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SECTION SC

STARTING & CHARGING SYSTEM

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PRECAUTIONS

PRECAUTIONS

PF0:00001

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

EKS006EZ

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 and SB 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 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 section.
- 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.

Wiring Diagrams and Trouble Diagnosis

EKS0037M

When you read wiring diagrams, refer to the following:

- [GI-14, "How to Read Wiring Diagrams"](#)
- [PG-3, "POWER SUPPLY ROUTING"](#) for power distribution circuit.

When you perform trouble diagnosis, refer to the following:

- [GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"](#).
- [GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"](#)

PREPARATION


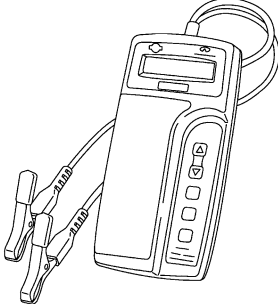
PREPARATION

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Special Service Tool

EKS0037N

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

| Tool number (Kent-Moore No.) Tool name | Description |
|---|--|
| <p>(J-48087) Battery Service Center</p>  <p>WKIA5280E</p> | <p>Tests battery. For operating instructions, refer to Technical Service Bulletin and Battery Service Center User Guide.</p> |
| <p>(J-44373) Model 620 Starting/Charging system tester</p>  <p>SEL403X</p> | <p>Tests starting and charging systems. For operating instructions, refer to Technical Service Bulletin.</p> |

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BATTERY

PFP:AYBGL

BATTERY

How to Handle Battery

EKS00370

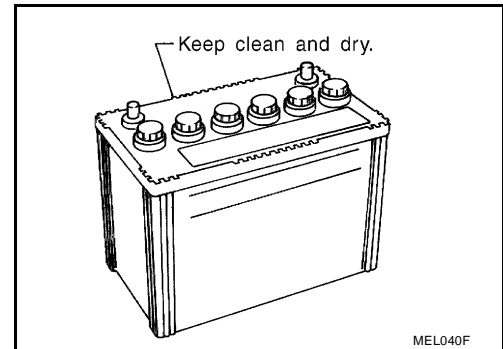
CAUTION:

- 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.

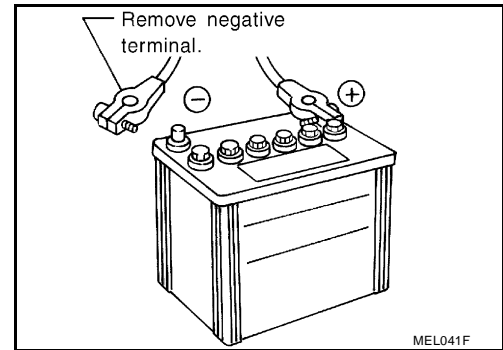
METHODS OF PREVENTING OVER-DISCHARGE

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

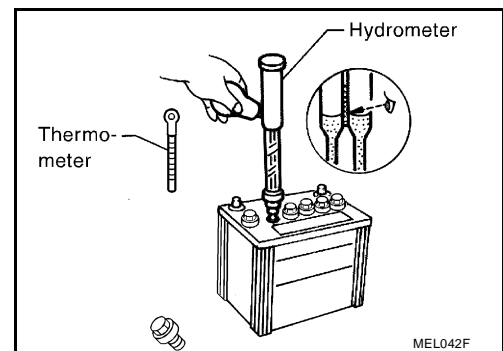
- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level. This also applies to batteries designated as "low maintenance" and "maintenance-free".



- 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.



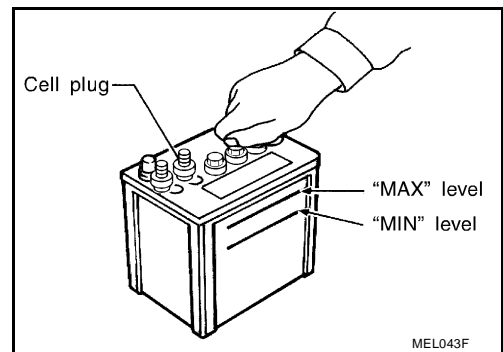
CHECKING ELECTROLYTE LEVEL

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.

BATTERY

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

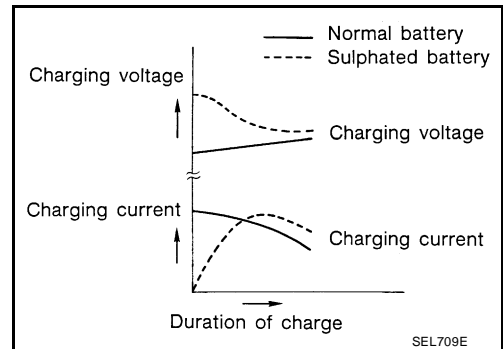


Sulphation

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.

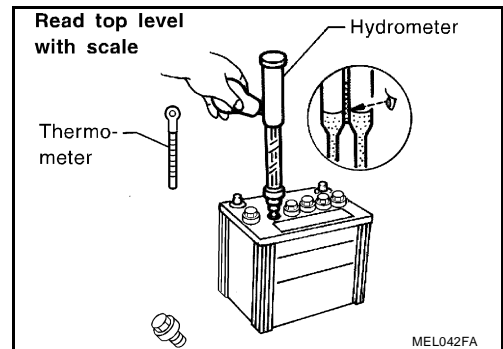
To determine if a battery has been “sulphated”, note its voltage and current when charging it. As shown in the figure, less current and higher voltage are observed in the initial stage of charging sulphated batteries.

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

1. Read hydrometer and thermometer indications at eye level.
2. Use the following chart to correct your hydrometer reading according to electrolyte temperature.



Hydrometer Temperature Correction

| 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 |
| 4 (40) | -0.016 |
| -1 (30) | -0.020 |
| -7 (20) | -0.024 |

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BATTERY

| Battery electrolyte temperature °C (°F) | Add to specific gravity reading |
|---|---------------------------------|
| -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

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

| 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.

Trouble Diagnoses with Battery Service Center

EKS0037P

For battery testing, use Battery Service Center (J-48087). For details and operating instructions, refer to Technical Service Bulletin and/or Battery Service Center User Guide.

STARTING SYSTEM

PFP:23300

STARTING SYSTEM

System Description M/T MODEL

EKS0037Q

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 S 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

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

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.

With the selector lever in the P or N position, ground is supplied:

- 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
- to terminal S 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.

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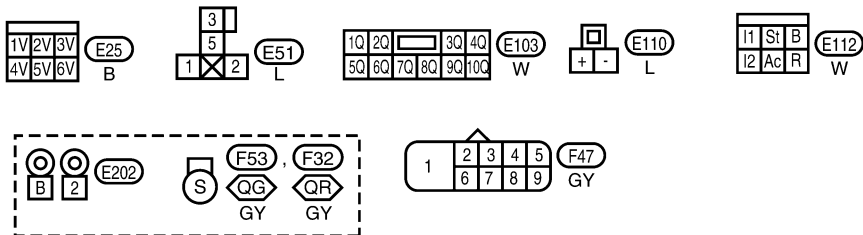
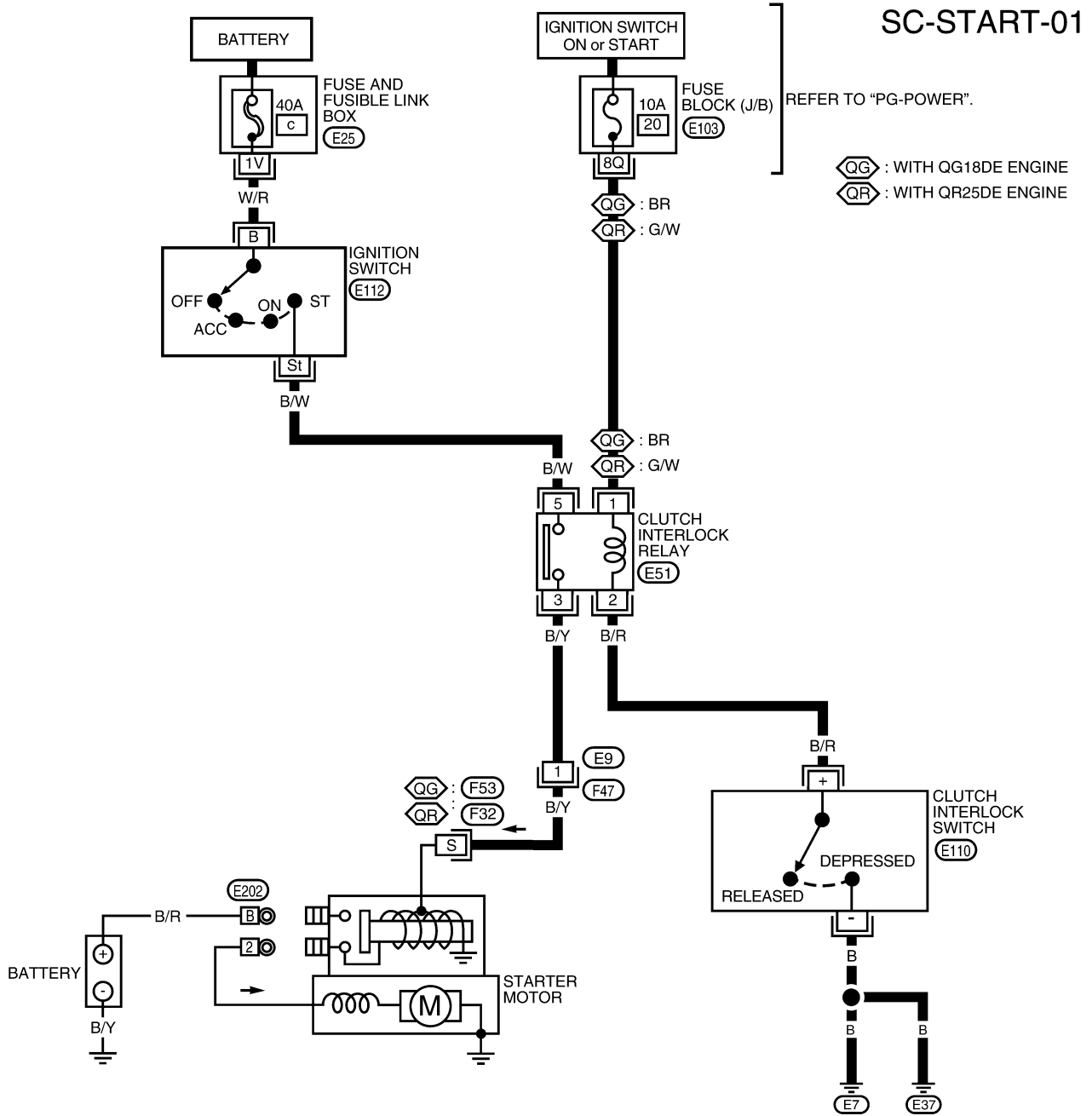
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STARTING SYSTEM

