# STARTING & CHARGING SYSTEM

# SECTION SC



## CONTENTS

## Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NISC0001

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL B15 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), front seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), side air bag (satellite) sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** 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 should be performed by an authorized NISSAN 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 RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses (except “SEAT BELT PRE-TENSIONER”) covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS.**

## Wiring Diagrams and Trouble Diagnosis

NISC0002

When you read wiring diagrams, refer to the following:

- ***GI-11***, “HOW TO READ WIRING DIAGRAMS”.
- ***EL-9***, “POWER SUPPLY ROUTING” for power distribution circuit.

When you perform trouble diagnosis, refer to the following:

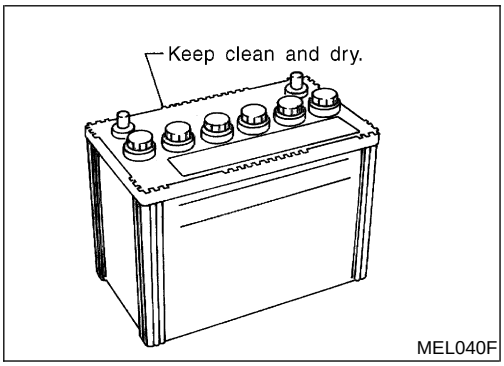
- ***GI-36***, “How To Follow Test Groups In Trouble Diagnosis”.
- ***GI-25***, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”.

## How to Handle Battery

NISC0003

**CAUTION:**

- **If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.**
- **After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.**
- **Never add distilled water through the hole used to check specific gravity.**

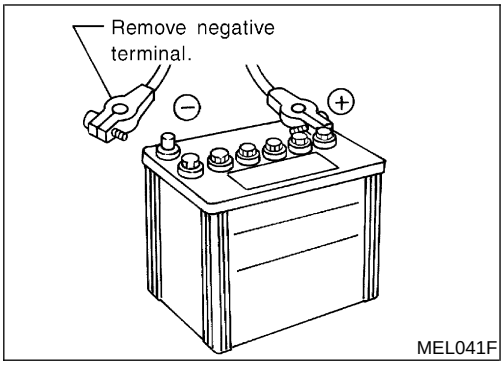



### METHODS OF PREVENTING OVER-DISCHARGE

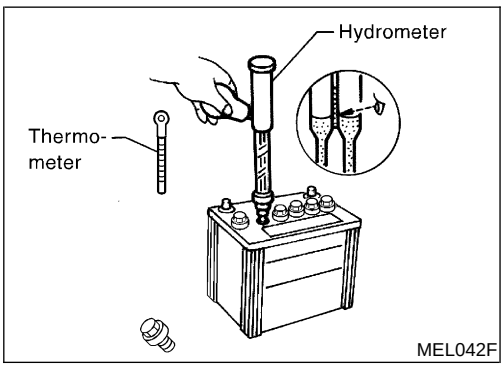
NISC0003S01

The following precautions must be taken to prevent over-discharging a battery.

- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level. This also applies to batteries designated as “low maintenance” and “maintenance-free”.




- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal.



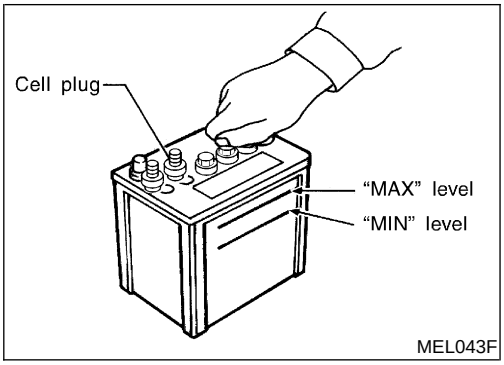

- Check the charge condition of the battery. Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent over-discharge.

### CHECKING ELECTROLYTE LEVEL

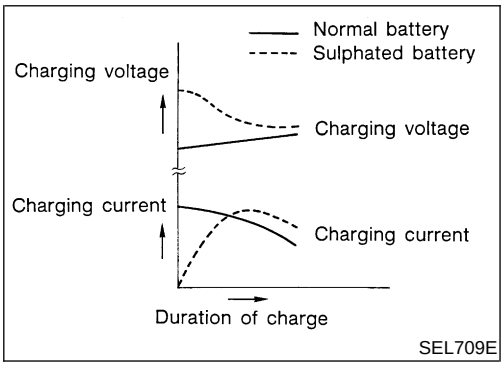
NISC0003S02

**WARNING:**

**Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.**



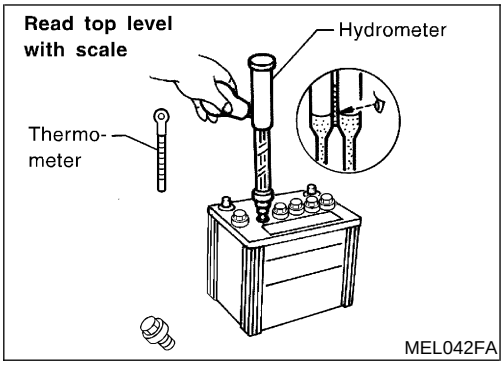

- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.




## Sulphation

NISC0003S0201

**A battery will be completely discharged if it is left unattended for a long time and the specific gravity will become less than 1.100. This may result in sulphation on the cell plates.**
**To determine if a battery has been "sulphated", note its voltage and current when charging it. As shown in the figure, less current and higher voltage are observed in the initial stage of charging sulphated batteries.**
**A sulphated battery may sometimes be brought back into service by means of a long, slow charge, 12 hours or more, followed by a battery capacity test.**




## SPECIFIC GRAVITY CHECK

NISC0003S03

1. Read hydrometer and thermometer indications at eye level.

2. Use the chart below to correct your hydrometer reading according to electrolyte temperature.

## Hydrometer Temperature Correction

NISC0003S0301

| Battery electrolyte temperature °C (°F) | Add to specific gravity reading |
|---|---|
| 71 (160) | 0.032 |
| 66 (150) | 0.028 |
| 60 (140) | 0.024 |
| 54 (130) | 0.020 |
| 49 (120) | 0.016 |
| 43 (110) | 0.012 |
| 38 (100) | 0.008 |
| 32 (90) | 0.004 |
| 27 (80) | 0 |
| 21 (70) | −0.004 |
| 16 (60) | −0.008 |
| 10 (50) | −0.012 |

| Battery electrolyte temperature °C (°F) | Add to specific gravity reading |
|---|---|
| 4 (40) | −0.016 |
| −1 (30) | −0.020 |
| −7 (20) | −0.024 |
| −12 (10) | −0.028 |
| −18 (0) | −0.032 |

| Corrected specific gravity | Approximate charge condition |
|---|---|
| 1.260 - 1.280 | Fully charged |
| 1.230 - 1.250 | 3/4 charged |
| 1.200 - 1.220 | 1/2 charged |
| 1.170 - 1.190 | 1/4 charged |
| 1.140 - 1.160 | Almost discharged |
| 1.110 - 1.130 | Completely discharged |

## CHARGING THE BATTERY

NISC0003S04

**CAUTION:**

- **Do not "quick charge" a fully discharged battery.**
- **Keep the battery away from open flame while it is being charged.**
- **When connecting the charger, connect the leads first, then turn on the charger. Do not turn on the charger first, as this may cause a spark.**
- **If battery electrolyte temperature rises above 60°C (140°F), stop charging. Always charge battery at a temperature below 60°C (140°F).**

### Charging Rates

NISC0003S0401

| Amps | Time |
|---|---|
| 50 | 1 hour |
| 25 | 2 hours |
| 10 | 5 hours |
| 5 | 10 hours |

**Do not charge at more than 50 ampere rate.**

**NOTE:**

The ammeter reading on your battery charger will automatically decrease as the battery charges. This indicates that the voltage of the battery is increasing normally as the state of charge improves. The charging amps indicated above refer to initial charge rate.

