

# STARTING & CHARGING SYSTEMS

## SECTION SC

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## PRECAUTIONS

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

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

NLSC0001

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 V10 is as follows (The composition varies according to the destination and optional equipment.):

- 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 intentional 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 covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

### Wiring Diagrams and Trouble Diagnoses

NLSC0002

When you read wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-10, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnoses, refer to the following:

- GI-32, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSES"
- GI-21, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

# BATTERY

How to Handle Battery

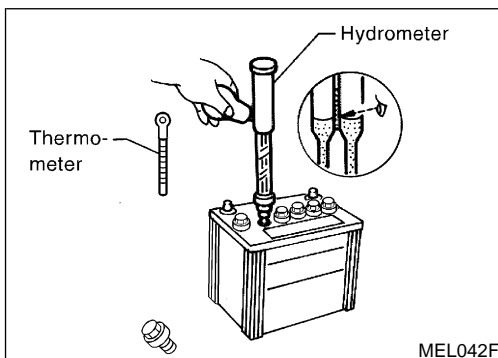
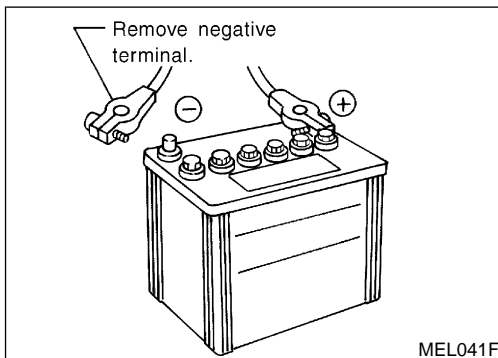
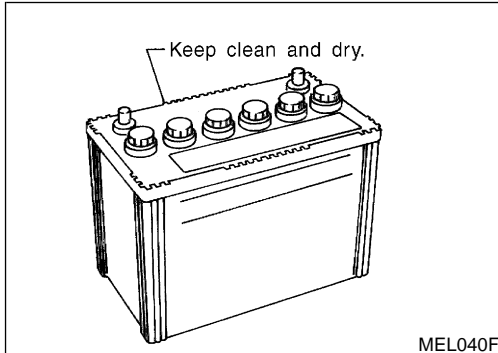
## How to Handle Battery

NLSC0003

### CAUTION:

If it becomes necessary to start the engine with a booster battery and jumper cables,

- 1) Use a 12-volt booster battery.
- 2) After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.
- 3) Never add distilled water through the hole used to check specific gravity.



## METHODS OF PREVENTING OVER-DISCHARGE

NLSC0003S01

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

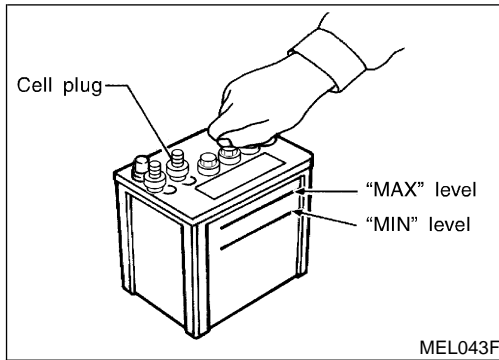
NLSC0003S02

### WARNING:

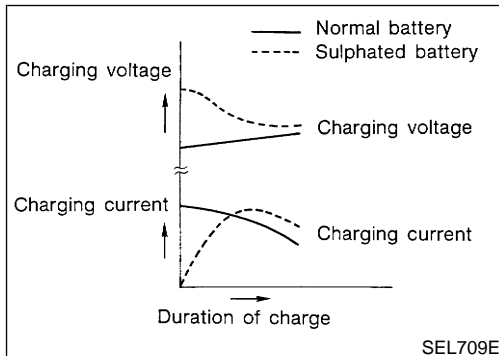
Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

# BATTERY

## How to Handle Battery (Cont'd)



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



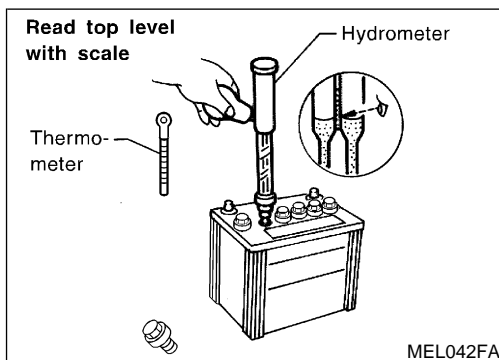
### Sulphation

NLSC0003S0201

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

NLSC0003S03

1. Read hydrometer and thermometer indications at eye level.

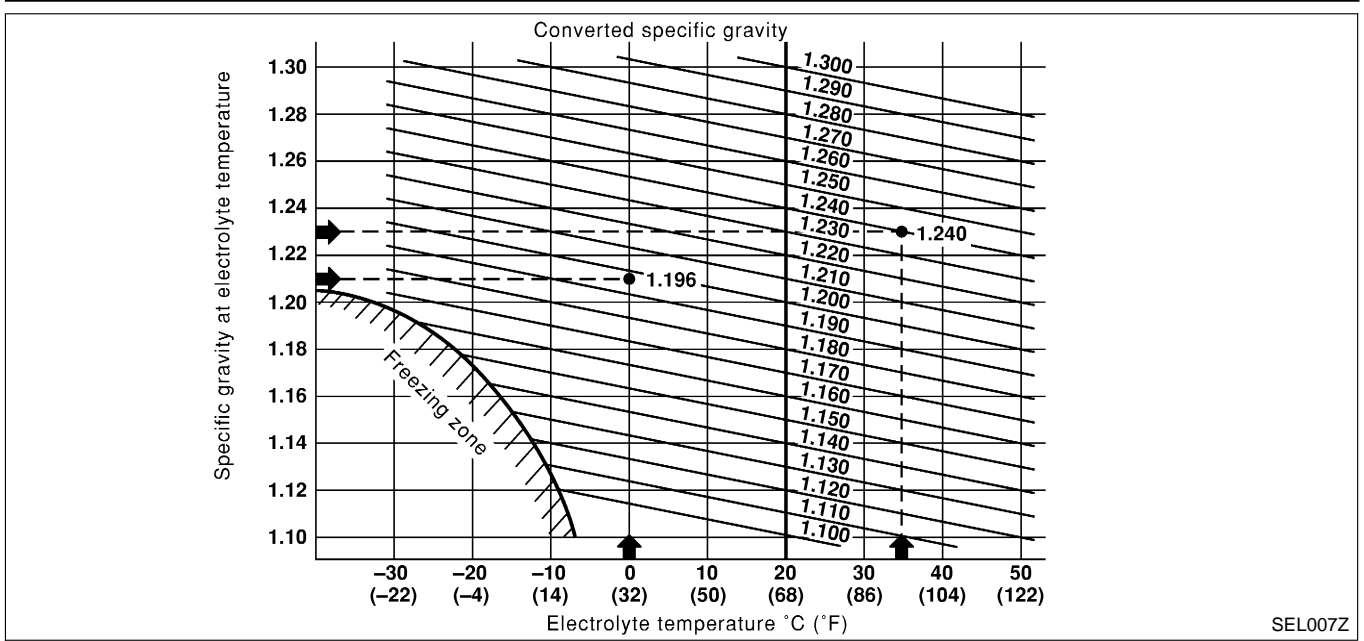
2. Convert into specific gravity at 20°C (68°F).

Example:

- When electrolyte temperature is 35°C (95°F) and specific gravity of electrolyte is 1.230, converted specific gravity at 20°C (68°F) is 1.240.
- When electrolyte temperature is 0°C (32°F) and specific gravity of electrolyte is 1.210, converted specific gravity at 20°C (68°F) is 1.196.

# BATTERY

How to Handle Battery (Cont'd)