Wiring Diagram — START — M/T MODEL

EKS0037R

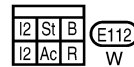
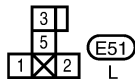
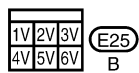
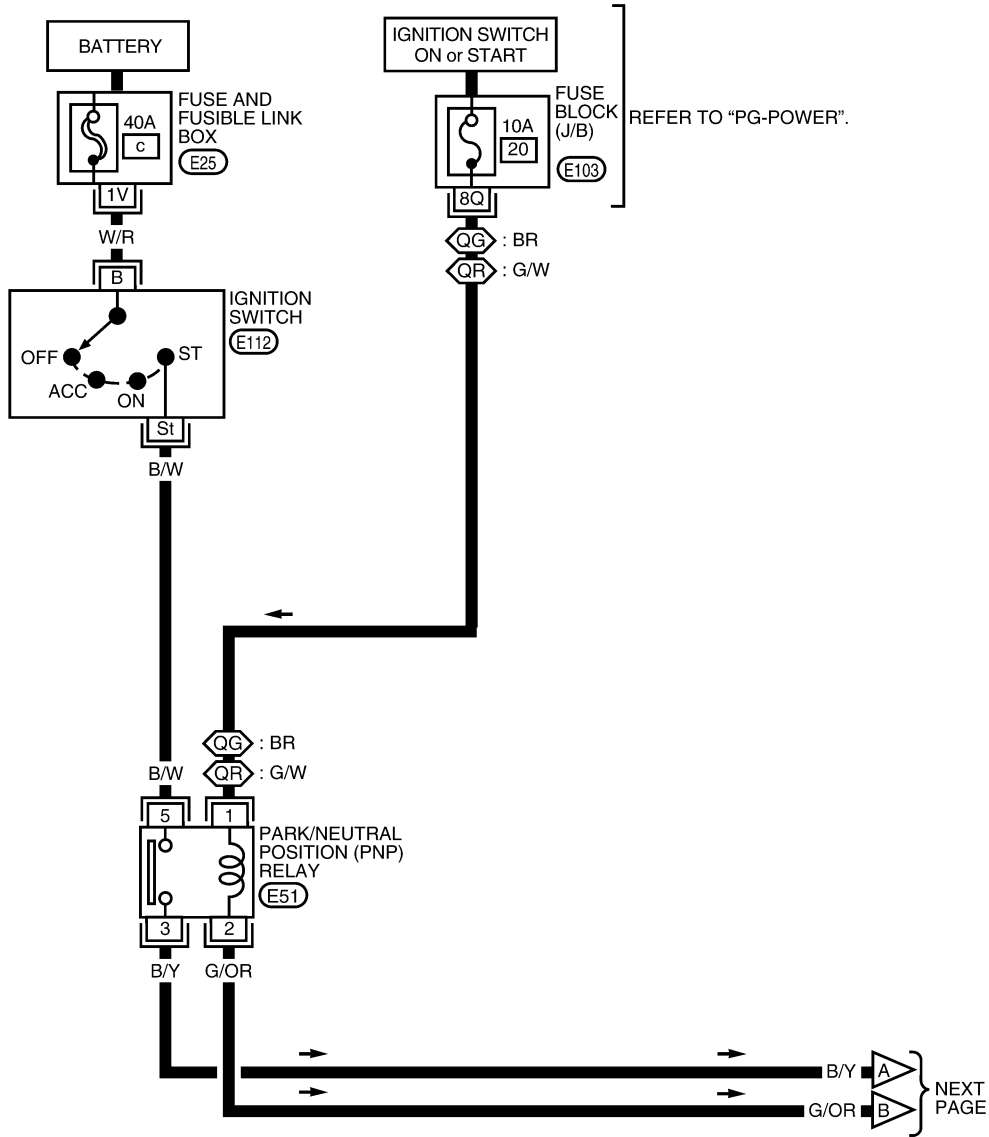


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STARTING SYSTEM

A/T MODEL

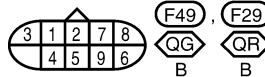
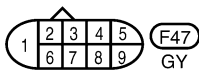
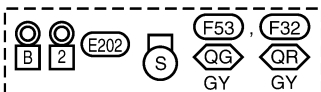
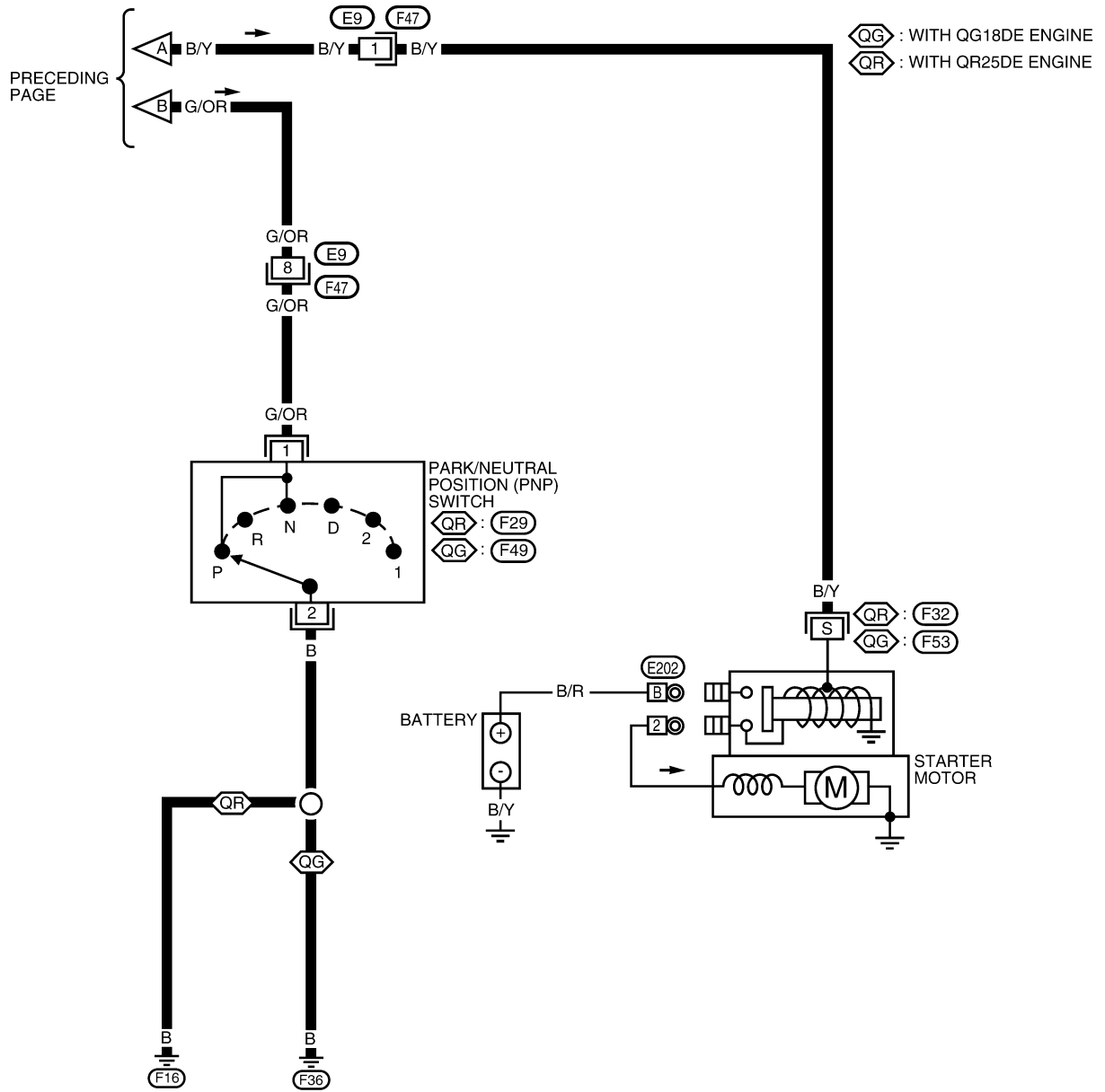
SC-START-02