- If, after charging, the specific gravity of any two cells varies more than .050, the battery should be replaced.

## System Description

NISC0004

### M/T MODEL

NISC0004S01

Power is supplied at all times:

- through 40A fusible link (letter **c**, located in the fuse and fusible link box)
- to ignition switch terminal B.

With the ignition switch in the START position, power is supplied:

- from ignition switch terminal St
- to clutch interlock relay terminal 5.

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 20, located in the fuse block (J/B)]
- to clutch interlock relay terminal 1.

When the clutch pedal is depressed, ground is supplied to clutch interlock relay terminal 2 through the clutch interlock switch and body grounds E7 and E37.
The clutch interlock relay is energized and power is supplied:

- from terminal 3 of the clutch interlock relay
- to terminal + of the starter motor windings.

The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, the starter motor operates.

### A/T MODEL

NISC0004S02

Power is supplied at all times:

- through 40A fusible link (letter **c**, located in the fuse and fusible link box)
- to ignition switch terminal B.

With the ignition switch in the START position, power is supplied:

- from ignition switch terminal St
- to park/neutral position relay terminal 5 (without ASCD) or terminal 6 (with ASCD)

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 20, located in the fuse block (J/B)]
- to park/neutral position relay terminal 1.

Ground is supplied, with the selector lever in the P or N position:

- to park/neutral position relay terminal 2
- through park/neutral position switch.

The park/neutral position relay is energized and power is supplied:

- from ignition switch terminal St
- through park/neutral position relay terminals 5 and 3 (without ASCD) or terminals 6 and 7 (with ASCD)
- to terminal + of the starter motor windings.

The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, the starter motor operates.

