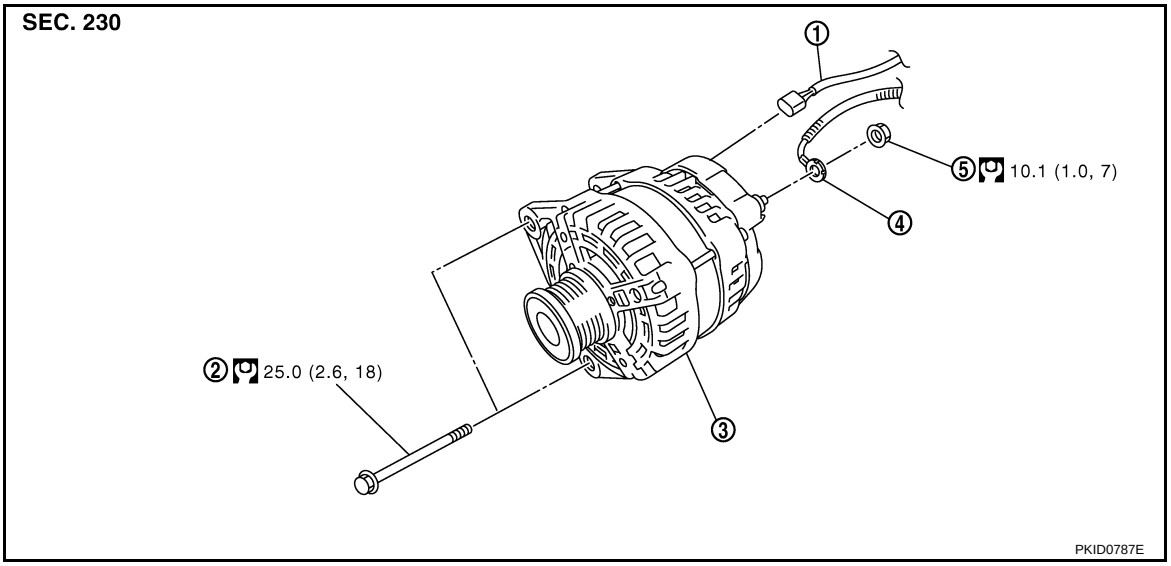


MR20DE MODELS

MR20DE MODELS : Exploded View

INFOID:0000000001191218

REMOVAL

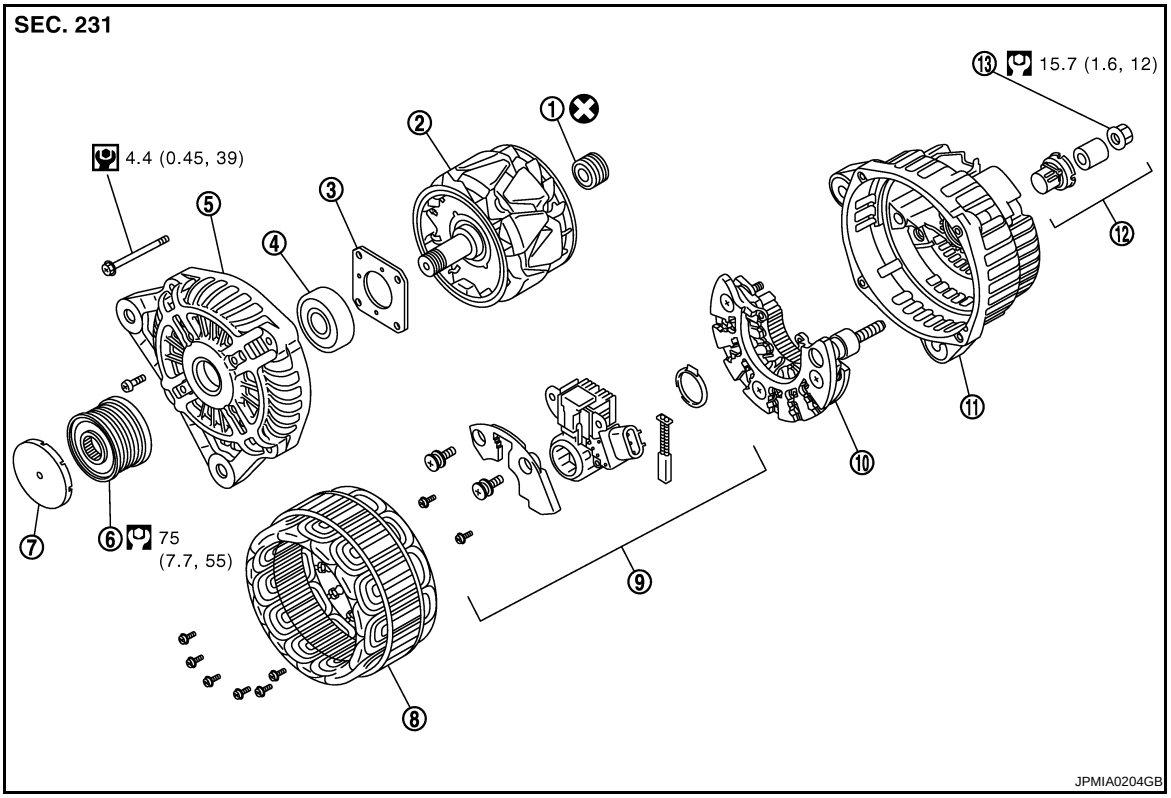


1. Alternator connector
2. Alternator mounting bolt
3. Alternator
4. “B” terminal harness
5. “B” terminal nut

Refer to GI-4, "Components" for symbols in the figure.

DISASSEMBLY

Type: A2TJ0281ZE



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

13. “B” terminal nut

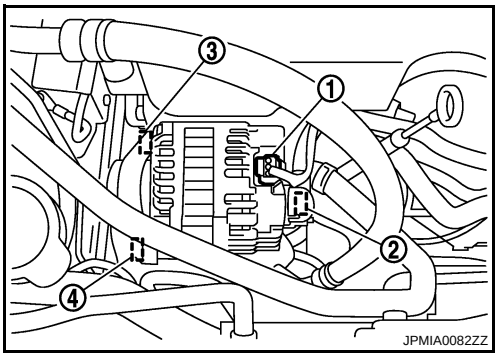
Refer to GI-4, "Components" for symbols in the figure.

MR20DE MODELS : Removal and Installation

INFOID:0000000001191219

REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove drive belt. Refer to EM-135, "Removal and Installation".
3. Disconnect alternator connector (1).
4. Remove “B” terminal nut (2) and “B” terminal harness.
5. Remove upper alternator mounting bolt (3).
6. Completely loosen lower alternator mounting bolt (4), and pull it out until the bolt head is in contact with the side member. And then, remove the alternator by pulling it forward.
   NOTE:
   The alternator can be removed together with the bolts by pulling it forward and using the alternator bracket bolt hole cutout.
7. Remove alternator upward from the vehicle.



INSTALLATION

Install in the reverse order of removal.

CAUTION:

Be sure to tighten “B” terminal nut carefully.

- Temporarily tighten the alternator bolts in order from the lower to the upper, and then tighten them in order from the upper to the lower.
  CAUTION:
  For the alternator, the front side (pulley side) surface is the reference surface. Fit the reference surface to the alternator mounting part, and then tighten the bolts.
- Install alternator, and check tension of belt. Refer to EM-135, "Checking".