WKWA0160E

STARTING SYSTEM

SC-START-03



WKWA0645E

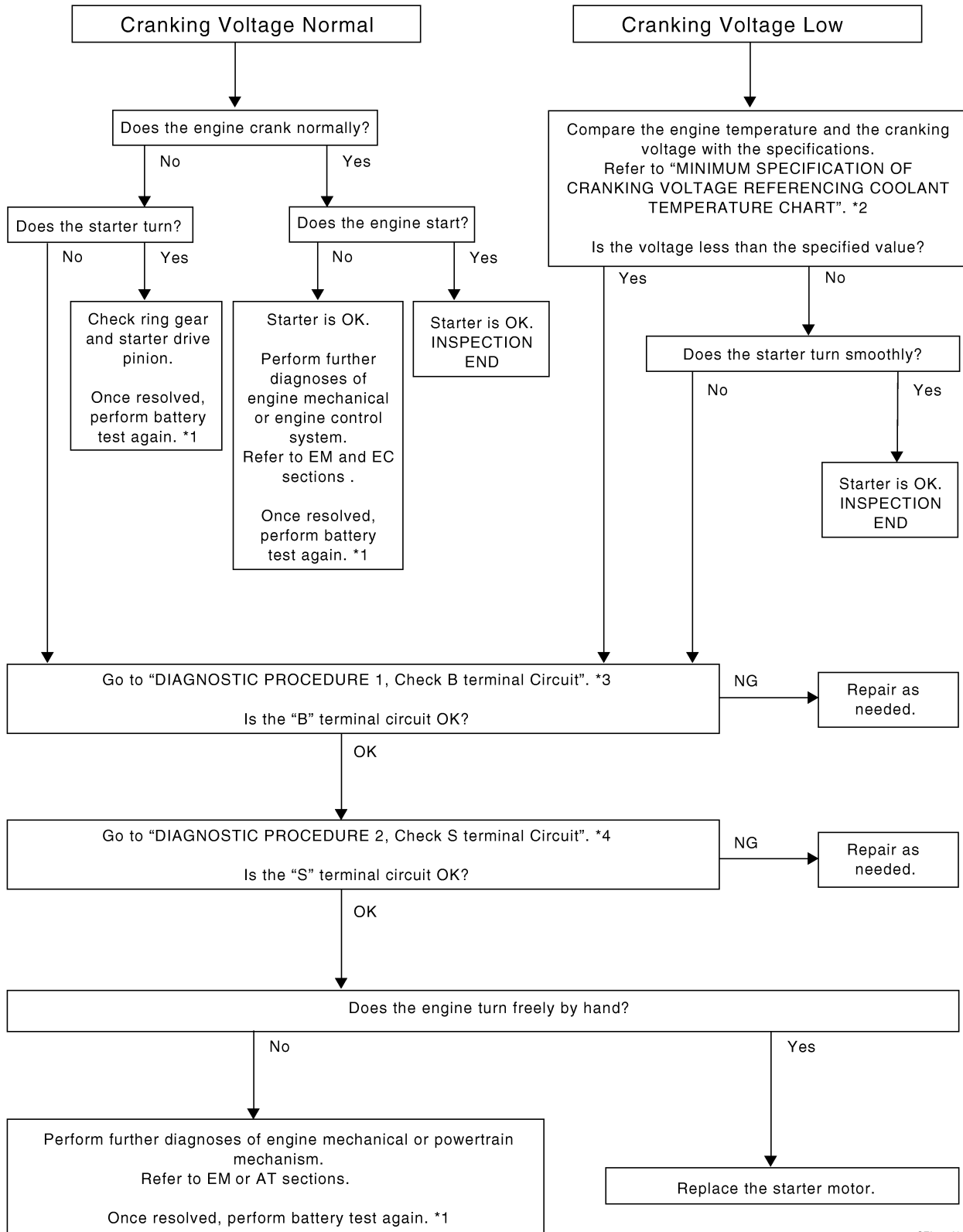
STARTING SYSTEM

EKS0037S

Trouble Diagnoses with Starting/Charging System Tester (Starting)

For starting system testing, use Starting/Charging System Tester (J-44373). For details and operating instructions, refer to Technical Service Bulletin.

WORK FLOW



SEL411X

STARTING SYSTEM

*1 For battery testing, use Battery Service Center (J-48087).
For details and operating instructions, refer to Technical Service Bulletin and/or Battery Service Center User Guide.

*4 [SC-14, "Check "S" Terminal Circuit"](#)

*2 [SC-15, "MINIMUM SPECIFICATION OF CRANKING VOLTAGE REFERENCE COOLANT TEMPERATURE"](#)

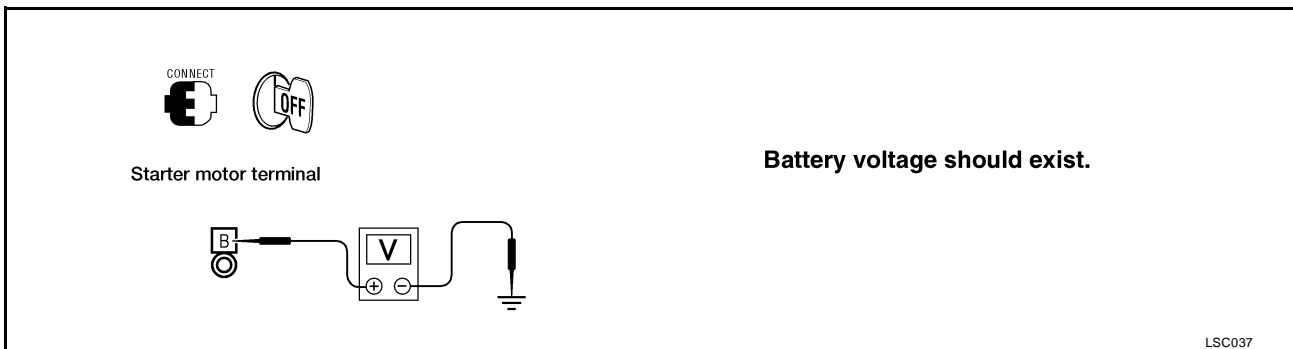
*3 [SC-12, "Check "B" Terminal Circuit"](#)

DIAGNOSTIC PROCEDURE 1

Check "B" Terminal Circuit

1. CHECK POWER SUPPLY FOR STARTER MOTOR "B" TERMINAL

1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition switch OFF.
4. Check that the starter motor connector E202 terminal B (B/R) connection is clean and tight.
5. Check voltage between starter motor connector E202 terminal B (B/R) and ground using a digital circuit tester.



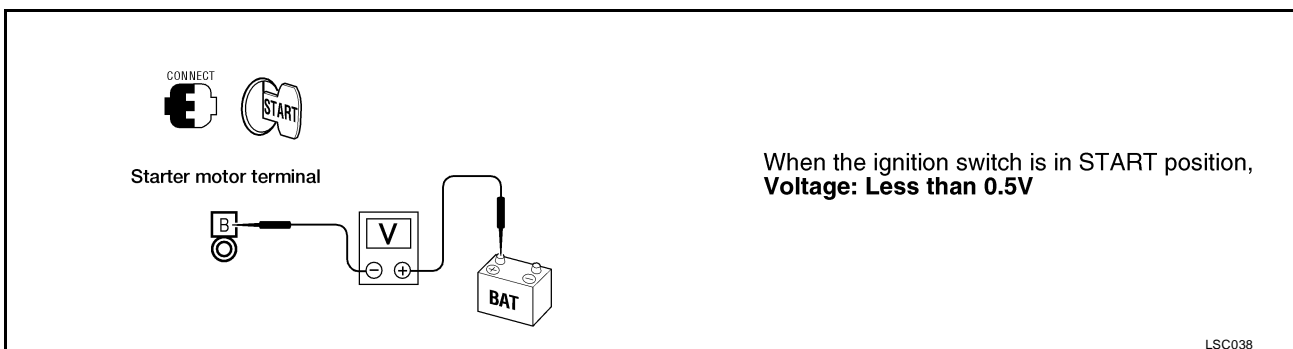
OK or NG

OK >> GO TO 2.

NG >> Check harness between the battery and the starter motor for open circuit.

2. CHECK BATTERY CABLE CONNECTION QUALITY (VOLTAGE DROP TEST)

1. Check voltage between starter motor connector E202 terminal B (B/R) and battery positive terminal using a digital circuit tester.



OK or NG

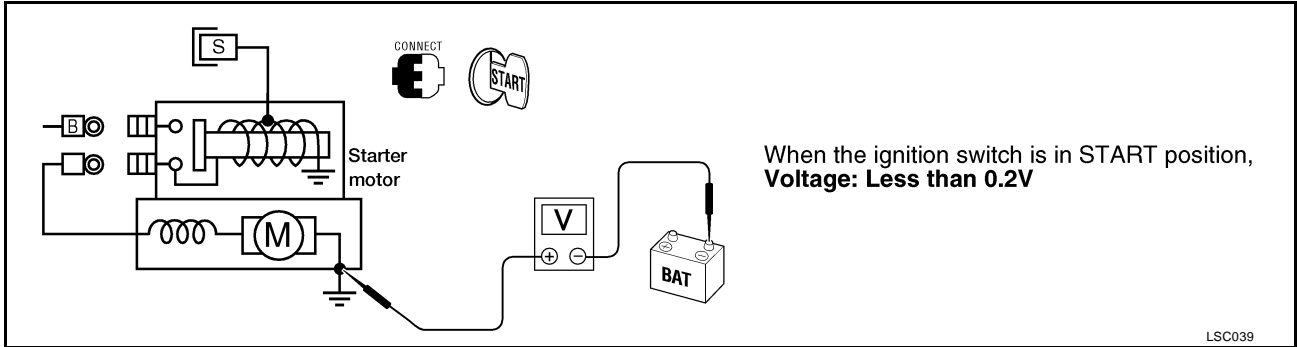
OK >> GO TO 3.

NG >> Check harness between the battery and the starter motor for poor continuity.

STARTING SYSTEM

3. CHECK STARTER MOTOR GROUND CIRCUIT (VOLTAGE DROP TEST)

1. Check voltage between starter motor case and battery negative terminal using a digital circuit tester.



OK or NG

- OK >> Starter motor "B" terminal circuit is OK. Further inspection is necessary. Refer to [SC-11, "WORK FLOW"](#).
- NG >> Check the starter motor case and ground for poor continuity.

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STARTING SYSTEM

DIAGNOSTIC PROCEDURE 2

Check "S" Terminal Circuit

1. CHECK POWER SUPPLY FOR STARTER MOTOR "S" TERMINAL

1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition switch OFF.
4. Disconnect starter motor connector F53 (QG18DE), F32 (QR25DE) terminal S (B/Y) connector.
5. Check voltage between starter motor connector F53 (QG18DE), F32 (QR25DE) terminal S (B/Y) and ground using a digital circuit tester.