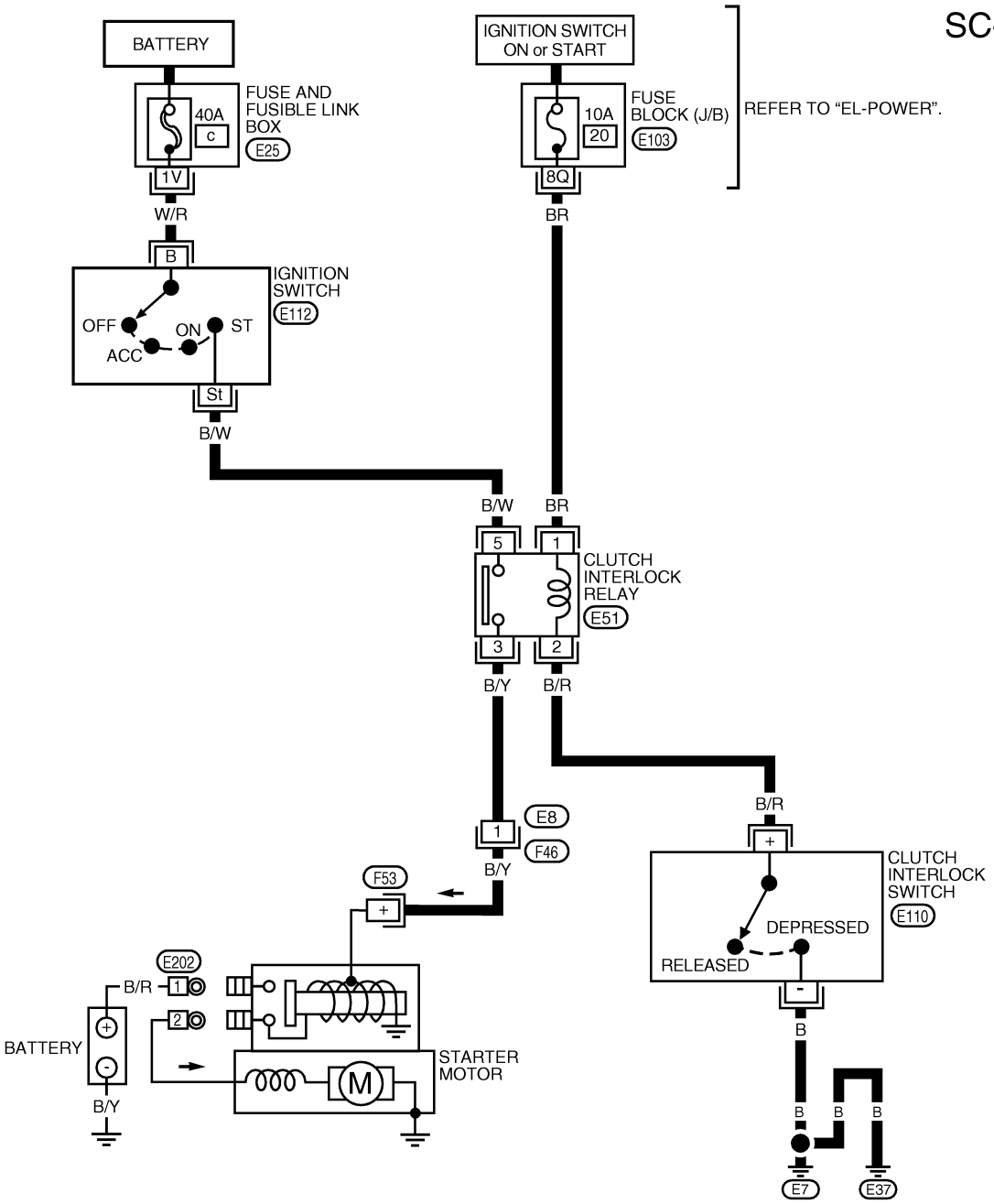
# Wiring Diagram — START —

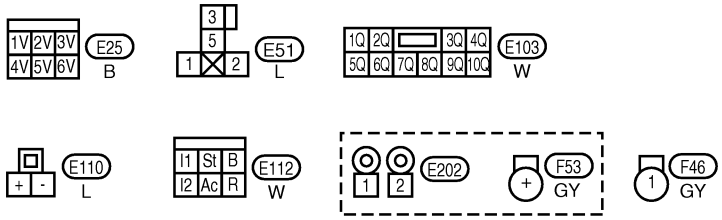
NISC0005

## M/T MODEL

NISC0005S01

SC-START-01



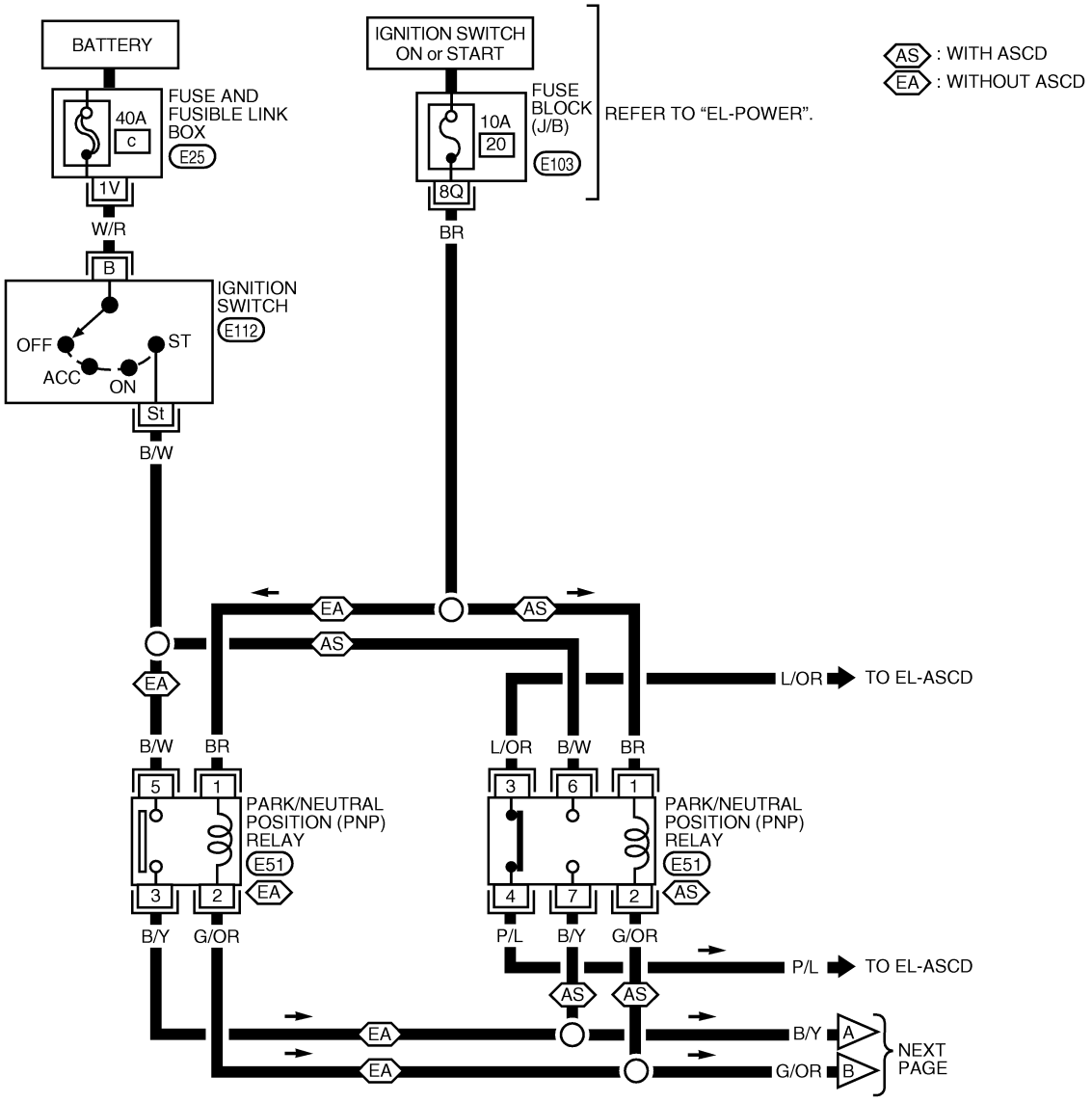




WSC003

## A/T MODEL

NISC0005S02

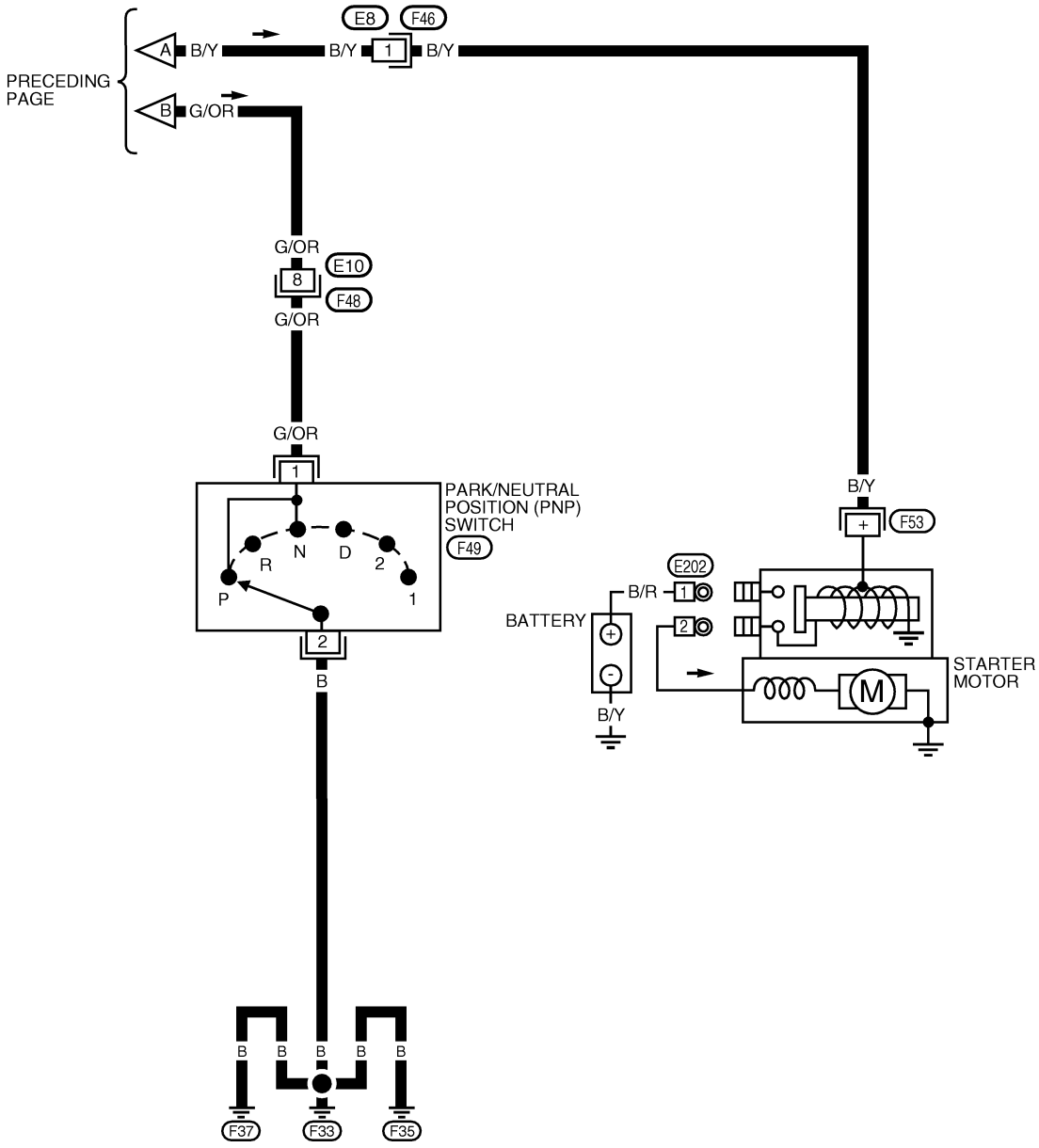
SC-START-02

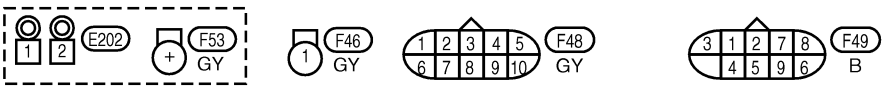




WSC004

SC-START-03

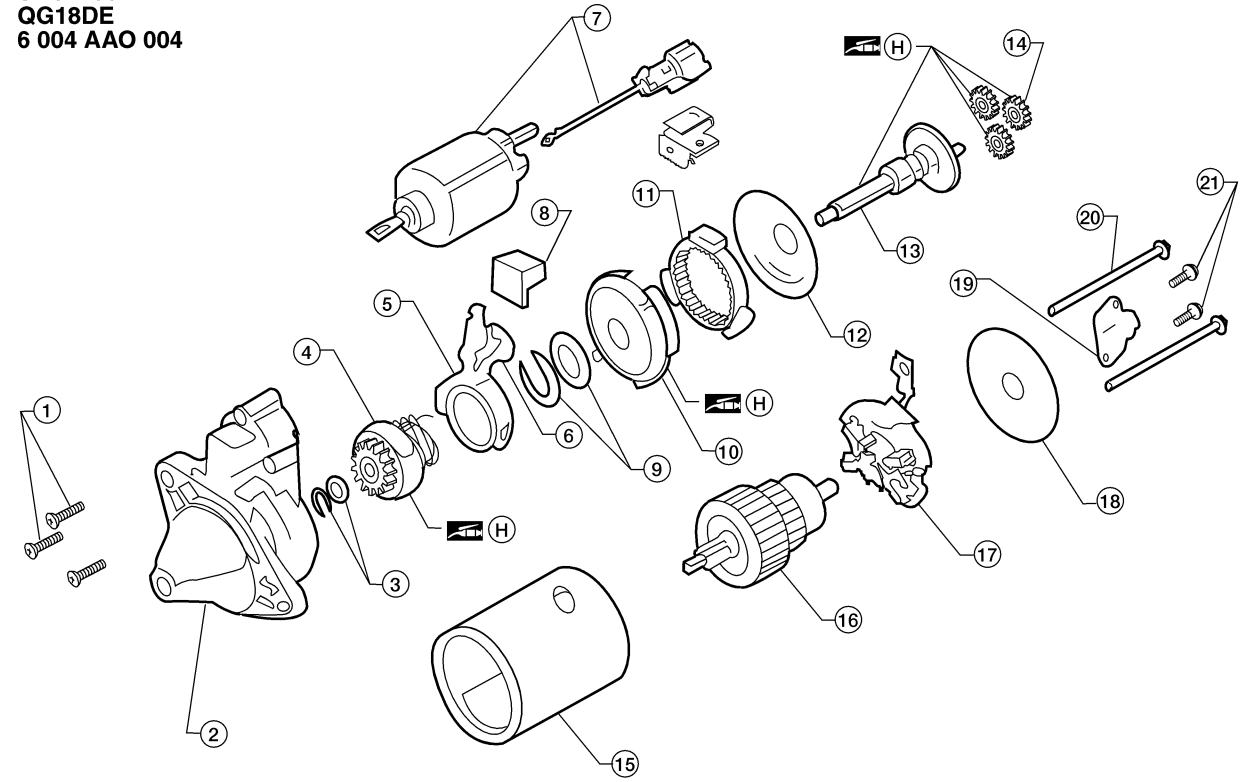


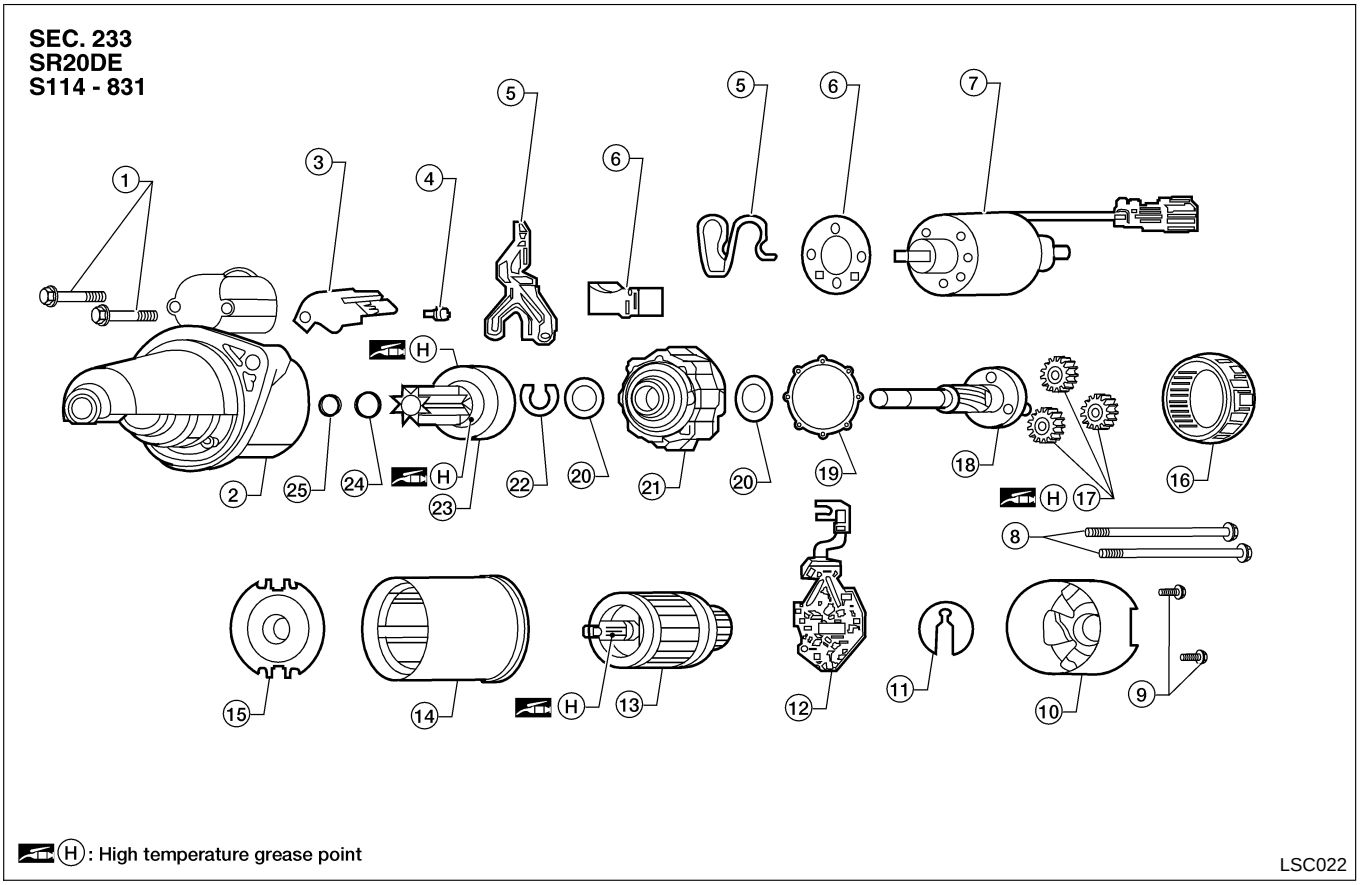

WSC005

## Construction

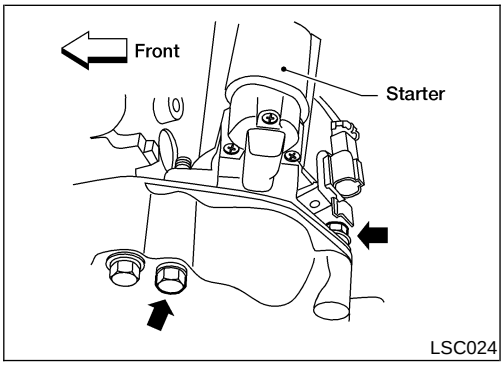
NISC0006




1. Solenoid through bolts
2. Drive end shield
3. Retainers
4. Pinion assembly
5. Fork lever
6. Bearing pedestal
7. Solenoid switch assembly
8. Seal
9. Locking washers
10. Intermediate bearing
11. Internal gear
12. Cover disc
13. Drive shaft
14. Planetary gears
15. Yoke assembly
16. Armature assembly
17. Brush holder
18. Commutator end shield
19. Closure cap
20. Starter through bolts
21. Closure cap screws




1. Solenoid through bolts
2. Gear case assembly
3. Connector stay
4. Connector stay screw
5. Shift lever set
6. Dust cover kit
7. Magnetic switch assembly
8. Through bolts