SEL007Z

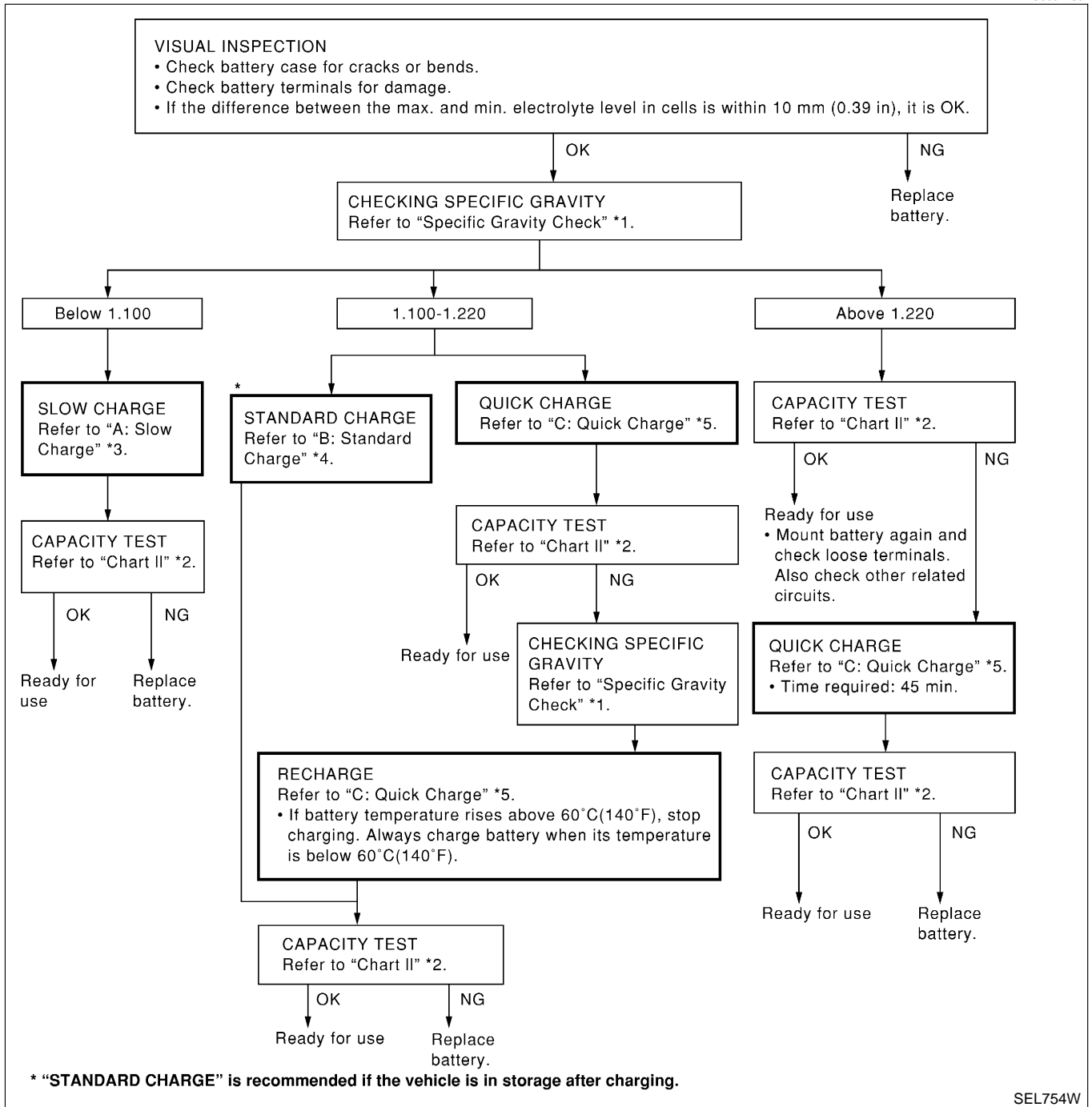
# BATTERY

## Battery Test and Charging Chart

NLSC0017

### CHART I

NLSC0017S01



SEL754W

\*1: SC-4  
\*2: SC-7

\*3: SC-8  
\*4: SC-10

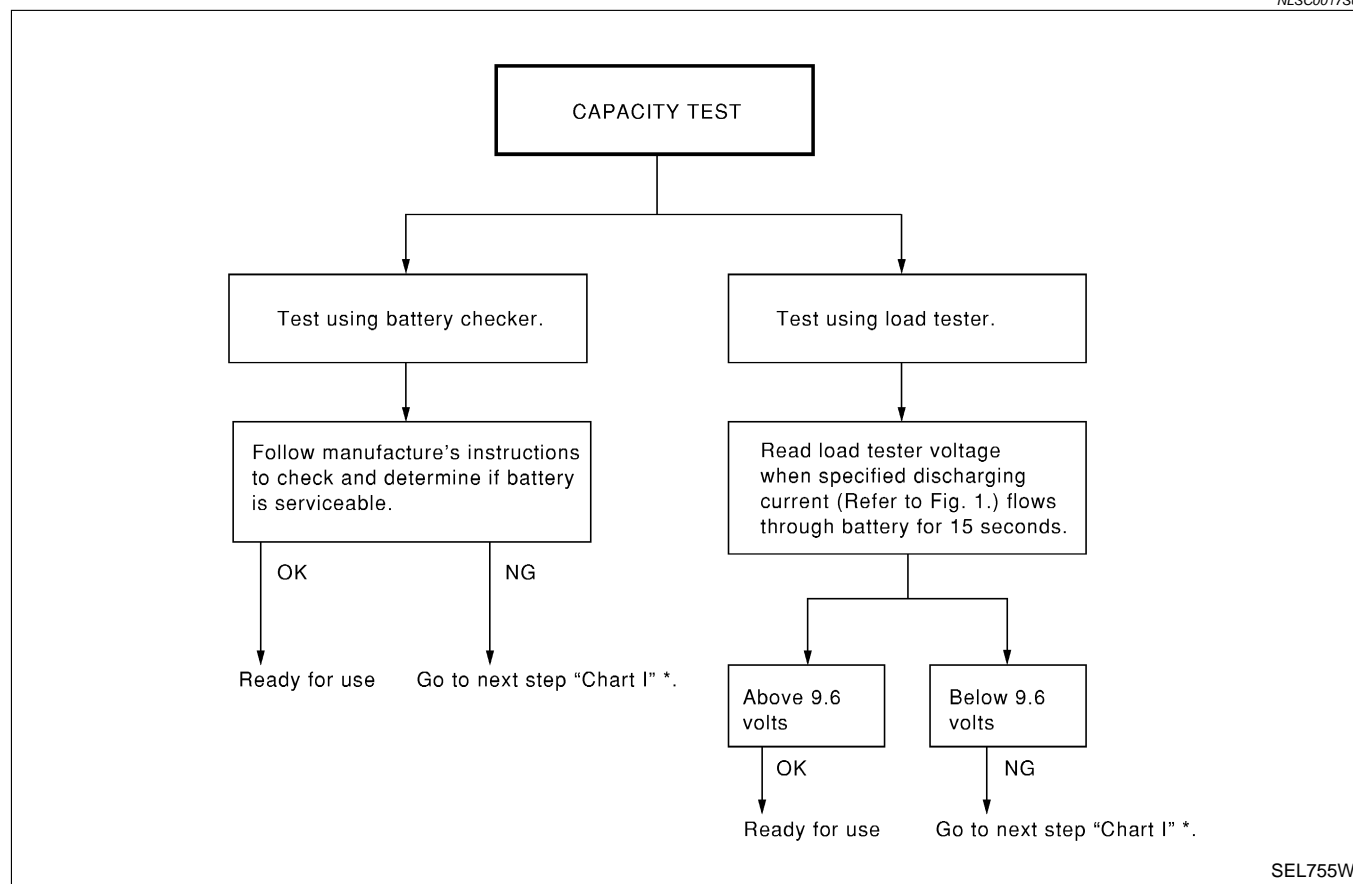
\*5: SC-11

# BATTERY

Battery Test and Charging Chart (Cont'd)

## CHART II

NLSC0017S02



SEL755W

\*: SC-6

- Check battery type and determine the specified current using the following table.

Fig. 1 DISCHARGING CURRENT (Load Tester)

Type	Current (A)
28B19R(L)	90
34B19R(L)	99
46B24R(L)	135
55B24R(L)	135
079 [YUASA type code]	135
50D23R(L)	150
55D23R(L)	180
65D26R(L)	195
80D26R(L)	195
75D31R(L)	210
95D31R(L)	240
115D31R(L)	240
025 [YUASA type code]	240
065 [YUASA type code]	255

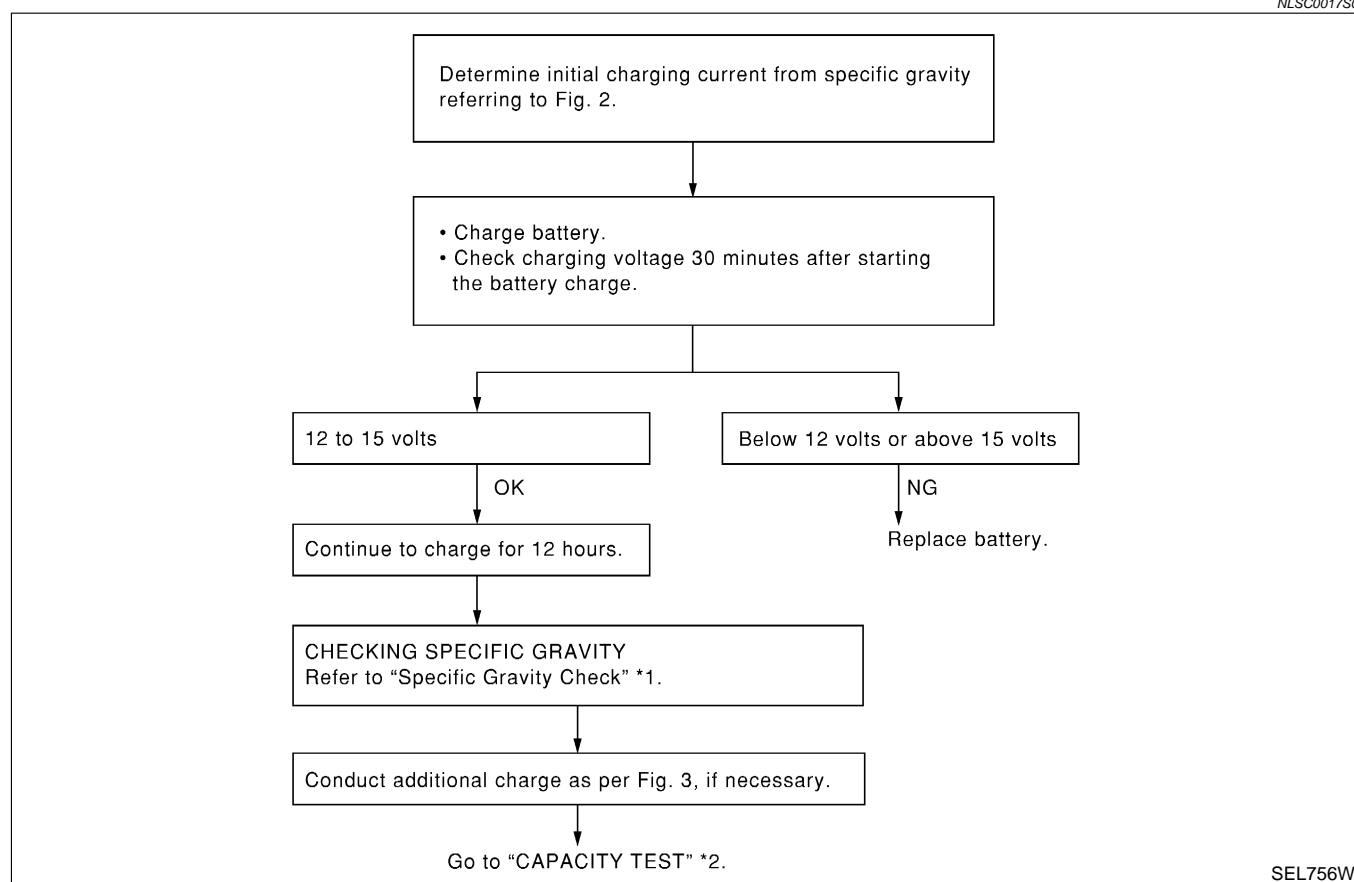
# BATTERY

## Battery Test and Charging Chart (Cont'd)

Type	Current (A)
027 [YUASA type code]	285
075 [YUASA type code]	300
110D26R(L)	300
95E41R(L)	300
067 [YUASA type code]	325
130E41R(L)	330
096 [YUASA type code]	375

### A: SLOW CHARGE

NLSC0017S03



SEL756W

\*1: SC-4

\*2: SC-7



# BATTERY

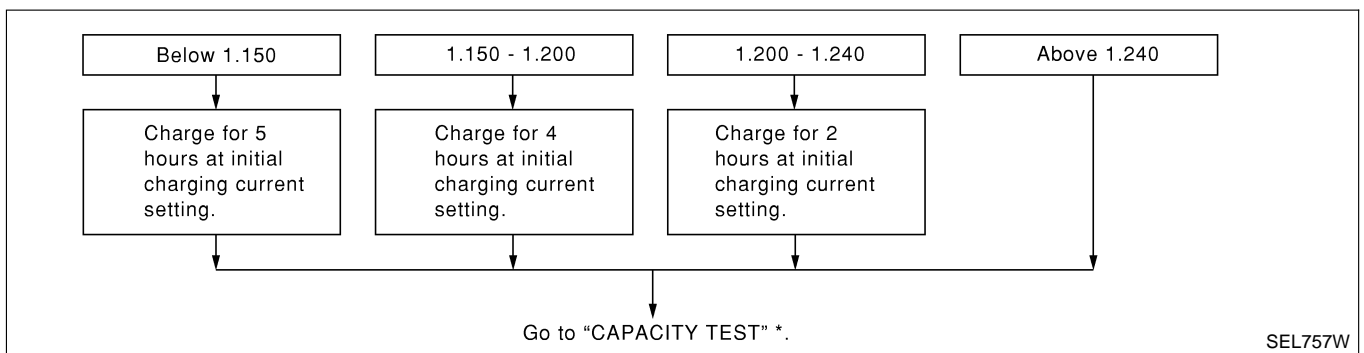
Battery Test and Charging Chart (Cont'd)

Fig. 2 INITIAL CHARGING CURRENT SETTING (Slow charge)

CON- VERTED SPECIFIC GRAVITY	BATTERY TYPE																					
	28B19R(L)	34B19R(L)	46B24R(L)	55B24R(L)	079 [YUASA type code]	50D23R(L)	55D23R(L)	025 [YUASA type code]	027 [YUASA type code]	65D26R(L)	80D26R(L)	067 [YUASA type code]	096 [YUASA type code]	75D31R(L)	065 [YUASA type code]	075 [YUASA type code]	95D31R(L)	115D31R(L)	110D26R(L)	95E41R(L)	130E41R(L)	
Below 1.100	4.0 (A)		5.0 (A)			7.0 (A)				8.0 (A)			8.5 (A)	9.0 (A)			10.0 (A)					14.0 (A)