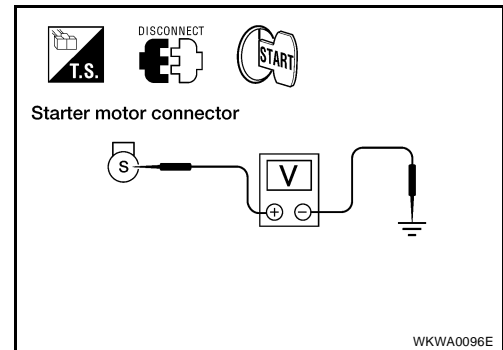
With the ignition switch ON : Battery voltage should exist

OK or NG

OK >> GO TO 2.

NG >> Check the following.

- 40A fusible link (letter **c** , located in fuse and fusible link box)
- Clutch interlock relay
- Park/neutral position relay
- Harness for open or short



2. CHECK "S" TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)

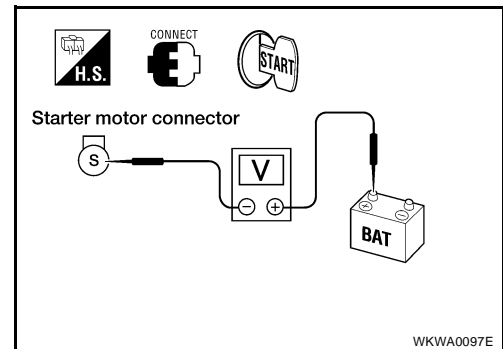
1. Connect starter motor connector F53 (QG18DE), F32 (QR25DE) terminal S (B/Y) connector.
2. Check voltage between starter motor connector F53 (QG18DE), F32 (QR25DE) terminal S (B/Y) and battery positive terminal using a digital tester.

With the ignition switch in START : Voltage less than 1V

OK or NG

OK >> Starter motor "S" terminal circuit is OK. Further inspection is necessary. Refer to [SC-11, "WORK FLOW"](#).

NG >> Check harness between the battery and the starter motor "S" terminal for poor continuity.



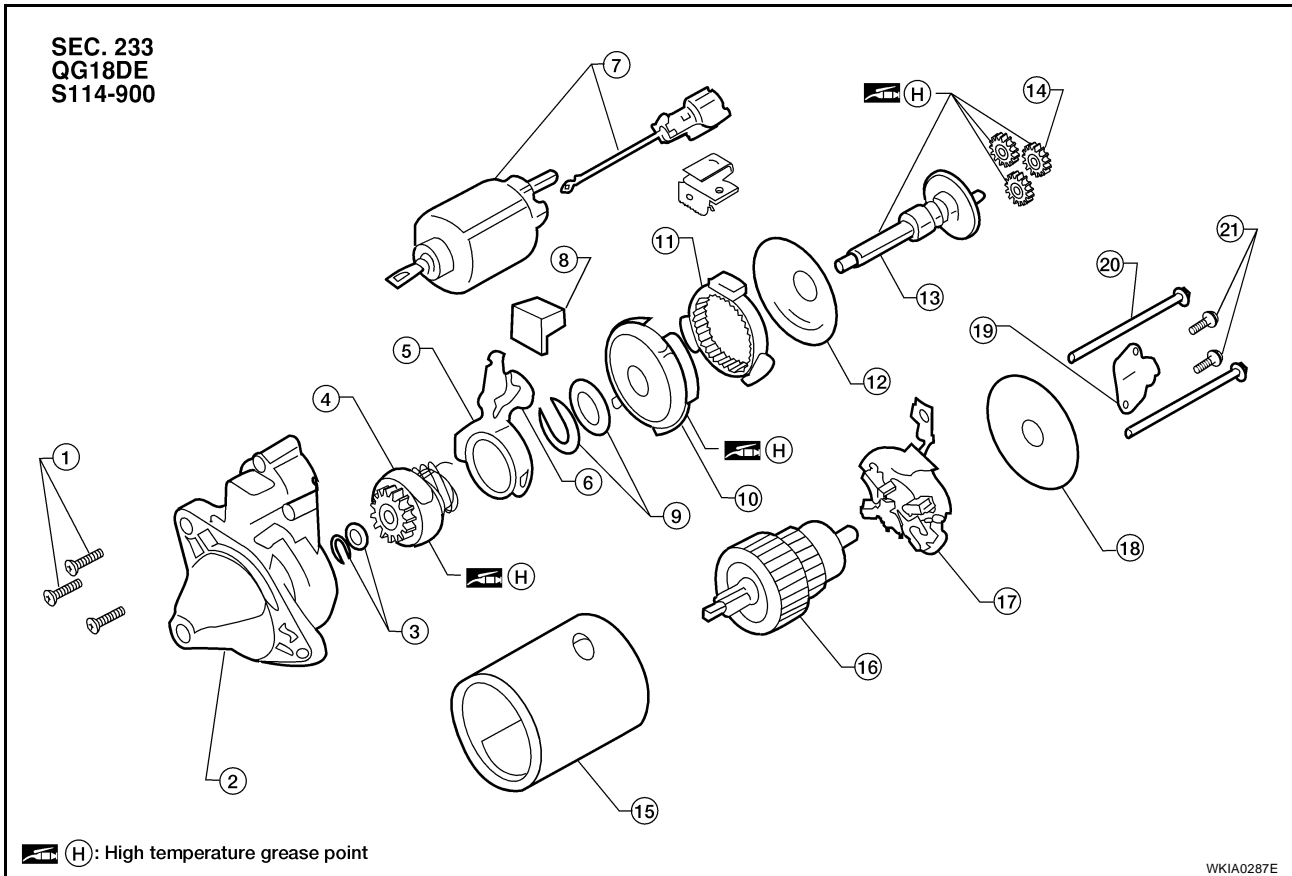
STARTING SYSTEM

MINIMUM SPECIFICATION OF CRANKING VOLTAGE REFERENCING COOLANT TEMPERATURE

| Engine coolant temperature | Voltage V | |
|--------------------------------|-----------|--------|
| | QG18DE | QR25DE |
| -30°C to -20°C (-22°F to -4°F) | 7.4 | 8.7 |
| -19°C to -10°C (-2°F to 14°F) | 8.2 | 9.2 |
| -9°C to 0°C (16°F to 32°F) | 9.3 | 9.6 |
| More than 1°C (More than 34°F) | 9.5 | 10.0 |

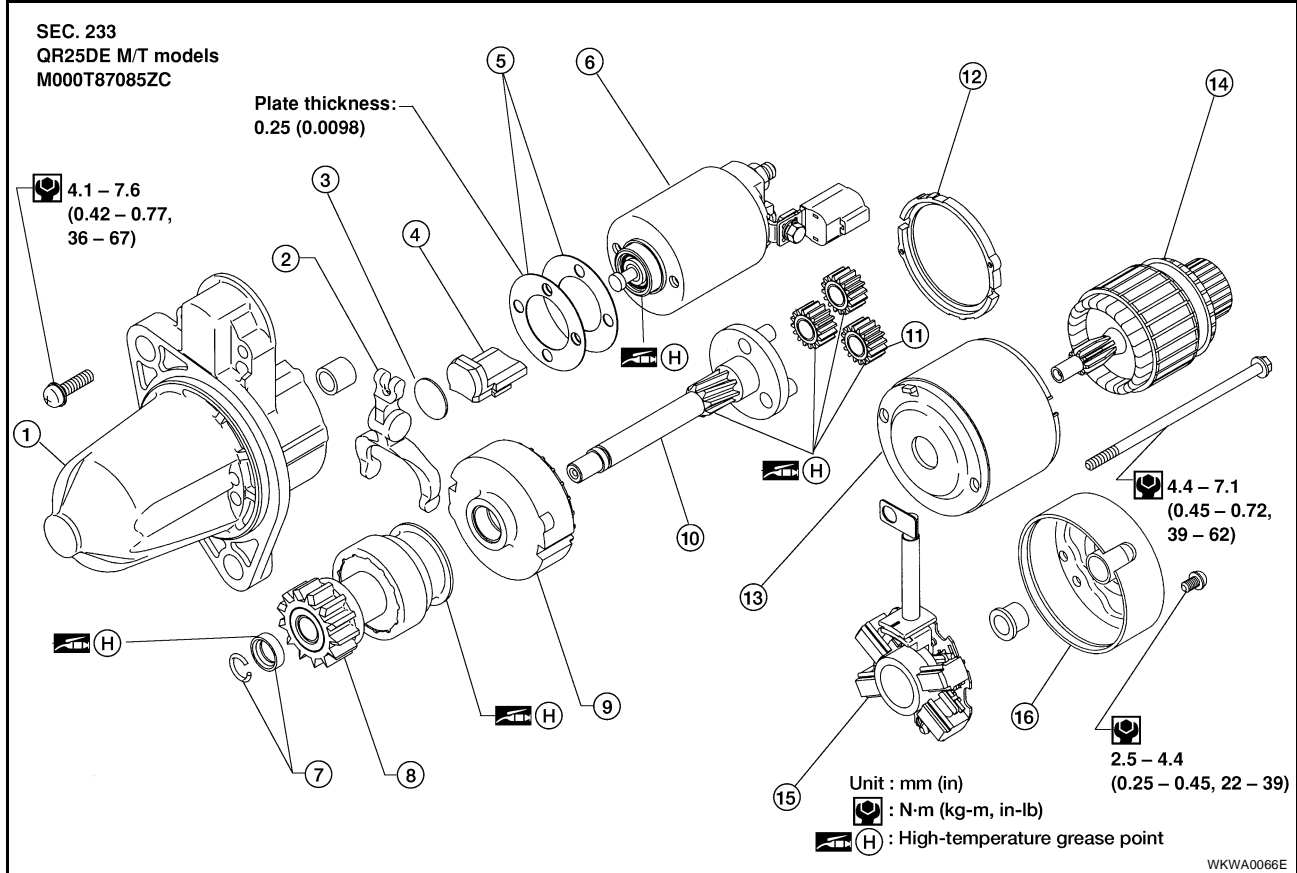
Construction

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| 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 |