MR20DE MODELS : Disassembly and Assembly

INFOID:0000000001191220

DISASSEMBLY

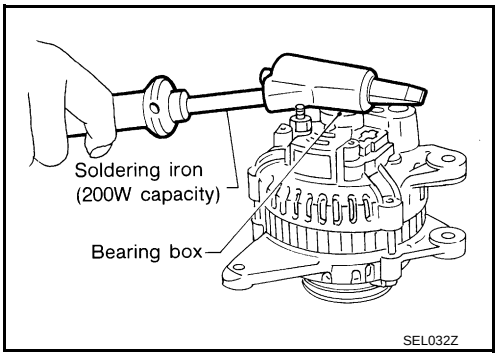
Rear Cover

NOTE:

Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. To facilitate removal of rear cover, heat only the bearing box section until the temperature increases to approximately 30°C (86°F) with a soldering iron (200W capacity).

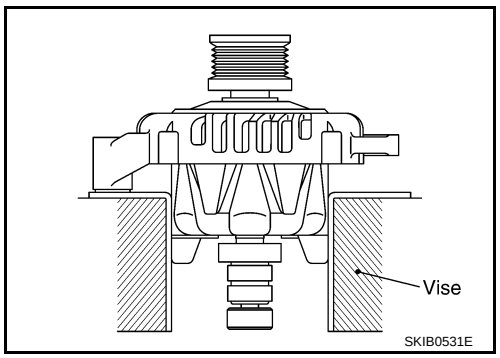
CAUTION:

Never use a heat gun, as if can damage diode assembly.

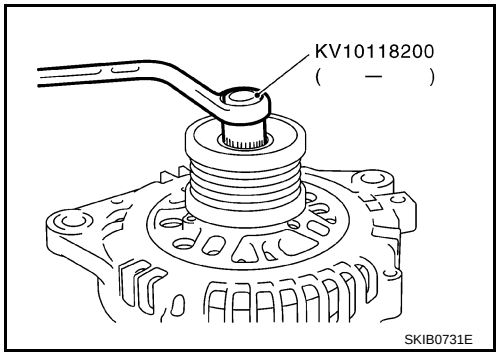


Front Cover

1. Set rotor to the vise.
   CAUTION:
   - **Be careful not to damage the rotor.**
   - **Use copper plate or thick cloth for rotor in the vise.**
2. Remove pulley cap, using suitable tool.



3. Remove alternator pulley, using alternator pulley adaptor [SST].



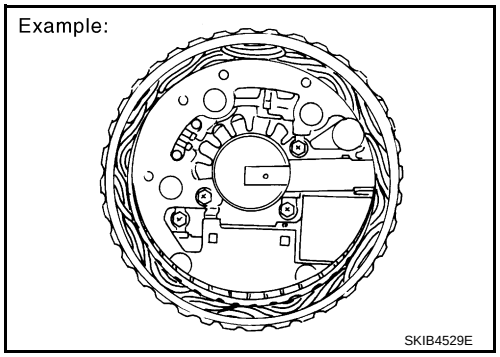
ASSEMBLY

Rear Bearing

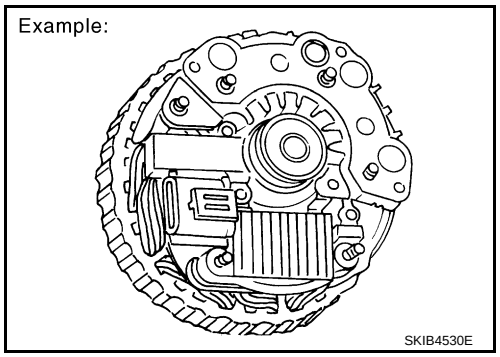
CAUTION:
- **Never reuse rear bearing. Replace with a new one.**
- **Never lubricate rear bearing outer race.**