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

Fig. 3 ADDITIONAL CHARGE (Slow charge)



\*: SC-7

### CAUTION:

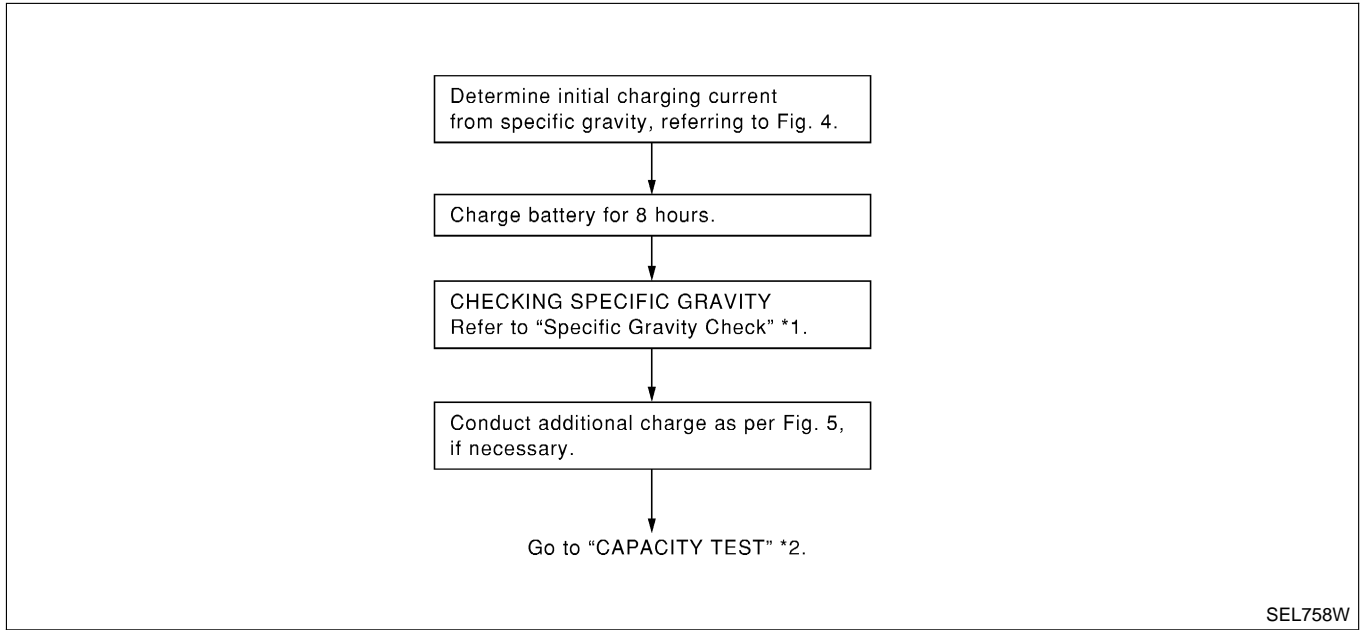
- Set charging current to value specified in Fig. 2. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

# BATTERY

Battery Test and Charging Chart (Cont'd)

## B: STANDARD CHARGE

NLSC0017S04



SEL758W

\*1: SC-4

\*2: SC-7

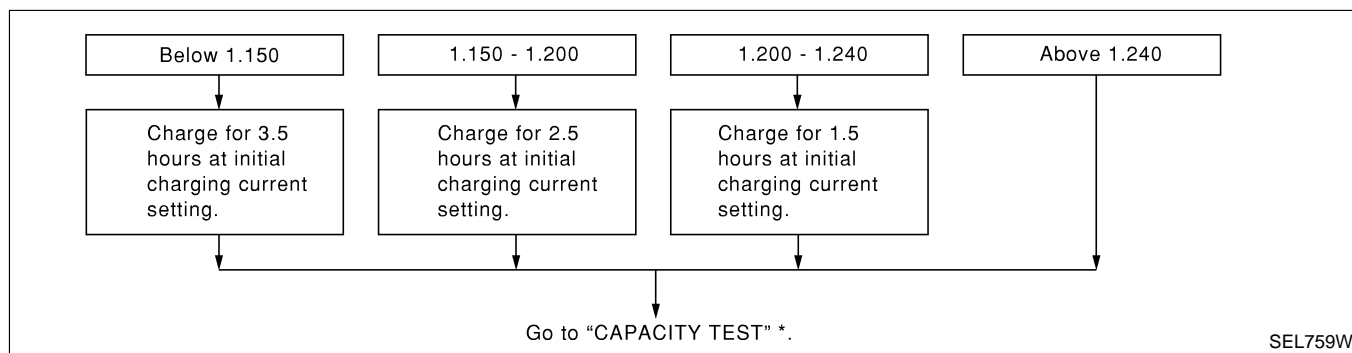
Fig. 4 INITIAL CHARGING CURRENT SETTING (Standard charge)

CON- VERTED SPECIFIC GRAVITY	BATTERY TYPE																130E41R(L)		
	28B19R(L)	34B19R(L)	46B24R(L)	55B24R(L)	079 [YUASA type code]	50D23R(L)	55D23R(L)	65D26R(L)	80D26R(L)	025 YUASA type code	027 YUASA type code	067 YUASA type code	096 YUASA type code	75D31R(L)	065 YUASA type code	075 YUASA type code		95D31R(L)	115D31R(L)
1.100 - 1.130	4.0 (A)		5.0 (A)		6.0 (A)		7.0 (A)					8.0 (A)		9.0 (A)				13.0 (A)	
1.130 - 1.160	3.0 (A)		4.0 (A)		5.0 (A)		6.0 (A)					7.0 (A)		8.0 (A)				11.0 (A)	
1.160 - 1.190	2.0 (A)		3.0 (A)		4.0 (A)		5.0 (A)					6.0 (A)		7.0 (A)				9.0 (A)	
1.190 - 1.220	2.0 (A)		2.0 (A)		3.0 (A)		4.0 (A)					5.0 (A)		5.0 (A)				7.0 (A)	

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

# BATTERY

Fig. 5 ADDITIONAL CHARGE (Standard charge)



SEL759W

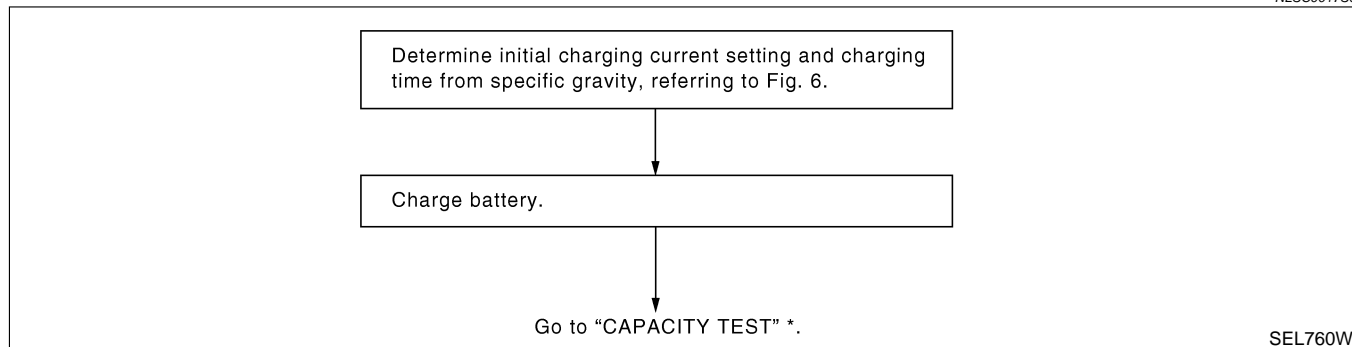
\*: SC-7

## CAUTION:

- Do not use standard charge method on a battery whose specific gravity is less than 1.100.
- Set charging current to value specified in Fig. 4. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

## C: QUICK CHARGE

NLSC0017S05



SEL760W

\*: SC-7

## BATTERY

Battery Test and Charging Chart (Cont'd)

Fig. 6 INITIAL CHARGING CURRENT SETTING AND CHARGING TIME (Quick charge)

BATTERY TYPE		28B19R(L)	34B19R(L)	46B24R(L)	55B24R(L)	50D23R(L)	079 [YUASA type code]	55D23R(L)	66D26R(L)	80D26R(L)	025 [YUASA type code]	027 [YUASA type code]	065 [YUASA type code]	075 [YUASA type code]	067 [YUASA type code]	096 [YUASA type code]	75D31R(L)	95D31R(L)	115D31R(L)	110D26R(L)	95E41R(L)	130E41R(L)
CURRENT [A]		10 (A)	15 (A)		20 (A)			25 (A)			30 (A)			40 (A)								
CONVERTED SPECIFIC GRAVITY	1.100 - 1.130	2.5 hours																				
	1.130 - 1.160	2.0 hours																				
	1.160 - 1.190	1.5 hours																				
	1.190 - 1.220	1.0 hours																				
	Above 1.220	0.75 hours (45 min.)																				

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

### CAUTION:

- Do not use quick charge method on a battery whose specific gravity is less than 1.100.
- Set initial charging current to value specified in Fig. 6. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- Be careful of a rise in battery temperature because a large current flow is required during quick-charge operation.  
If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).
- Do not exceed the charging time specified in Fig. 6, because charging battery over the charging time can cause deterioration of the battery.

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## System Description

NLSC0004

### M/T MODELS

NLSC0004S01

Power is supplied at all times

- through 40A fusible link (letter **B**, located in the fuse and fusible link box)
- to ignition switch terminal 1.

With the ignition switch in START position, power is supplied

- from ignition switch terminal 5
- to starter motor harness connector terminal 1.

The starter motor plunger closes and provides a closed circuit between the battery and starter motor. The starter motor is grounded to the engine block. With power and ground supplied, cranking occurs and the engine starts.

### A/T MODELS

NLSC0004S02

Power is supplied at all times

- through 40A fusible link (letter **B**, located in the fuse and fusible link box)
- to ignition switch terminal 1.

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

- from ignition switch terminal 5
- to park/neutral position relay terminal 5.

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

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

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

- to park/neutral position relay terminal 2 through the park/neutral position switch
- from body grounds, F9 and F10.

Then park/neutral position relay is energized and power is supplied

- from park/neutral position relay terminal 3
- to starter motor harness connector terminal 1.

The starter motor plunger closes and provides a closed circuit between the battery and starter motor. The starter motor is grounded to the engine block. With power and ground supplied, cranking occurs and the engine starts.