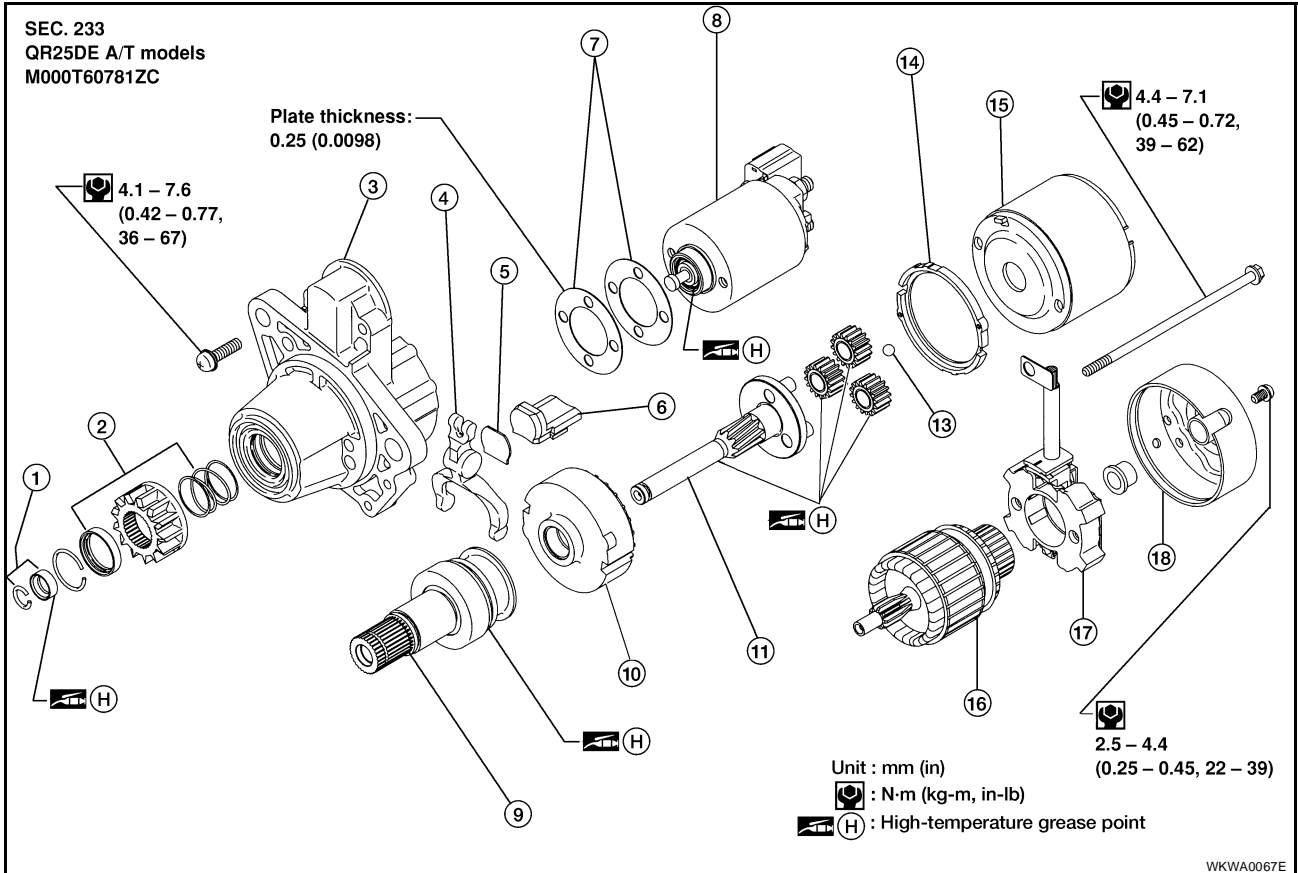
STARTING SYSTEM



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| 1. Gear case | 2. Shift lever | 3. Plate |
| 4. Packing | 5. Adjusting plate | 6. Magnetic switch assembly |
| 7. Pinion stopper set | 8. Pinion assembly | 9. Internal gear |
| 10. Pinion shaft | 11. Planetary gear | 12. Packing |
| 13. Yoke | 14. Armature | 15. Brush holder assembly |
| 16. Rear cover | | |

STARTING SYSTEM

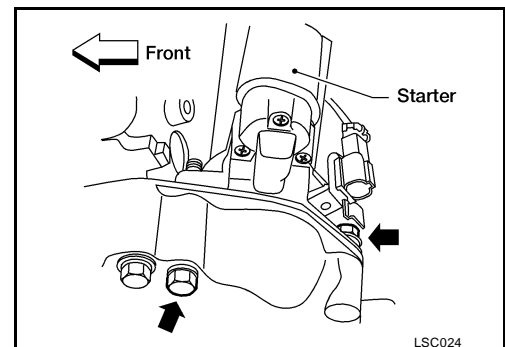


- | | | |
|-----------------------|-----------------------------|---------------------|
| 1. Pinion stopper set | 2. Pinion assembly | 3. Front bracket |
| 4. Shift lever | 5. Plate | 6. Packing |
| 7. Adjusting plate | 8. Magnetic switch assembly | 9. Clutch gear |
| 10. Internal gear | 11. Gear shaft | 12. Planetary gears |
| 13. Ball | 14. Center bracket | 15. Yoke assembly |
| 16. Armature | 17. Brush assembly | 18. Rear bracket |

Removal and Installation QG18DE

Removal

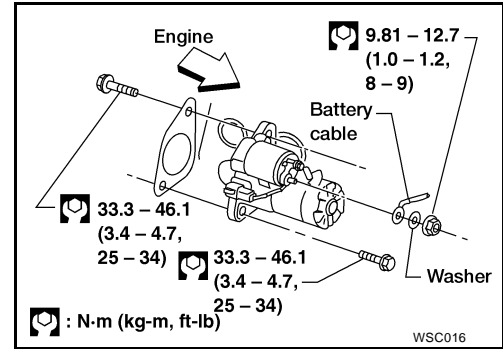
1. Disconnect the negative battery terminal.
2. Remove the upper starter mounting bolt.
3. Remove the harness protector from the starter engine room harness.
4. Disconnect the starter harness connectors.
5. Remove the lower starter mounting bolt.
6. Remove the starter.



STARTING SYSTEM

Installation

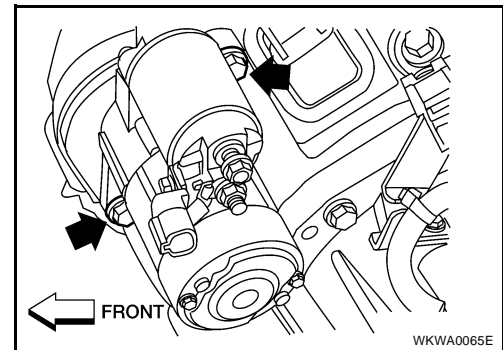
To install, reverse the removal procedure.



QR25DE

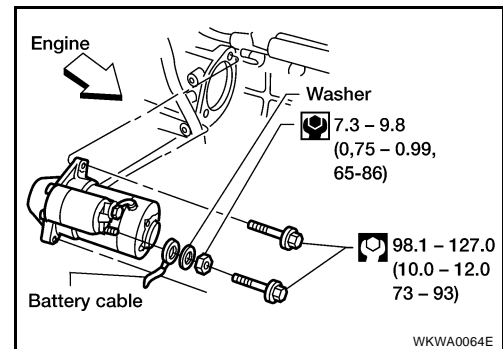
Removal

1. Disconnect the negative and positive battery cables.
2. Remove the engine undercover (M/T) or the air duct, fresh air intake hose, and air cleaner lid (A/T).
3. Disconnect the starter harness connectors.
4. Remove the two starter mounting bolts.
5. Remove the starter.



Installation

To install, reverse the removal procedure.



EKS0037V

Pinion/Clutch Check

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/planetary gear teeth.
 - Replace planetary 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.

CHARGING SYSTEM

PFP:23100

System Description

EKS0037W

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 (QG18DE) or 120A (QR25DE) 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 (QG18DE) or 120A (QR25DE) 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 terminals 20 and 26 (without tachometer), terminals 6 and 41 (QG18DE with tachometer) or terminals 7 and 14 (QR25DE engine) for the charge warning lamp.

Ground is supplied to terminal 13 (without tachometer), terminal 19 (QG18DE with tachometer) or terminal 23 (QR25DE engine) 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.