Rear Cover Installation

1. Fit brush assembly, diode assembly, regulator assembly and stator.



2. Push brushed up with fingers and install them to rotor.
   NOTE:
   Take care not damage slip ring sliding surface.



MR20DE MODELS : Inspection

INFOID:0000000001191221

INSPECTION AFTER DISASSEMBLY

Rotor Check

1. Resistance test

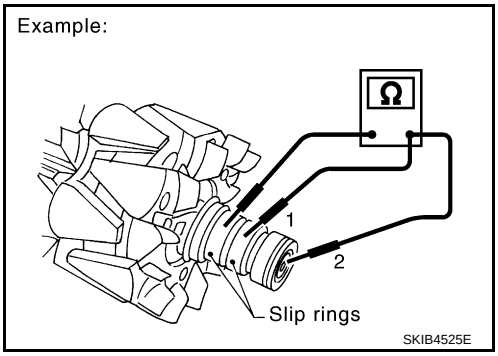
Resistance	**Refer to SDS CHG-35, "Alternator".**

- Replace the rotor if the measurement value is outside of the specified range.

2. Insulator test
   - Replace the rotor if continuity exists.
3. Check slip ring for wear.

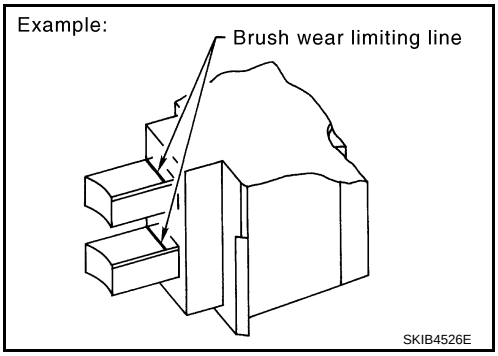
Slip ring minimum outer diameter	**: Refer to SDS CHG-35, "Alternator".**

- Replace the rotor if the measurement value is outside of the specified range.



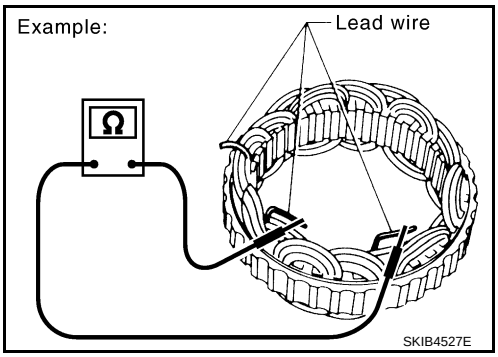
Brush Check

1. Check smooth movement of brush.
   - Check brush holder and clean if it is not smooth.
2. Check brush for wear.
   - Replace brush if it is worn down to the limit line.

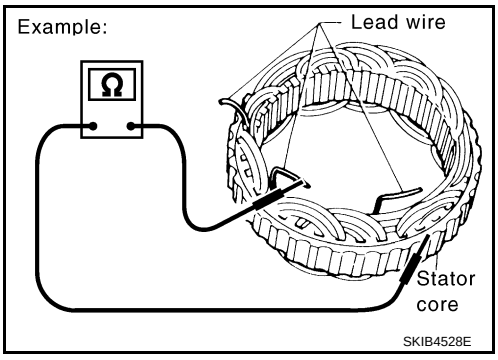


Stator Check

1. Continuity test
   - Replace the stator if continuity does not exist.



2. Ground test
   - Replace the stator if continuity exists.



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Alternator

INFOID:0000000001191222

Applied model		K9K	M9R	HR16DE	MR20DE
Type		0 124 525 082	A3TJ2481ZE	A2TJ0291ZE	A2TJ0281ZE
		BOSCH make	MITSUBISHI make		
Nominal rating	[V - A]	—	12 - 150	12 - 120	
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 122/2,500 More than 144/5,000	More than 27/1,300 More than 95/2,500 More than 116/5,000	
Regulated output voltage	[V]	—	14.1 - 14.7		
Minimum length of brush	[mm (in)]	—	More than 5.00 (0.197)		
Brush spring pressure	[N (g, oz)]	—	4.1 - 5.3 (418 - 541, 14.7 - 19.1)		
Slip ring minimum outer diameter	[mm (in)]	—	More than 22.1 (0.870)		
Rotor (Field coil) resistance	[Ω]	—	1.7 - 2.0	1.7 - 2.2	