# STARTING SYSTEM

Wiring Diagram — START —

## Wiring Diagram — START —

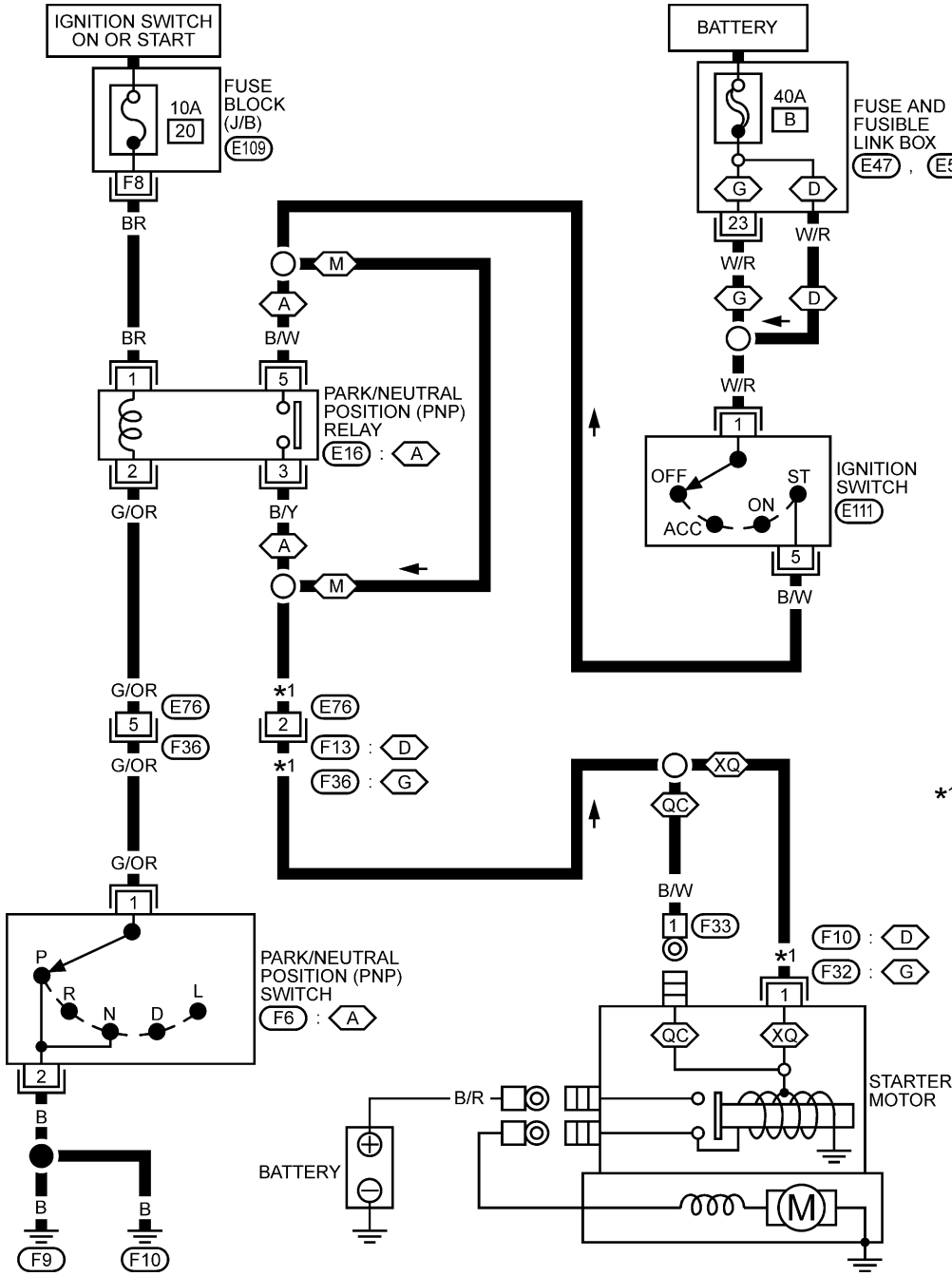
MODELS WITH FUSE AND FUSIBLE LINK BOX E43

NLSC0005

NLSC0005S06

SC-START-01

REFER TO EL-POWER.



QC : QG ENGINE FOR COLD AREA AND QG ENGINE FOR RHD MODELS

XQ : EXCEPT QC

QG : QG ENGINE

SR : SR ENGINE

G : GASOLINE ENGINE

D : DIESEL ENGINE

A : A/T MODELS

M : M/T MODELS

\*1 B/Y : A

B/W : M

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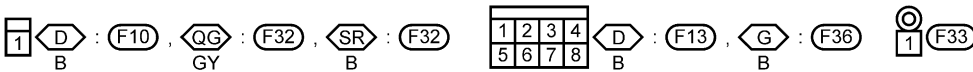
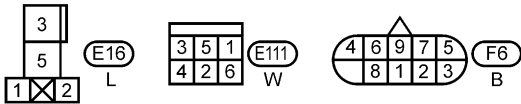
REFER TO THE FOLLOWING.

(E109) - FUSE BLOCK-

JUNCTION BOX (J/B)

(E47), (E58) - FUSE AND FUSIBLE LINK BOX

LINK BOX



YEL857B

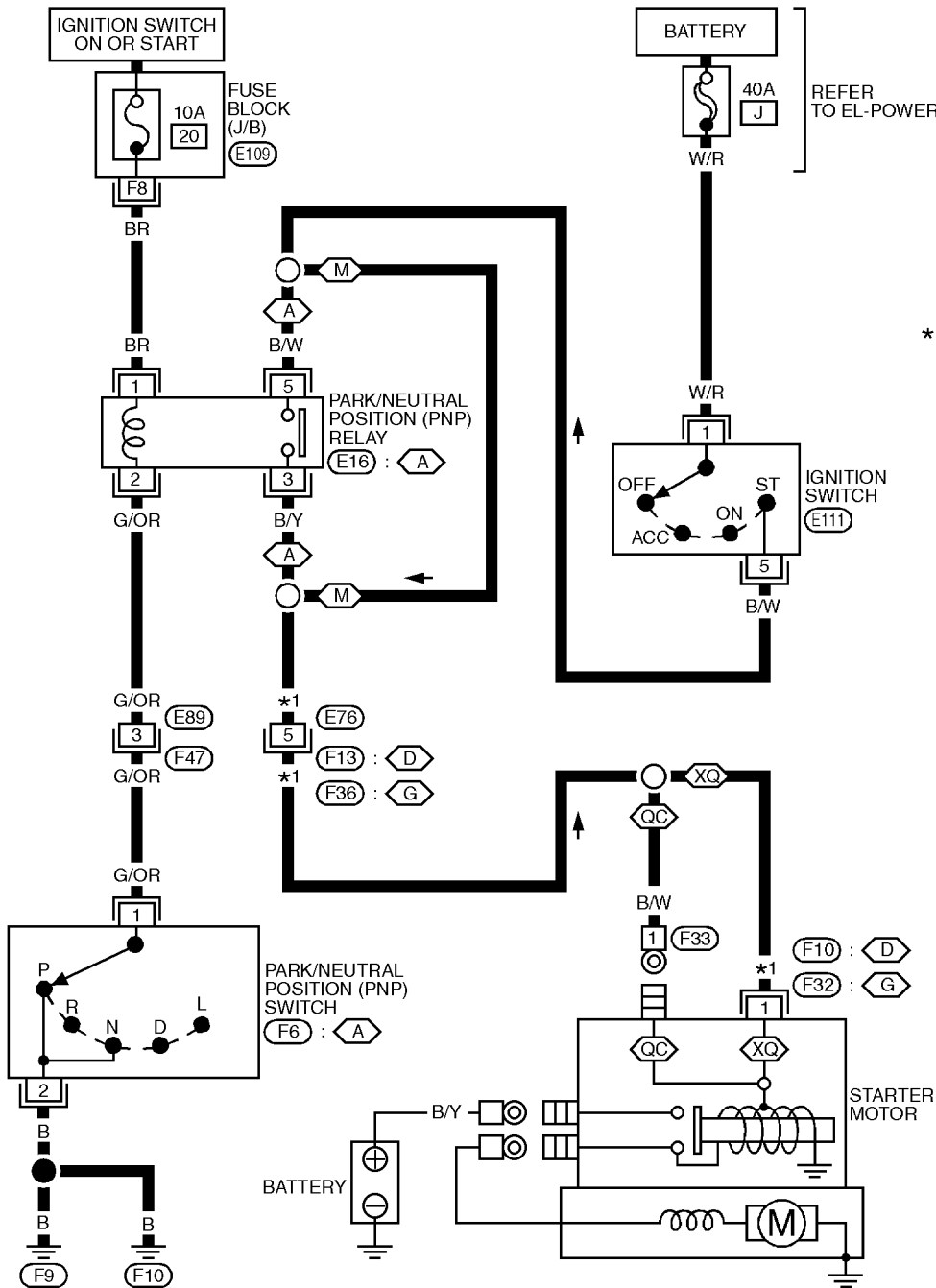
# STARTING SYSTEM

Wiring Diagram — START — (Cont'd)

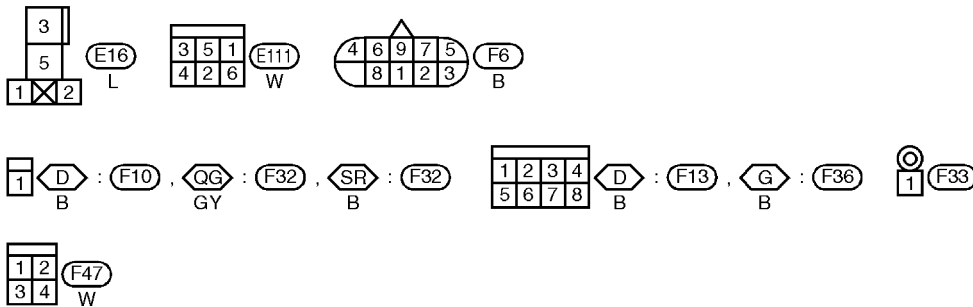
## MODELS WITH FUSE AND FUSIBLE LINK BOX E90

NLSC0005S07

### SC-START-01



- REFER TO EL-POWER.
- QC : QG ENGINE EXCEPT FOR COLD AREA
  - XQ : QG ENGINE COLD AREA, SR ENGINE AND YD ENGINE
  - G : GASOLINE ENGINE
  - D : DIESEL ENGINE
  - A : A/T MODELS
  - M : M/T MODELS
- \*1 B/Y : A  
B/W : M