A

B

C

D

E

F

G

H

I

J

SC

L

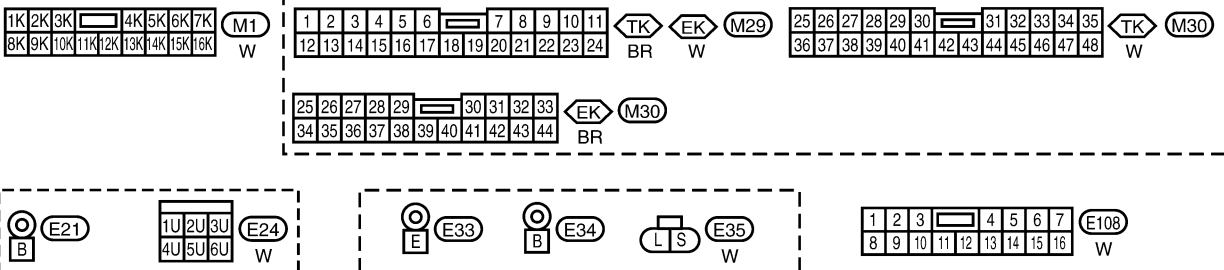
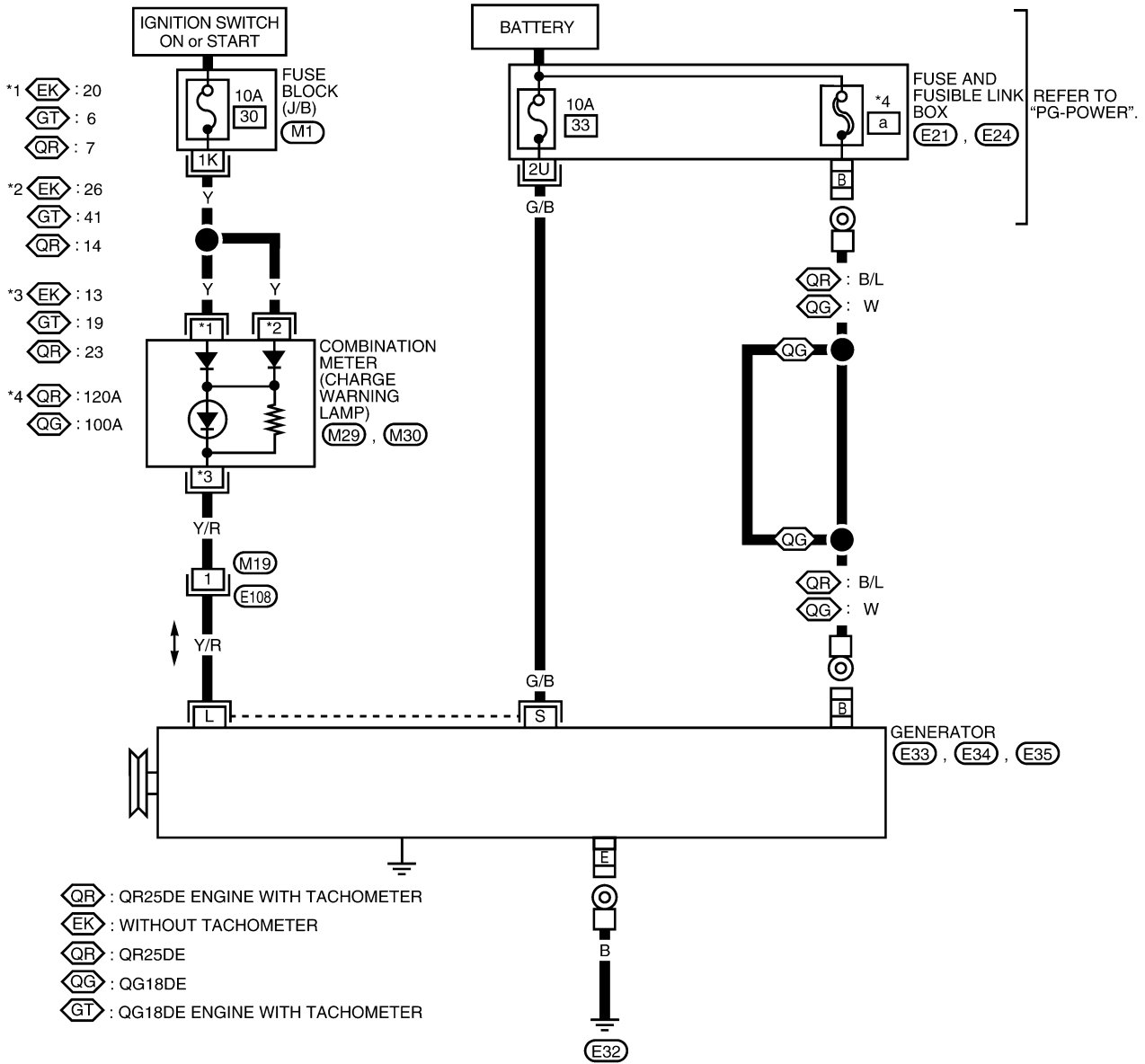
M

CHARGING SYSTEM

Wiring Diagram — CHARGE —

EKS0037X

SC-CHARGE-01



WKWA1149E

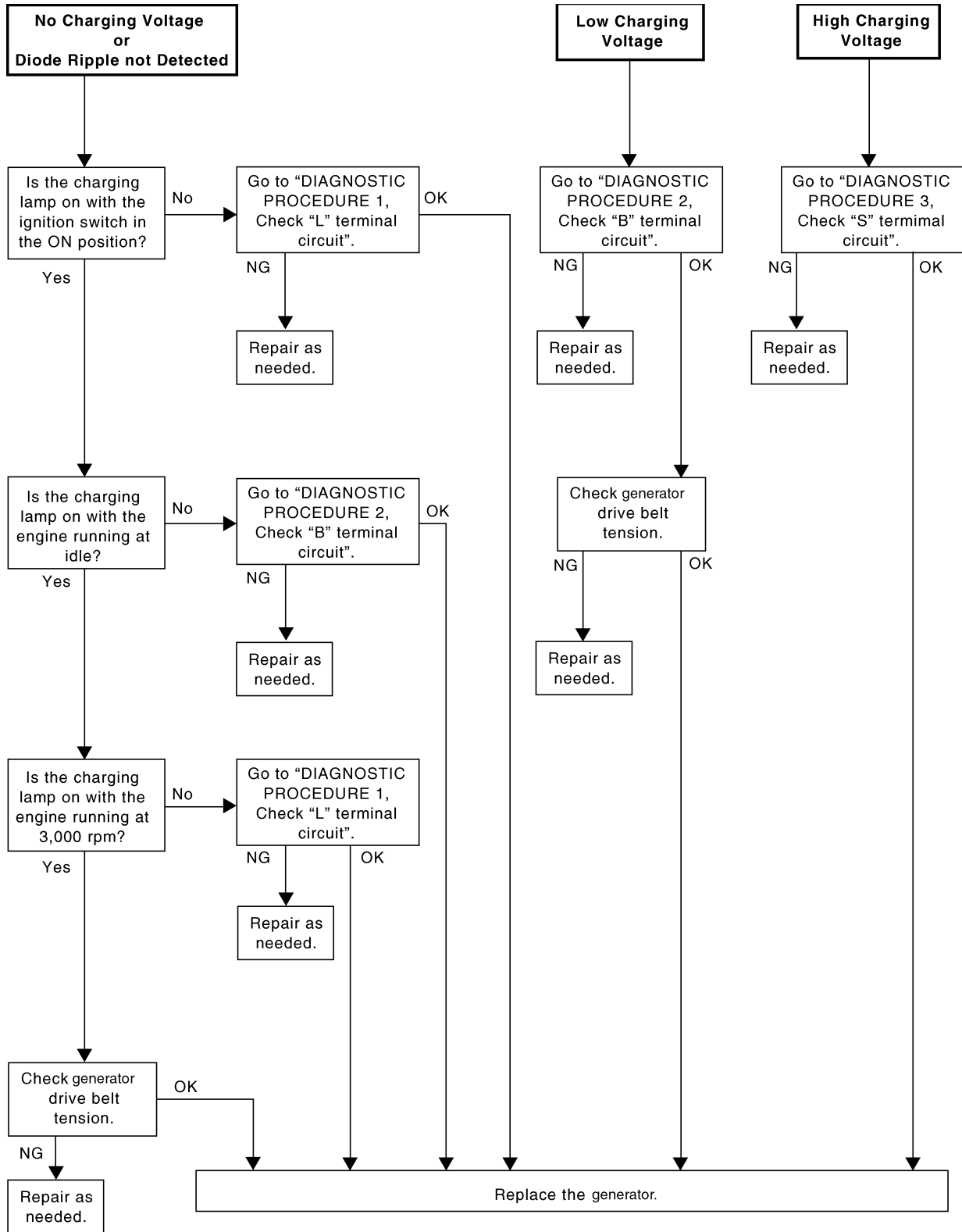
CHARGING SYSTEM

Trouble Diagnoses with Starting/Charging System Tester (Charging)

EKS0037Y

For charging system testing, use Starting/Charging System Tester (J-44373). For details and operating instructions, refer to Technical Service Bulletin.

WORK FLOW



LSC047

A
B
C
D
E
F
G
H
I
J
SC
L
M

CHARGING SYSTEM

DIAGNOSTIC PROCEDURE 1

Check "L" Terminal Circuit

1. CHECK "L" TERMINAL CONNECTION

Check to see if "L" terminal is clean and tight.

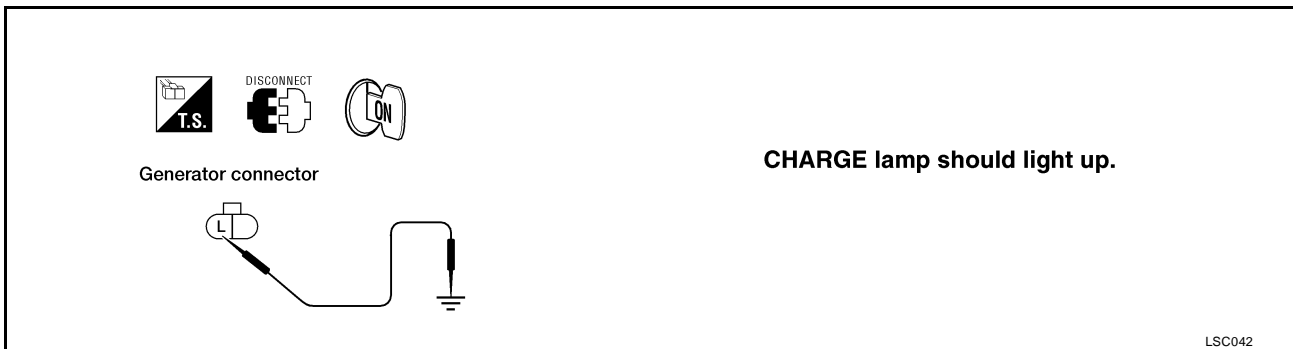
OK or NG

OK >> GO TO 2.

NG >> Repair "L" terminal connection. Confirm repair by performing complete Starting/Charging system test.