9. Rear cover assembly screws
10. Rear cover assembly
11. Thrust washer
12. Brush holder assembly
13. Armature assembly
14. Yoke assembly
15. Armature center bracket
16. Internal gear
17. Planet gears
18. Pinion shaft
19. Packing
20. Armature thrust washer
21. Pinion center bracket
22. E-ring
23. Pinion assembly
24. Pinion stopper
25. Pinion stopper clip




## Removal and Installation

NISC0007

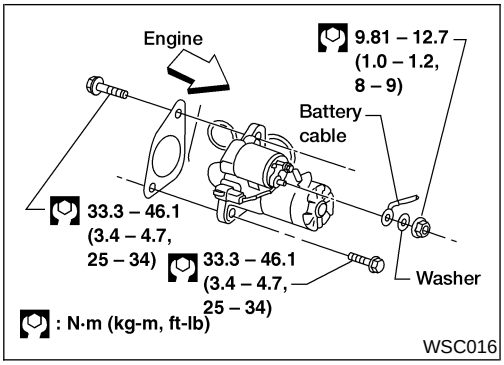
### QG18DE

NISC0007S01

### Removal

NISC0007S0101

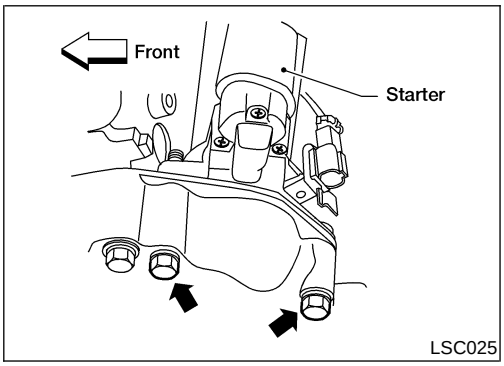
1. Disconnect the negative battery terminal.
2. Remove the upper starter mounting bolt.
3. Remove the harness protector from the starter engine room harness.
4. Disconnect the starter harness connectors.
5. Remove the lower starter mounting bolt.
6. Remove the starter.




### Installation

NISC0007S0102

To install, reverse the removal procedure.



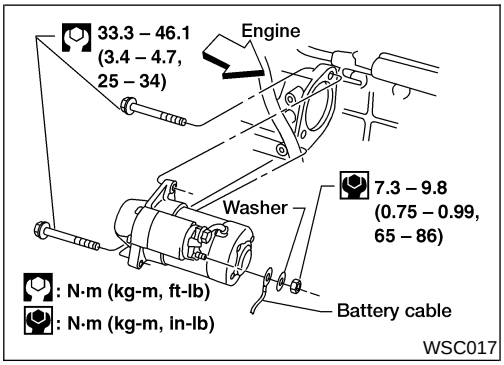

## SR20DE

NISC0007S02

### Removal

NISC0007S0201

1. Disconnect the negative battery terminal.
2. Remove the air cleaner cover and the air cleaner to intake manifold collector duct.
3. Remove the intake manifold support.
4. Remove the harness protector from the starter engine room harness.
5. Disconnect the starter harness connectors.
6. Remove the two starter mounting bolts.
7. Remove the starter.




### Installation

NISC0007S0202

To install, reverse the removal procedure.

## Pinion/Clutch Check

NISC0008

1. Inspect pinion assembly teeth.

- Replace pinion assembly if teeth are worn or damaged. (Also check condition of ring gear teeth.)

2. Inspect planetary gears'/planet gears' teeth.

- Replace planetary gears/planet gears if teeth are worn or damaged. (Also check condition of pinion shaft/drive shaft gear teeth.)

3. Check to see if pinion assembly locks in one direction and rotates smoothly in the opposite direction.

- If it locks or rotates in both directions, or unusual resistance is evident, replace.

## System Description

NISC0009

The generator 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.
Power is supplied at all times to generator terminal B through:

- 100A fusible link (letter **a**, located in the fuse and fusible link box).