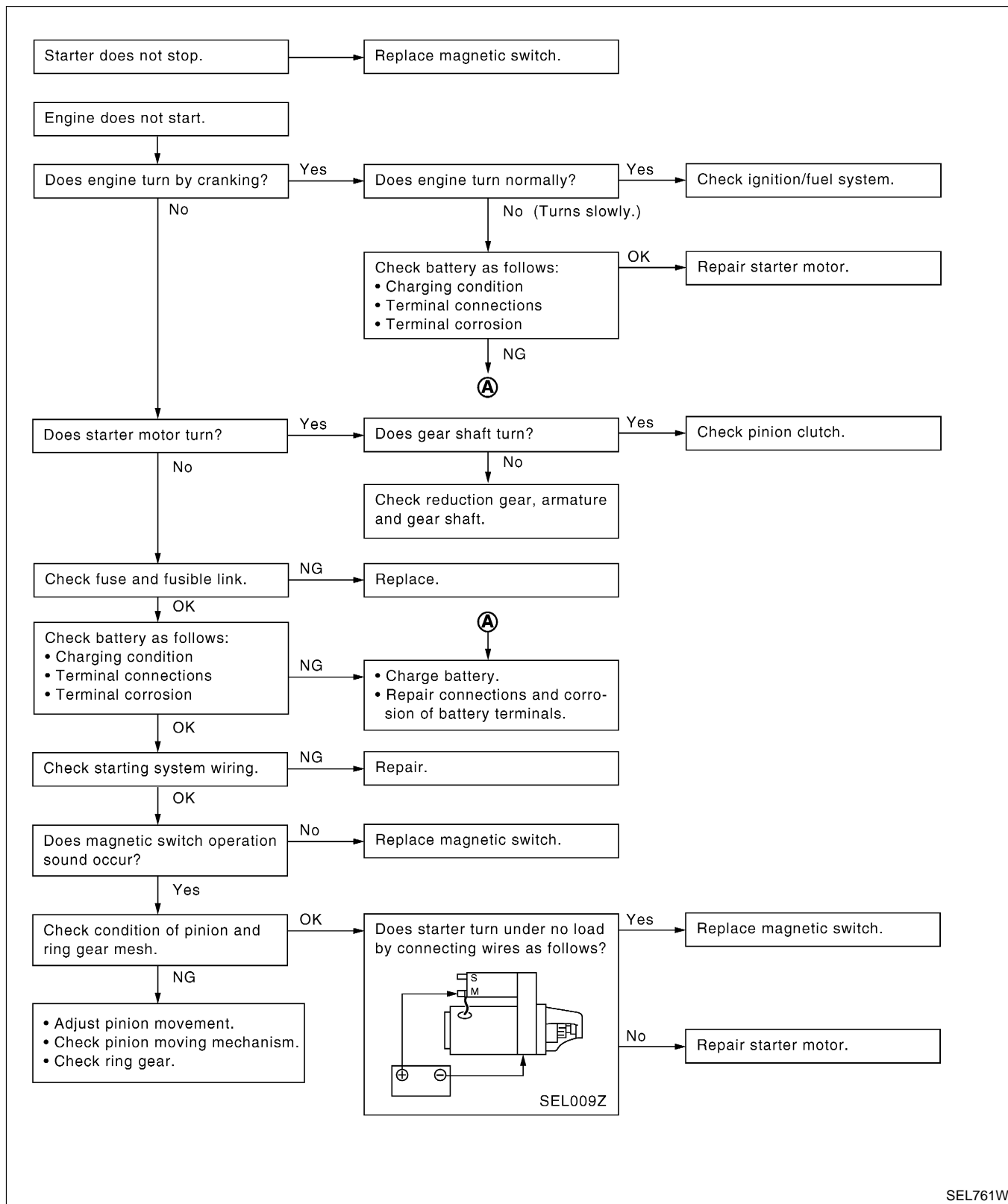
REFER TO THE FOLLOWING.  
E109 - FUSE BLOCK-  
JUNCTION BOX (J/B)