2. CHECK "L" TERMINAL CIRCUIT

1. Disconnect E35 connector from generator.
2. Apply ground to connector E35 terminal L (Y/R) with the ignition switch in the ON position.



OK or NG

OK >> Replace the generator. Confirm repair by performing complete Starting/Charging system test.

NG >> Check the following.

- 10A fuse [No. 30, located in fuse block (J/B)]
- CHARGE lamp
- Harness for open or short between combination meter and fuse
- Harness for open or short between combination meter and generator

CHARGING SYSTEM

DIAGNOSTIC PROCEDURE 2

Check "B" Terminal Circuit

1. CHECK "B" TERMINAL CONNECTION

Check to see if "B" terminal is clean and tight.

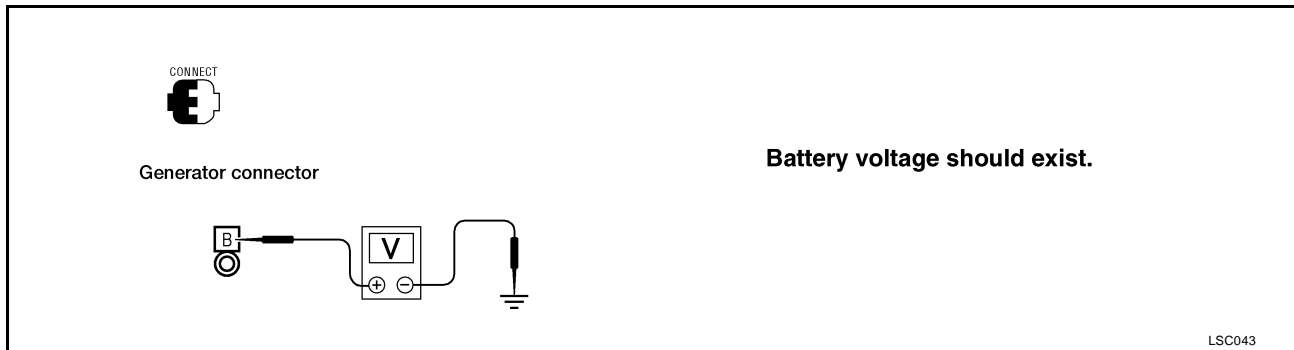
OK or NG

OK >> GO TO 2.

NG >> Repair "B" terminal connection. Confirm repair by performing complete Starting/Charging system test.

2. CHECK GENERATOR "B" TERMINAL CIRCUIT

Check voltage between generator connector E34 terminal B (B/L) (QG18DE), (W) (QR25DE) and ground using a digital circuit tester.



OK or NG

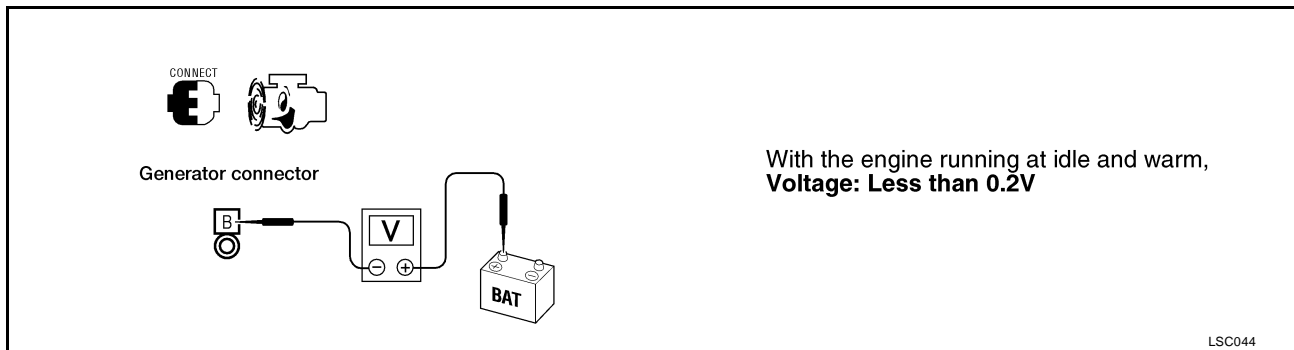
OK >> GO TO 3.

NG >> Check the following.

- 100A (QG18DE), 120A (QR25DE) fusible link (letter a , located in fuse and fusible link box)
- Harness for open or short between generator and fusible link

3. CHECK "B" TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)

Check voltage between generator connector E34 terminal B (B/L) (QG18DE), (W) (QR25DE) and battery positive terminal using a digital circuit tester.



OK or NG

OK >> Replace the generator. Confirm repair by performing complete Starting/Charging system test.

NG >> Check harness between the battery and the generator for poor continuity.

CHARGING SYSTEM

DIAGNOSTIC PROCEDURE 3

Check "S" Terminal Circuit

1. CHECK "S" TERMINAL CONNECTION

Check to see if "S" terminal is clean and tight.

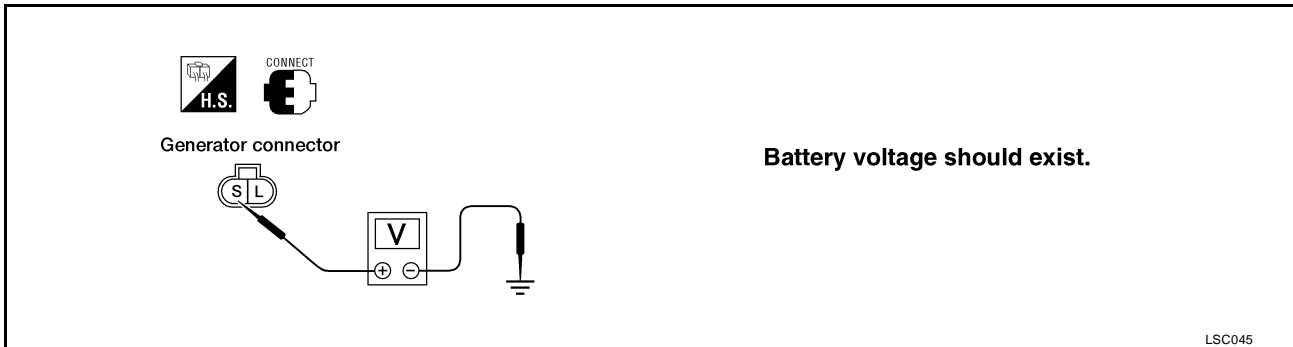
OK or NG

OK >> GO TO 2.

NG >> Repair "S" terminal connection. Confirm repair by performing complete Starting/Charging system test.

2. CHECK GENERATOR "S" TERMINAL CIRCUIT

Check voltage between generator connector E35 terminal S (G/B) and ground using a digital circuit tester.



OK or NG

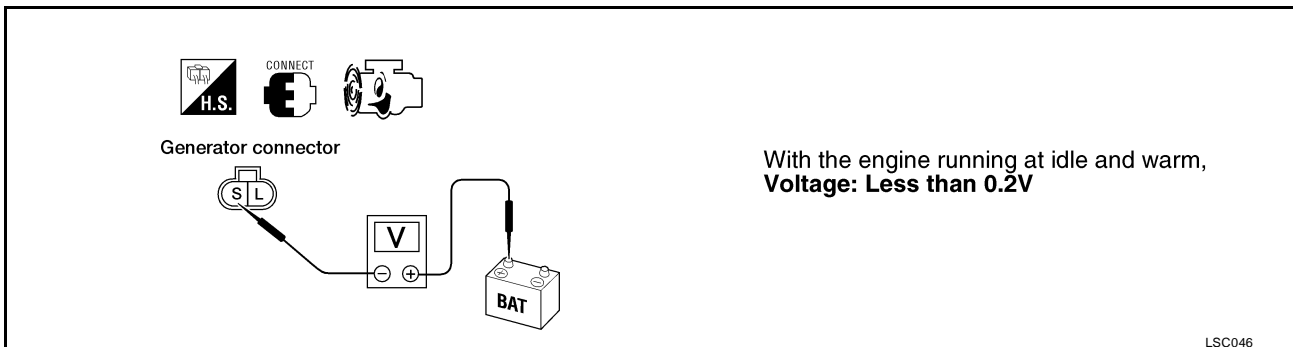
OK >> GO TO 3.

NG >> Check the following.

- 10A fuse (No. 33, located in fuse and fusible link box)
- Harness for open or short between generator and fuse

3. CHECK "S" TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)

Check voltage between generator connector E35 terminal S (G/B) and battery positive terminal using a digital circuit tester.



OK or NG

OK >> Replace the generator. Confirm repair by performing complete Starting/Charging system test.

NG >> Check harness between the battery and the generator for poor continuity.