Power is supplied at all times to generator terminal S through:

- 10A fuse (No. 33, located in the fuse and fusible link box).

Terminal B supplies power to charge the battery and operate the vehicle's electrical system. Output voltage is controlled by the IC regulator at terminal S detecting the input voltage. The charging circuit is protected by the 100A fusible link.
The generator is grounded to the engine block.
With the ignition switch in the ON or START position, power is supplied:

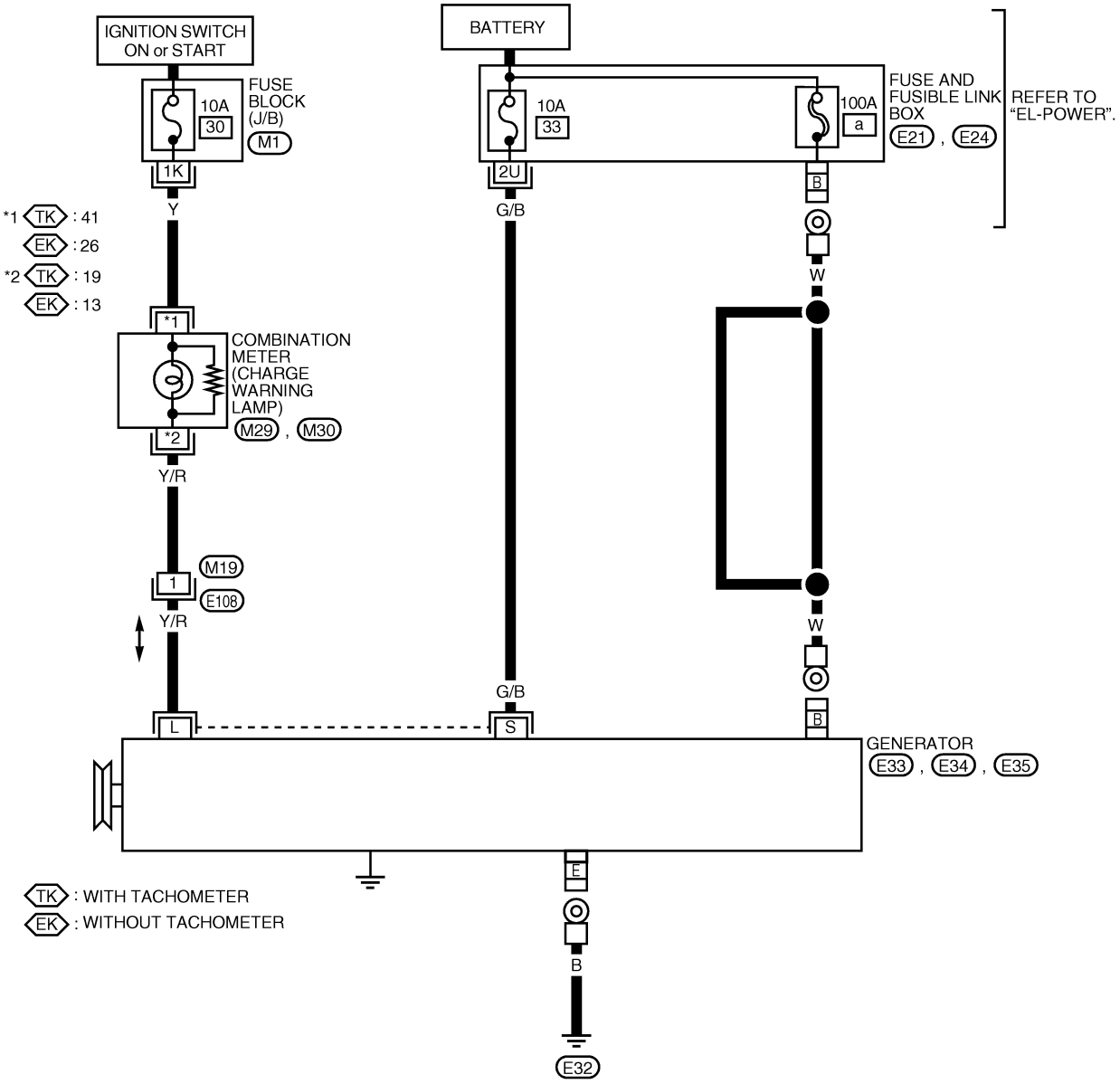
- through 10A fuse [No. 30, located in the fuse block (J/B)]
- to combination meter terminal 26 (without tachometer) or 41 (with tachometer) for the charge warning lamp.

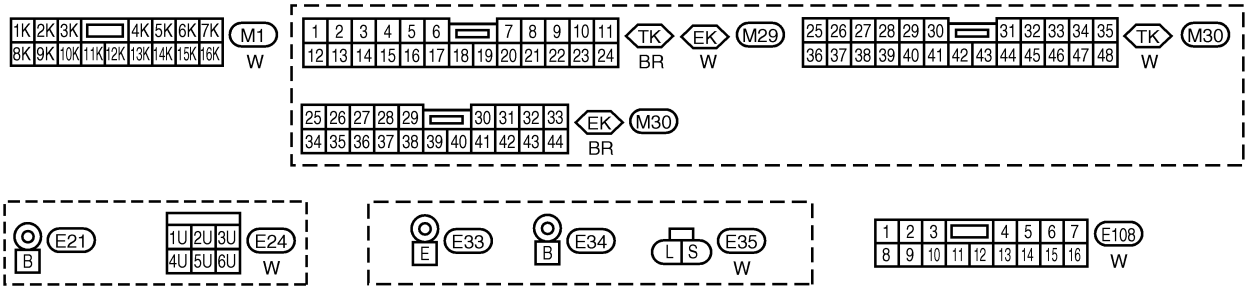
Ground is supplied to terminal 13 (without tachometer) or 19 (with tachometer) of the combination meter through terminal L of the generator. With power and ground supplied, the charge warning lamp will illuminate. When the generator is providing sufficient voltage with the engine running, the ground is opened and the charge warning lamp will go off.
If the charge warning lamp illuminates with the engine running, a fault is indicated.