YEL387C

# STARTING SYSTEM

## Trouble Diagnoses

**If any abnormality is found, immediately disconnect battery negative terminal.**





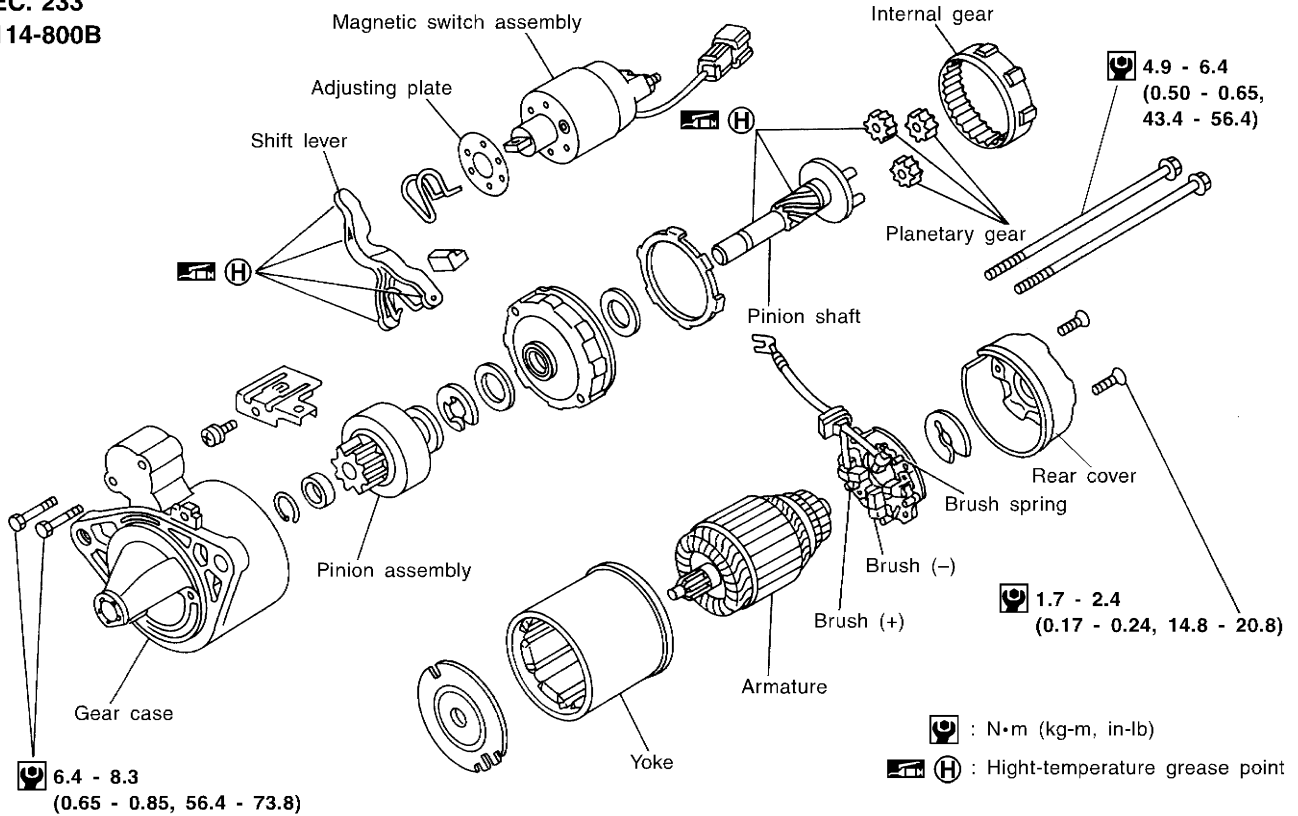
# STARTING SYSTEM

Construction

## Construction

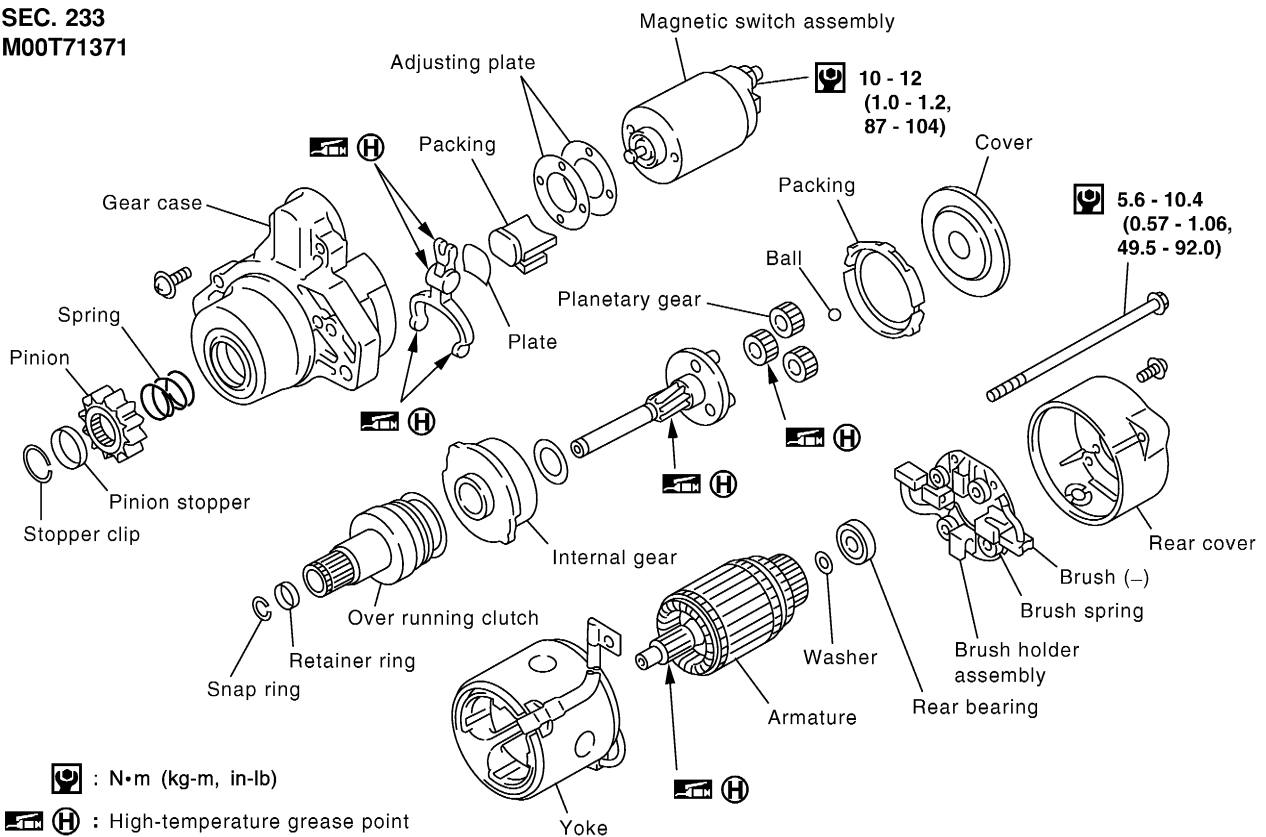
NLSC0006

SEC. 233  
S114-800B



SEL027UC

SEC. 233  
M00T71371

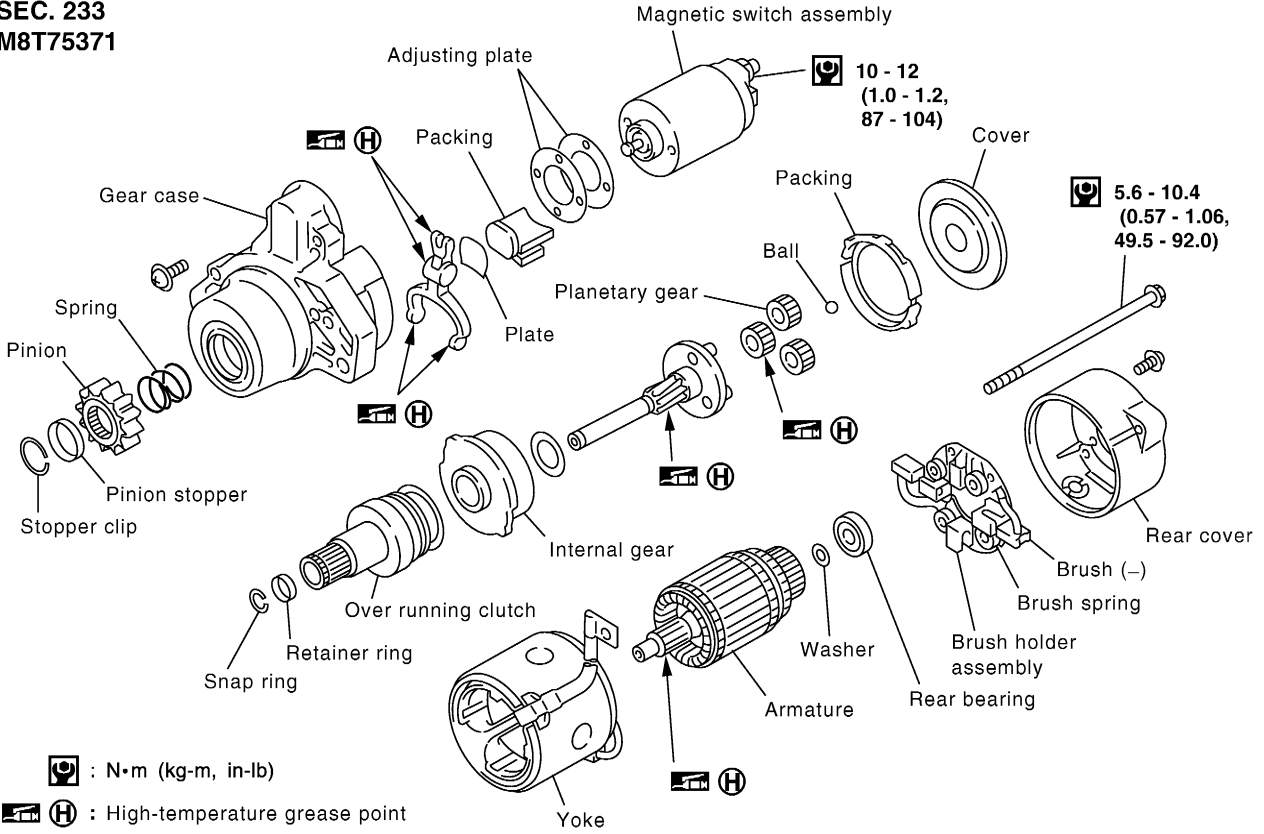


NEL772

# STARTING SYSTEM

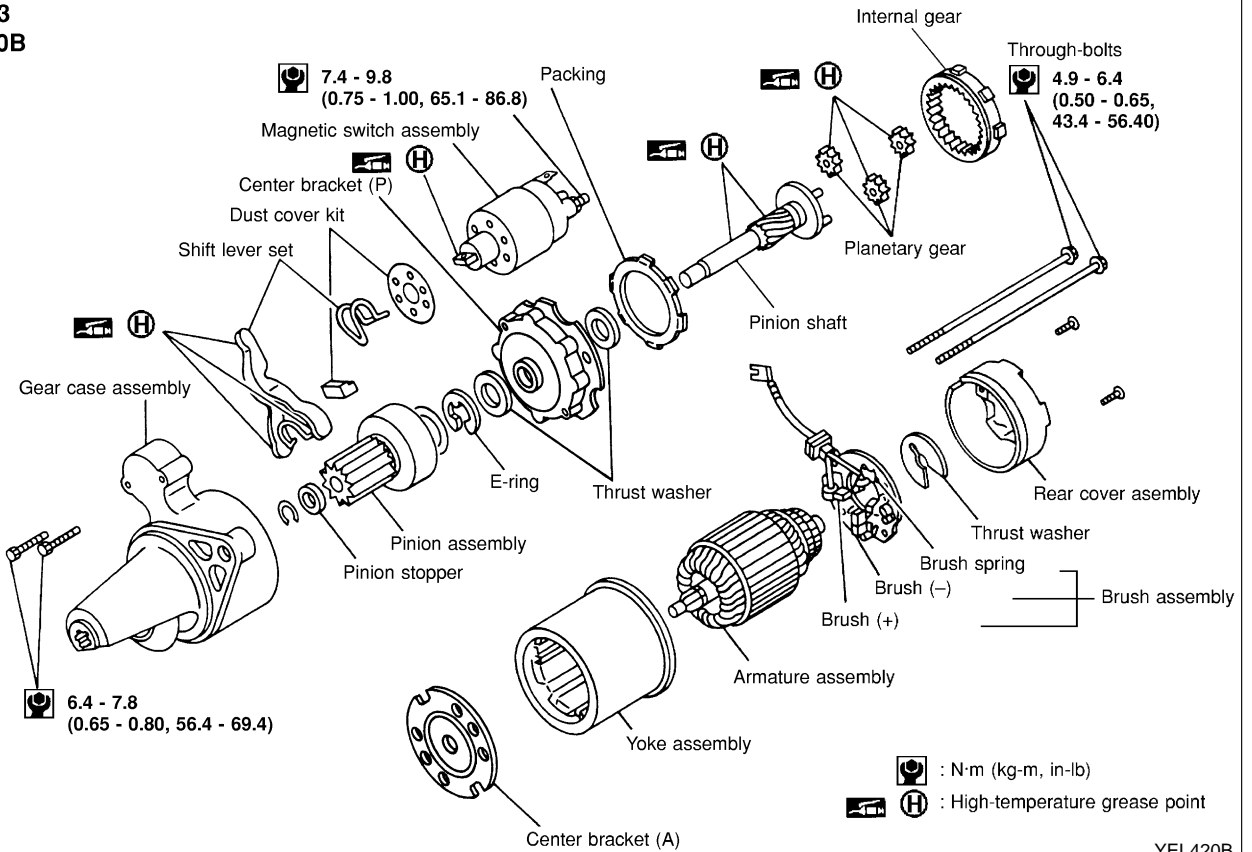
Construction (Cont'd)

## SEC. 233 M8T75371



MEL136L

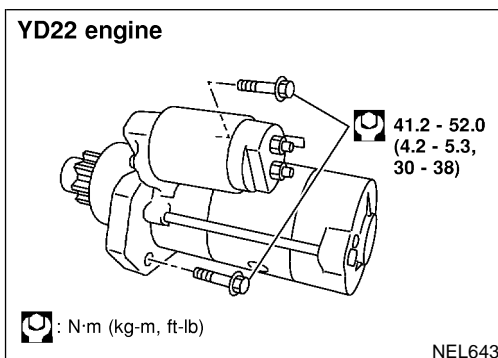
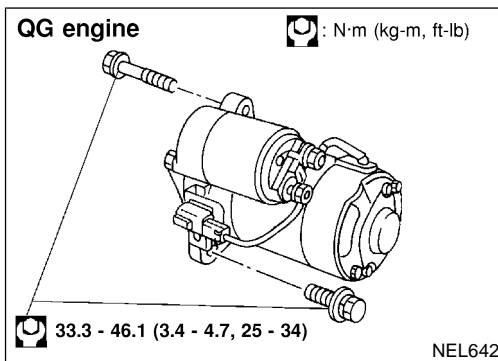
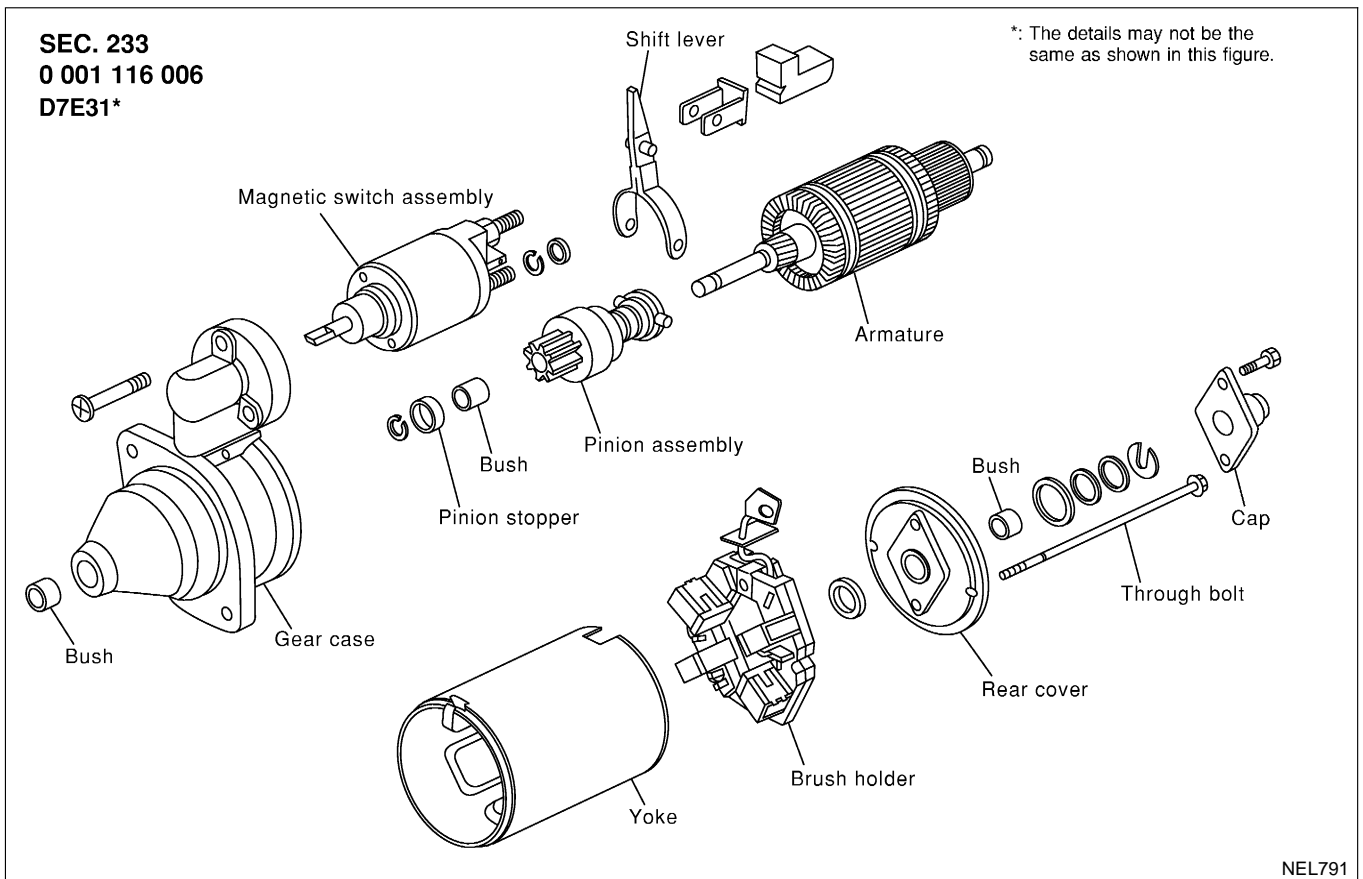
## SEC. 233 S114-800B



YEL420B

# STARTING SYSTEM

Construction (Cont'd)



## Removal and Installation

### REMOVAL

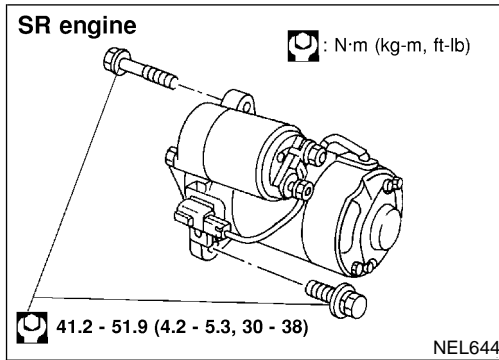
1. Remove intake air duct and air cleaner assembly.
2. Disconnect starter harness.
3. Remove starter bolts (two).
4. Remove starter.

NLSC0007

NLSC0007S01

# STARTING SYSTEM

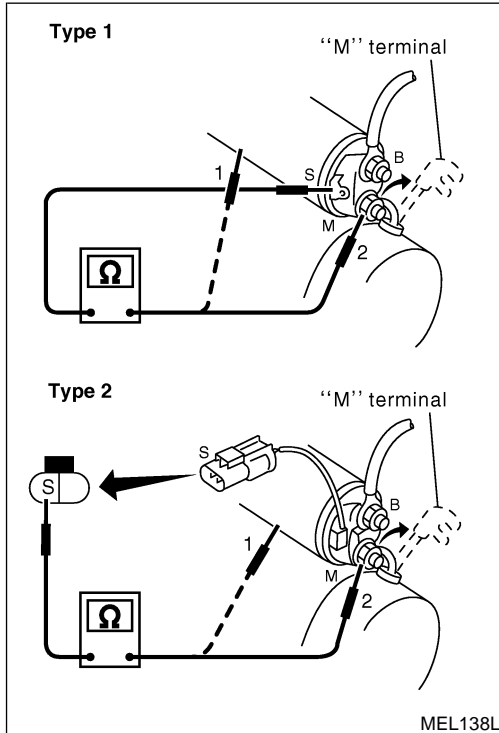
Removal and Installation (Cont'd)



## INSTALLATION

To install, reverse the removal procedure.