CHARGING SYSTEM

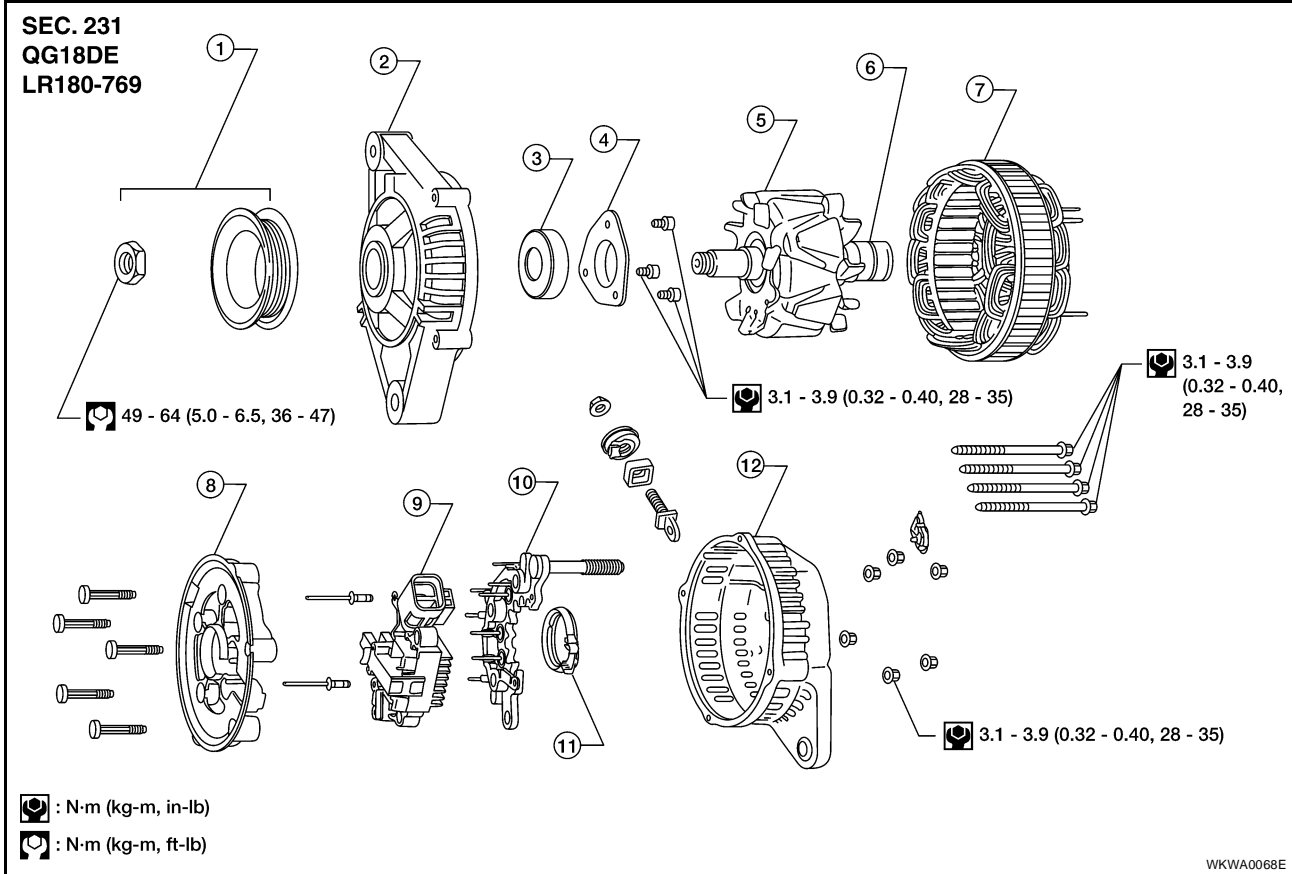
MALFUNCTION INDICATOR

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

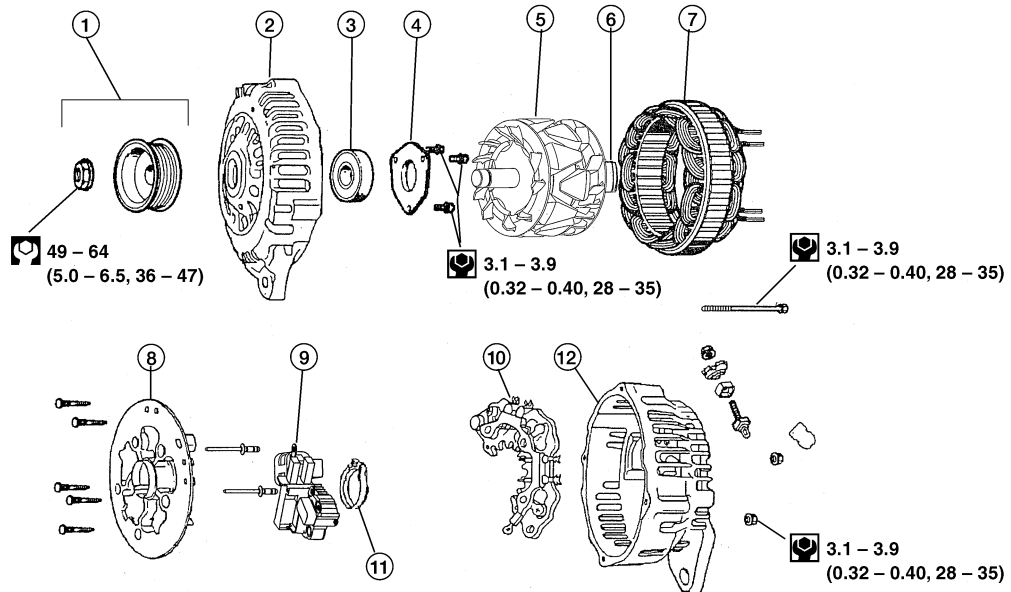
EKS0037Z



- | | | |
|--------------------|----------------|--------------------------|
| 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 |

CHARGING SYSTEM

SEC231
QR25DE
LR1100-734



: N·m (kg·m, in·lb)

: N·m (kg·m, ft·lb)

WKIA0136E

- | | | |
|--------------------|----------------|--------------------------|
| 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 |

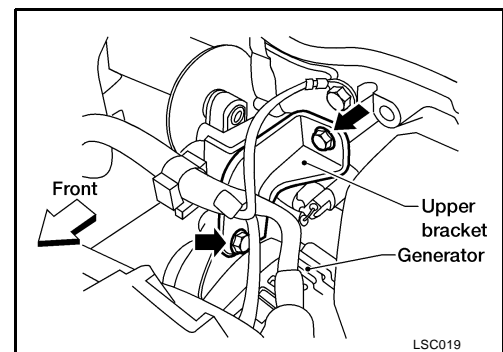
Removal and Installation

QG18DE

EKS00380

Removal

1. Disconnect the negative battery terminal.
2. Remove the front/right-side engine 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.

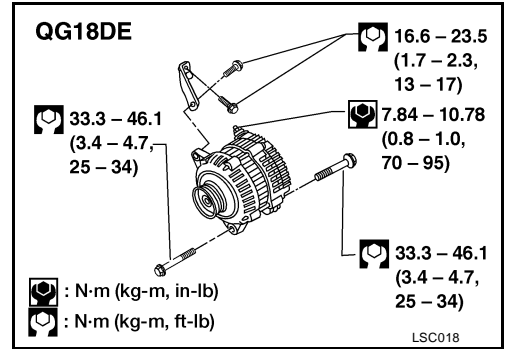


LSC019

CHARGING SYSTEM

Installation

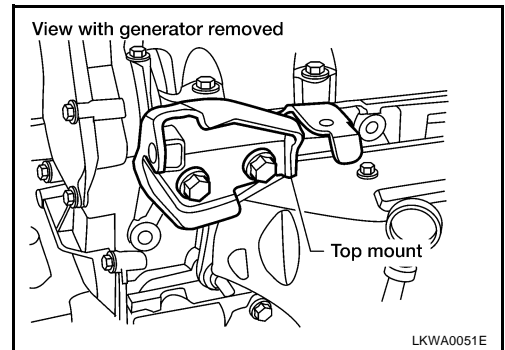
To install, reverse the removal procedure.



QR25DE

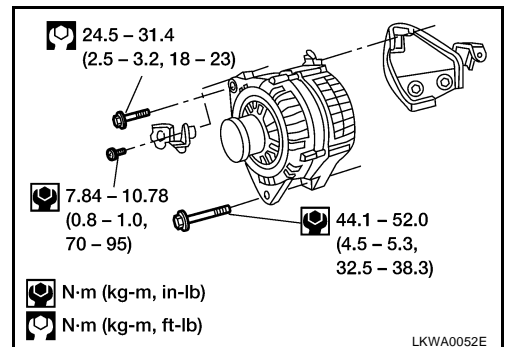
Removal

1. Disconnect the negative battery cable.
2. Remove the front/right-side engine undercover.
3. Remove the drive belt.
4. Disconnect the generator harness connectors.
5. Disconnect the engine ground wire from the top mount.
6. Remove the generator upper and lower mount bolts.
7. Set the generator aside and remove the generator top mount.
8. Slide the generator out and remove.



Installation

To install, reverse the removal procedure.



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PF:00030

Battery

EKS00381

| | | |
|--|-------------------|-------------------|
| Application | QG18DE | QR25DE |
| Type | GR.21R (BCI) | GR.24R (BCI) |
| Capacity (20 HR) minimum V-AH | 12-49 | 12-63 |
| Cold cranking current A (For reference value) | 356 @ -18°C (0°F) | 550 @ -18°C (0°F) |

Starter

EKS00382

| | | | |
|--|---------------------------|--|--|
| Application | QG18DE | QR25DE | |
| Manufacturer | Hitachi S114-900 | Mitsubishi M000T87085ZC | Mitsubishi M000T60781ZC |
| | | M/T models | A/T models |
| Type | Reduction gear type | Reduction gear type | |
| System voltage | 12V | 12V | |
| No-load | Terminal voltage | 11V | |
| | Current | 90A Max. | |
| | Revolution | 2,500 rpm Min. | |
| Minimum diameter of commutator | 32.1 mm | 28.8 mm | |
| Minimum length of brush | 10.7 mm | 5.5 mm | 7.0 mm |
| Brush spring tension | 11.5 N (1.17 kg, 2.58 lb) | 15.0 - 20.4 (1.53 - 2.08 kg, 3.37 - 4.59 lb) | 18.3 - 24.8 (1.87 - 2.53 kg, 4.11 - 5.58 lb) |
| Clearance between pinion front edge and pinion stopper | 1.8 mm | 0.5 - 2.0 mm | |

Generator

EKS00383

| | | |
|---|---|---|
| Application | QG18DE | QR25DE |
| Type | LR180-769 | LR1100-734 |
| | HITACHI | |
| Nominal rating | 12V-80A | 12V-110A |
| Ground polarity | Negative | |
| Minimum revolution under no-load (When 13.5 volts is applied) | 1,000 rpm | 950 rpm |
| Hot output current (When 13.5 volts is applied) | 23A/1,300 rpm 66A/2,500 rpm 79A/5,000 rpm | 35A/1,300 rpm 83A/2,500 rpm 95A/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 | 2.67 ohms | 2.31 ohms |