# Wiring Diagram — CHARGE —

NISC0010

SC-CHARGE-01




WSC006

## Trouble Diagnoses

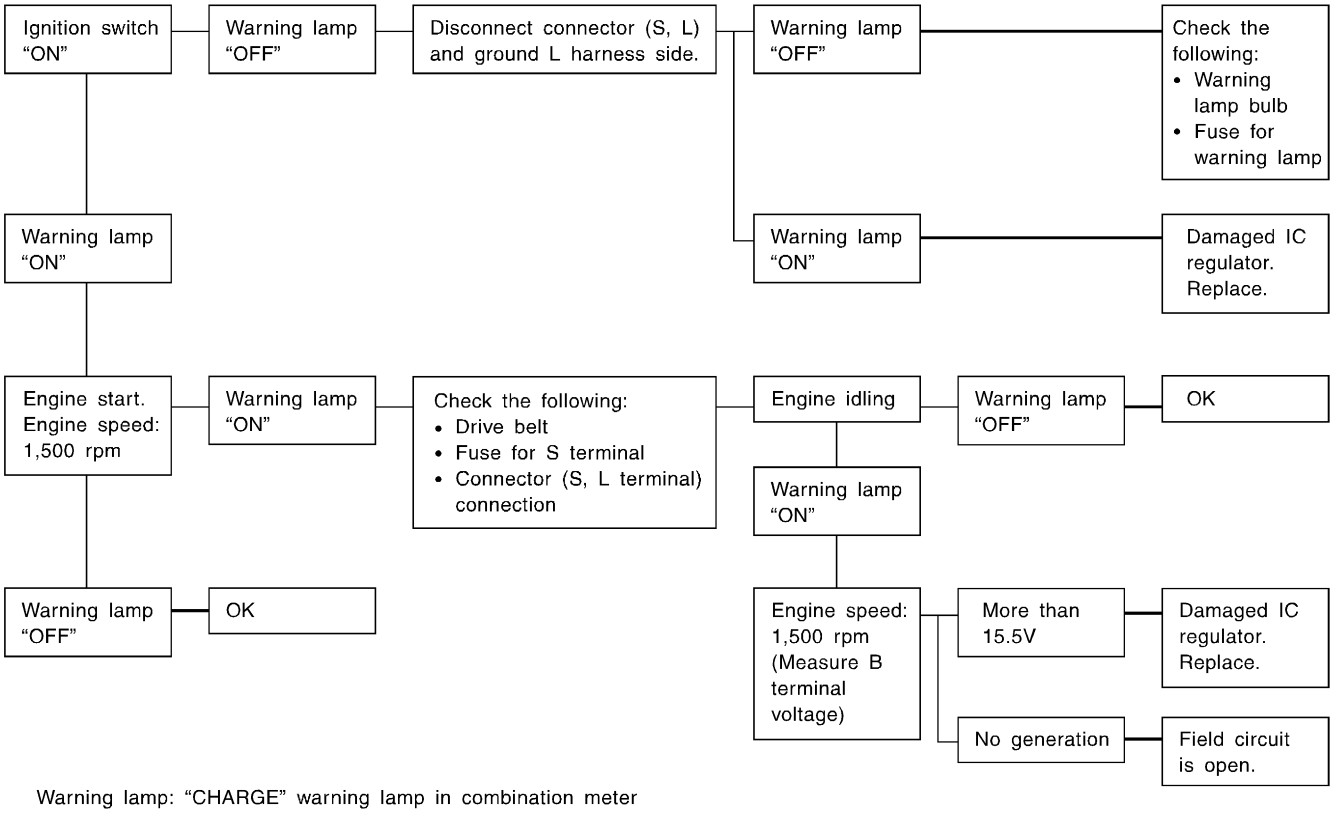
NISC0011

Before conducting a generator test, make sure that the battery is fully charged. A 30-volt voltmeter and suitable test probes are necessary for the test. The generator can be checked easily by referring to the Inspection Table.

- **Before starting, inspect the fusible link.**
- **Use fully charged battery.**

### WITH IC REGULATOR

NISC0011S01




Warning lamp: "CHARGE" warning lamp in combination meter

SEL338V

**NOTE:**

- If the inspection result is OK even though the charging system is malfunctioning, check the B terminal connection. Check the tightening torque.

  **B terminal tightening torque:**

  **7.84 - 10.78 N·m (0.8 - 1.0 kg-m, 70 - 95 in-lb)**

- When field circuit is open, check condition of rotor coil, rotor slip ring and brush. If necessary, replace faulty parts with new ones.

### MALFUNCTION INDICATOR

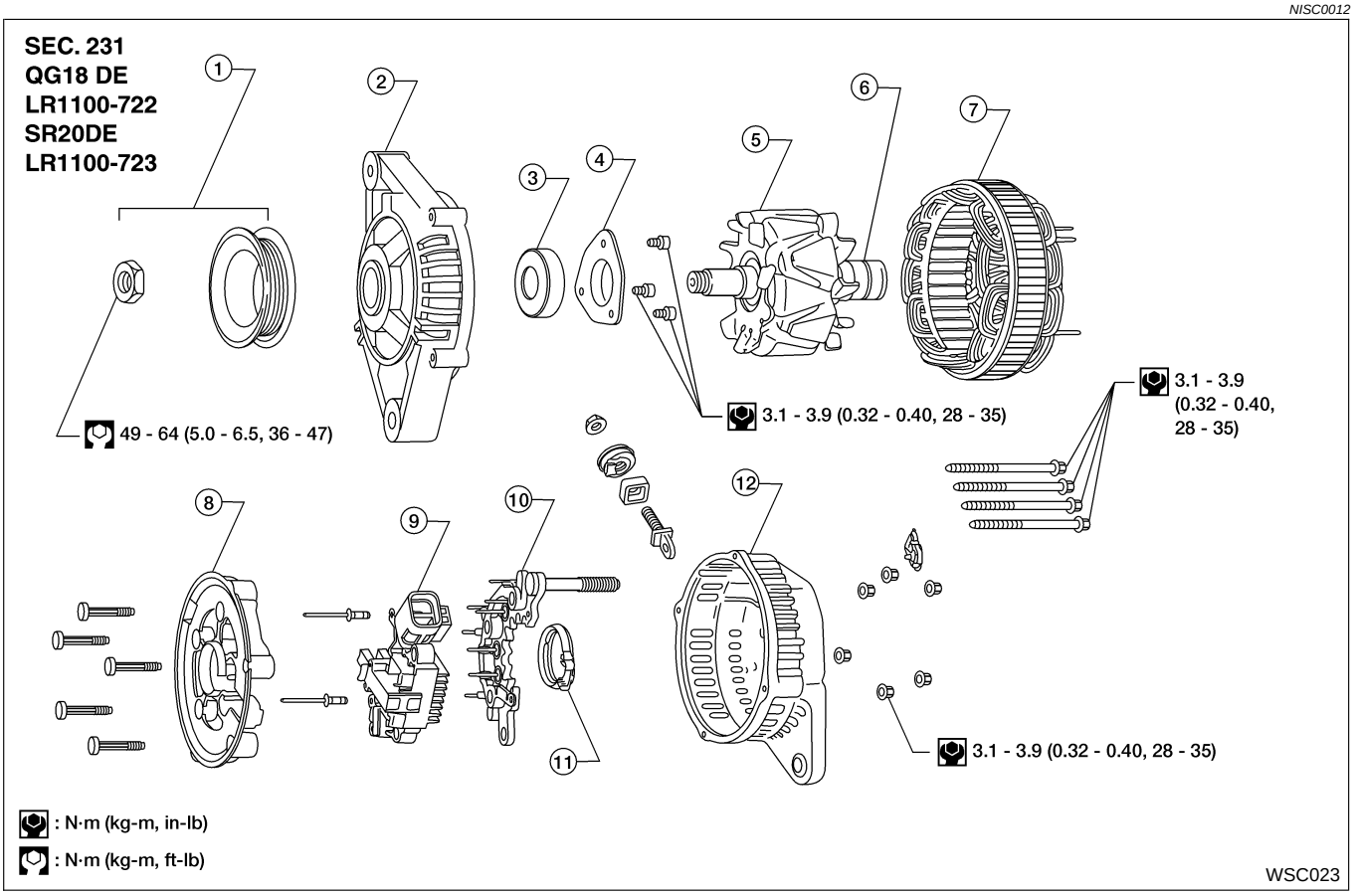
NISC0011S02

The IC regulator warning function activates to illuminate "CHARGE" warning lamp, if any of the following symptoms occur while generator is operating:

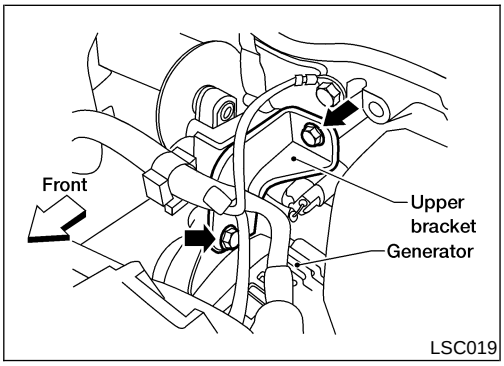
- Excessive voltage is produced.
- No voltage is produced.

## Construction

NISC0012




1. Pulley assembly
2. Front cover
3. Front bearing
4. Retainer
5. Rotor
6. Slip ring
7. Stator
8. Fan guide
9. IC regulator assembly
10. Diode assembly
11. Packing
12. Rear cover




## Removal and Installation

NISC0013

### QG18DE

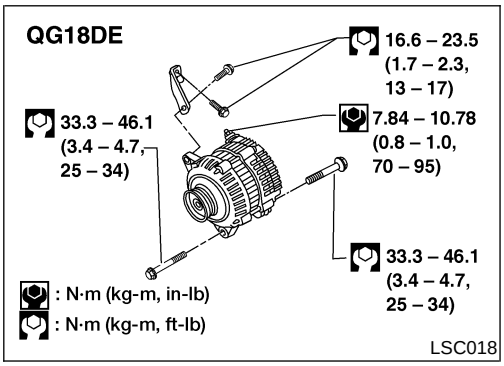
NISC0013S01

### Removal

NISC0013S0101

1. Disconnect the negative battery terminal.
2. Remove the front/right-side splash undercover.
3. Remove the drive belt.
4. Disconnect the A/C compressor harness connector.
5. Remove the four A/C compressor mounting bolts.
6. Slide the A/C compressor forward and support it.
7. Remove the two generator lower mounting bolts.

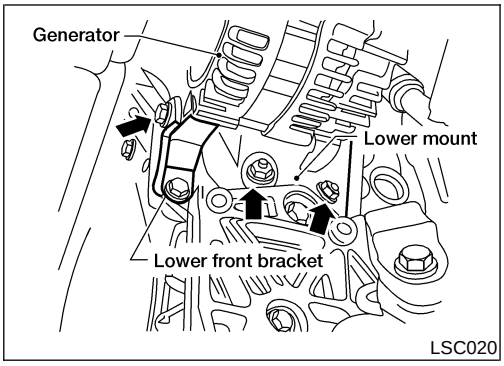
8. Disconnect the generator harness connectors.
9. Remove the generator upper bracket.
10. Remove the generator.




## Installation

NISC0013S0102

To install, reverse the removal procedure.



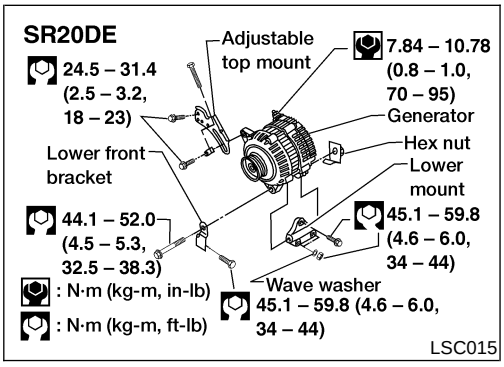

## SR20DE

NISC0013S02

## Removal

NISC0013S0201

1. Disconnect the negative battery terminal.
2. Remove the generator adjustable top mount.
3. Disconnect the generator harness connectors.
4. Remove the front/right-side splash undercover.
5. Remove the drive belt.
6. Disconnect the A/C compressor harness connector.
7. Remove the four A/C compressor mounting bolts.
8. Slide the A/C compressor forward and support it.
9. Remove the generator lower mount bolt and nuts.
10. Remove the generator lower front bracket bolt.
11. Slide the generator out and remove.




## Installation

NISC0013S0202

To install, reverse the removal procedure.

## Battery

NISC0014

| | |
|---|---|
| Type | GR.21R (BCI) |
| Capacity (20 HR) minimum V-AH | 12-49 |
| Cold cranking current A<br>(For reference value) | 356 @ -18°C (0°F) |

## Starter

NISC0015

| | | | |
|---|---|---|---|
| Application | | QG18DE | SR20DE |
| Manufacturer | | Bosch 6 004 AA0 004 | Hitachi S114-831 |
| Type | | Reduction gear type | Reduction gear type |
| System voltage | | 12V | 12V |
| No-load | Terminal voltage | 11V | 11V |
| | Current | 90A Max. | 90A Max. |
| | Revolution | 3,500 rpm Min. | 2,700 rpm Min. |
| Minimum diameter of commutator | | 32.1 mm | 28 mm |
| Minimum length of brush | | 10.7 mm | 10.5 mm |
| Brush spring tension | | 11.5 N (1.17 kg, 2.58 lb) | 16.2 N (1.65 kg, 3.64 lb) |
| Clearance between pinion front edge and pinion stopper | | 1.8 mm | 0.3 - 2.5 mm |

## Generator

NISC0016

| | | |
|---|---|---|
| Application | QG18DE | SR20DE |
| Type | LR1100-722 | LR1100-723 |
| | HITACHI | |
| Nominal rating | 12V-100A | |
| Ground polarity | Negative | |
| Minimum revolution under no-load (When 13.5 volts is applied) | Less than 1000 rpm | |
| Hot output current (When 13.5 volts is applied) | More than 24A/1,300 rpm<br>More than 71A/2,500 rpm<br>More than 98A/5,000 rpm | |
| Regulated output voltage | 14.1 - 14.7V | |
| Minimum length of brush | 6 mm (0.236 in) | |
| Brush spring pressure | 1.000 - 3.432 N (0.102 - 0.350 kg, 0.225 - 0.772 lbs) | |
| Slip ring minimum outer diameter | 26.0 mm (1.024 in) | |
| Rotor (Field coil) resistance | 1.9 - 2.2 ohms | |

**NOTES**