NLSC007S02



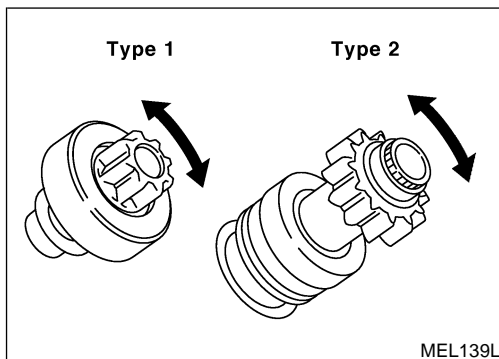
## Inspection

### MAGNETIC SWITCH CHECK

NLSC0019

NLSC0019S01

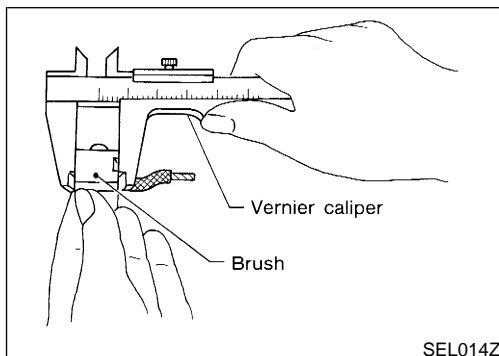
- Before starting to check, disconnect battery ground cable.
  - Disconnect "M" terminal of starter motor.
1. Continuity test (between "S" terminal and switch body).
  - No continuity ... Replace.
  2. Continuity test (between "S" terminal and "M" terminal).
  - No continuity ... Replace.



### PINION/CLUTCH CHECK

NLSC0019S02

1. Inspect pinion teeth.
  - Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)
2. Inspect reduction gear teeth (If equipped).
  - Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)
3. Check to see if pinion 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.



### BRUSH CHECK

NLSC0019S03

#### Brush

NLSC0019S0301

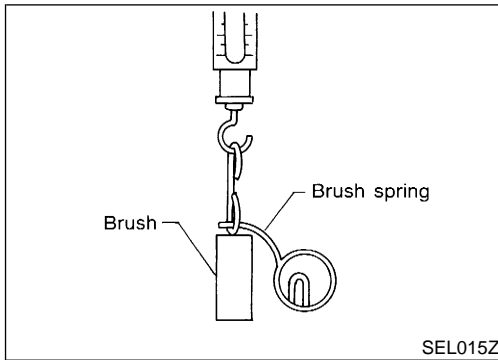
Check wear of brush.

**Wear limit length:**  
**Refer to SDS (SC-34).**

- Excessive wear ... Replace.

# STARTING SYSTEM

Inspection (Cont'd)

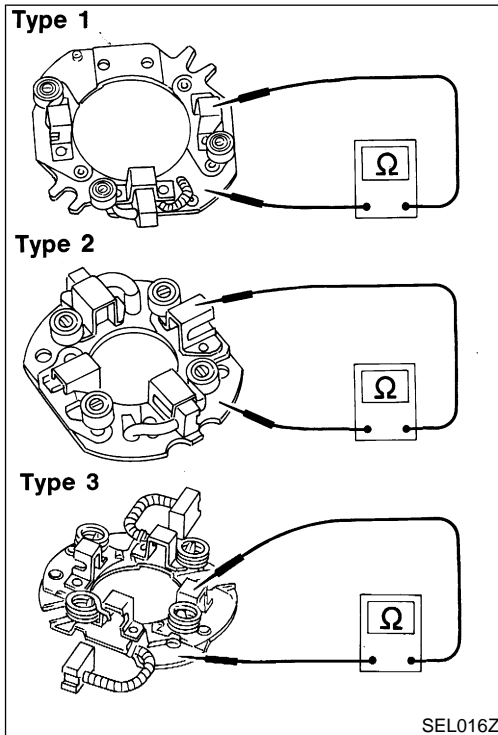


## Brush Spring Check

Check brush spring pressure with brush spring detached from brush. NLSC0019S0302

**Spring pressure (with new brush):**  
**Refer to SDS (SC-34).**

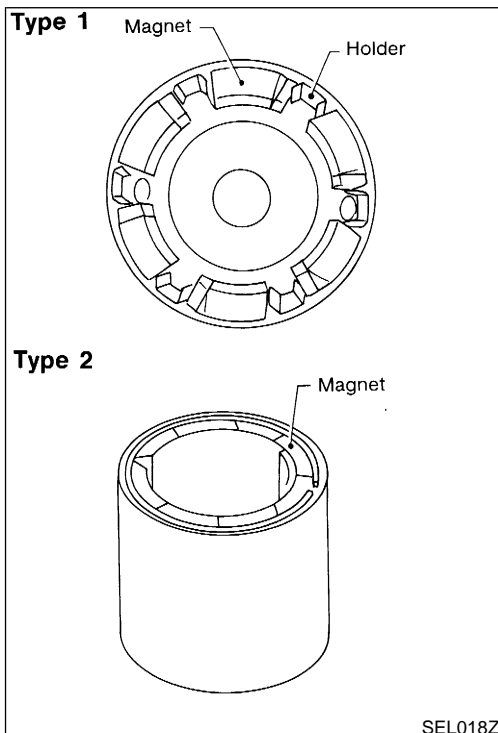
- Not within the specified values ... Replace.



## Brush Holder

1. Perform insulation test between brush holder (positive side) and its base (negative side). NLSC0019S0303

- Continuity exists. ... Replace.
- 2. Check brush to see if it moves smoothly.
- If brush holder is bent, replace it; if sliding surface is dirty, clean.



## YOKE CHECK

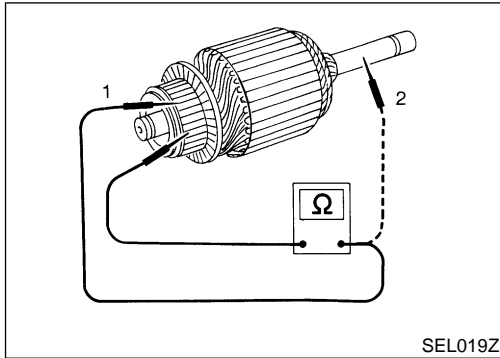
Magnet is secured to yoke by bonding agent. Check magnet to see that it is secured to yoke and for any cracks. Replace malfunctioning parts as an assembly. NLSC0019S04

### CAUTION:

**Do not clamp yoke in a vice or strike it with a hammer.**

## STARTING SYSTEM

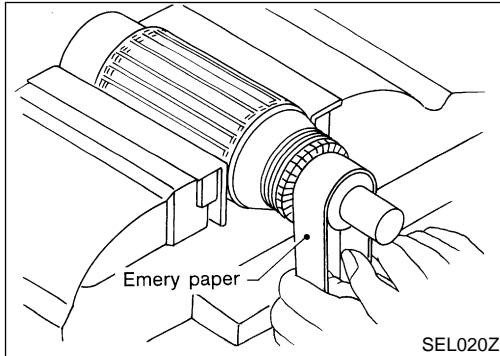
Inspection (Cont'd)



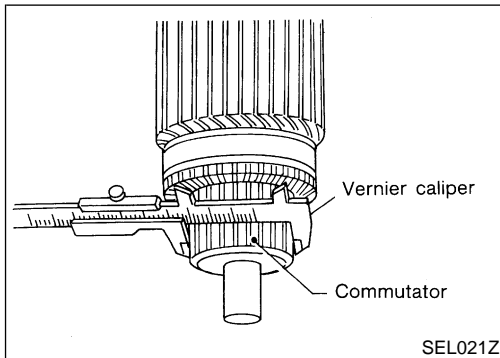
### ARMATURE CHECK

NLSC0019S05

1. Continuity test (between two segments side by side).
  - No continuity ... Replace.
2. Insulation test (between each commutator bar and shaft).
  - Continuity exists. ... Replace.



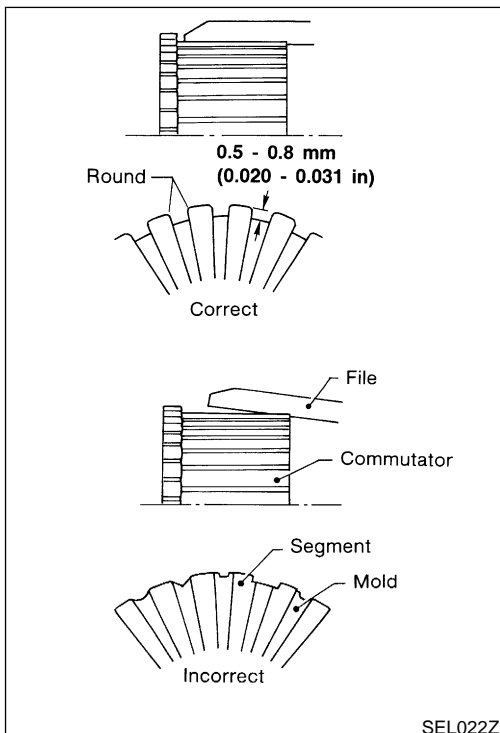
3. Check commutator surface.
  - Rough ... Sand lightly with No. 500 - 600 emery paper.



4. Check diameter of commutator.

**Commutator minimum diameter:  
Refer to SDS (SC-34).**

  - Less than specified value ... Replace.

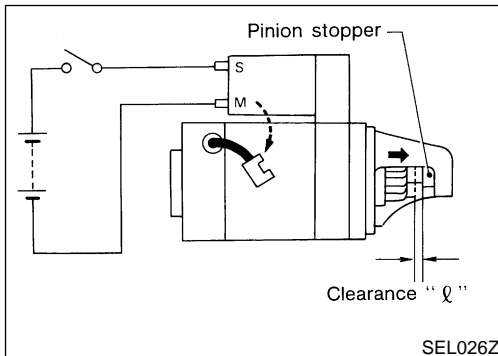


5. Check depth of insulating mold from commutator surface.
  - Less than 0.2 mm (0.008 in) ... Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in)

## Assembly

Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter.  
Carefully observe the following instructions.

NLSC0020



### PINION PROTRUSION LENGTH ADJUSTMENT

NLSC0020S01

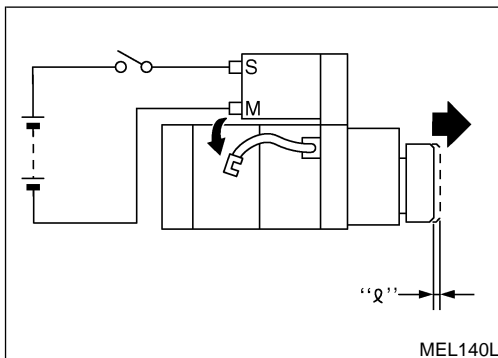
#### Clearance (QG & SR engine models)

NLSC0020S0101

With pinion driven out by magnetic switch, push pinion back to remove slack and measure clearance "ℓ" between the front edge of the pinion and the pinion stopper.

**Clearance "ℓ":**

**Refer to SDS (SC-34).**



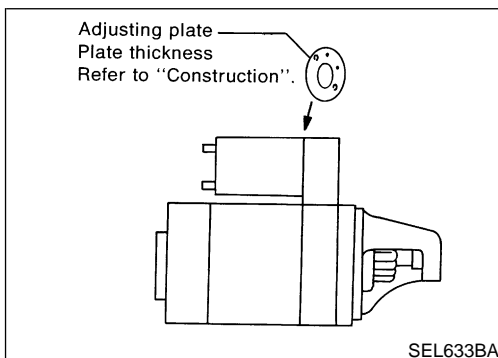
#### Movement (YD engine models)

NLSC0020S0102

Compare movement "ℓ" in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper.

**Movement "ℓ":**

**Refer to SDS, (SC-34).**



- Not in the specified value ... Adjust by adjusting plate.

# CHARGING SYSTEM

## System Description

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### System Description

NLSC0009

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.

Power is supplied at all times to alternator terminal 4 (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 4 (S) detecting the input voltage. The charging circuit is protected by the 80A (QG engine models except for Northern Europe and cold spec.) or 100A (SR, YD engine models and QG engine models for Northern Europe and cold spec.) fusible link.

The alternator 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 9

Ground is supplied to terminal 22 of the combination meter through terminal 3 (L) of the alternator. With power and ground supplied, the charge warning lamp will illuminate. When the alternator 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.



# CHARGING SYSTEM

Wiring Diagram — CHARGE —

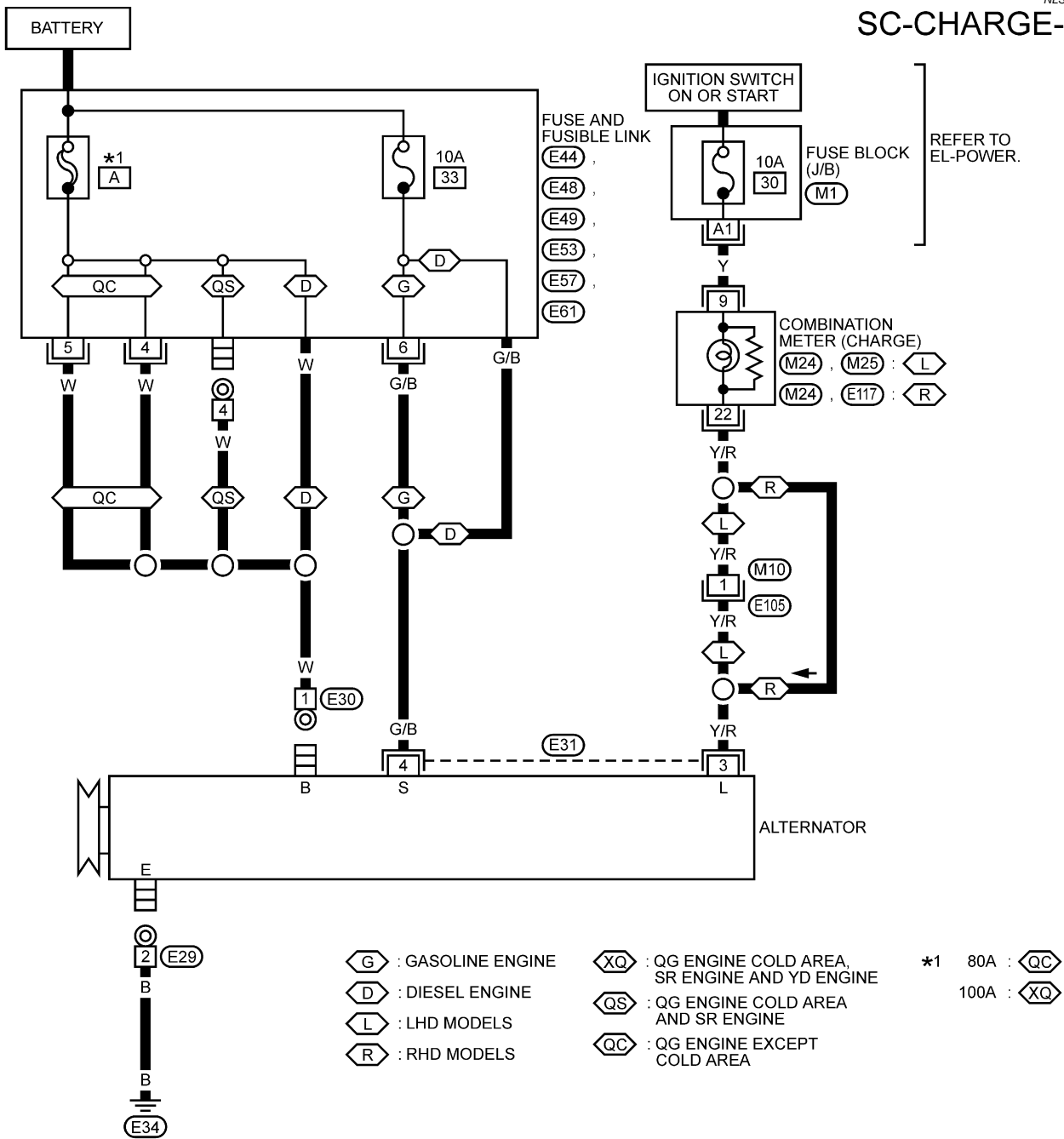
## Wiring Diagram — CHARGE —

NLSC0010

**MODELS WITH FUSE AND FUSIBLE LINK BOX E43**

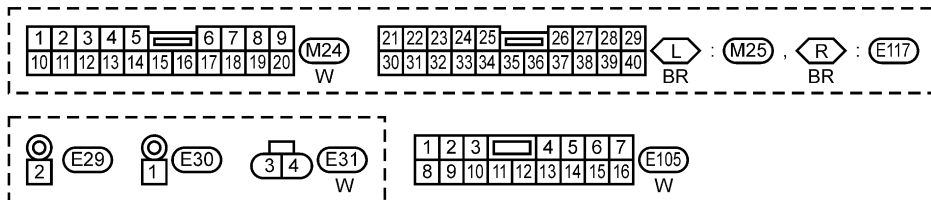
NLSC0010S04

**SC-CHARGE-01**



REFER TO THE FOLLOWING.

(M1) -FUSE BLOCK-  
 JUNCTION BOX (J/B)  
 (E44), (E48), (E49), (E53),  
 (E57), (E61) -FUSE AND  
 FUSIBLE LINK BOX



YEL858B

# CHARGING SYSTEM

Wiring Diagram — CHARGE — (Cont'd)

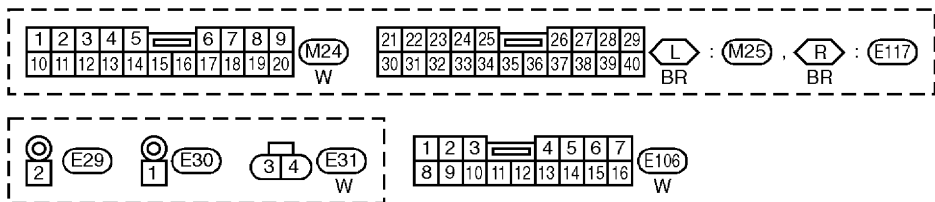
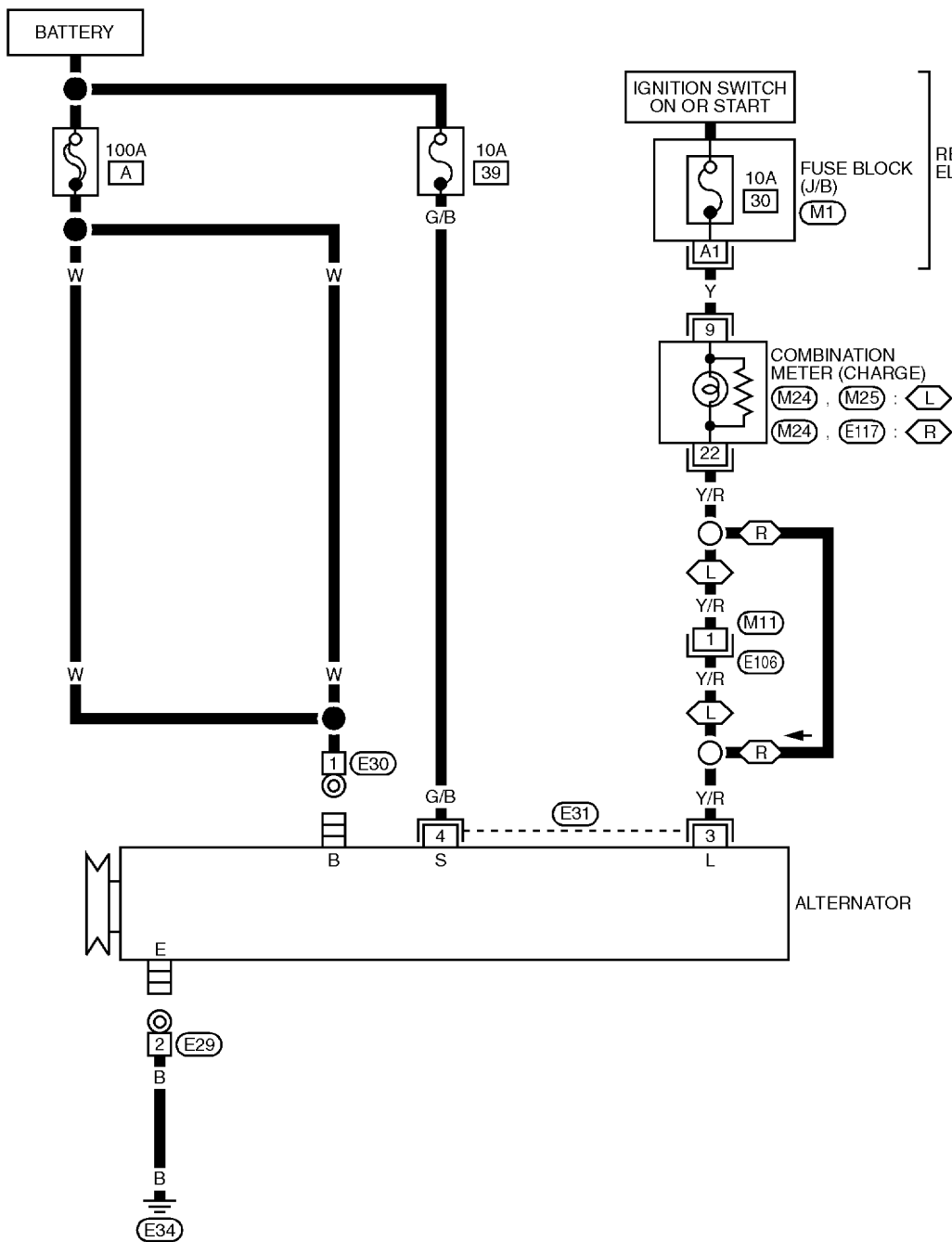
## MODELS WITH FUSE AND FUSIBLE LINK BOX E90

NLSC0010S05

### SC-CHARGE-01

⬡ : LHD MODELS  
⬢ : RHD MODELS

REFER TO EL-POWER.



REFER TO THE FOLLOWING.  
Ⓜ - FUSE BLOCK-  
JUNCTION BOX (J/B)

YEL388C

## Trouble Diagnoses

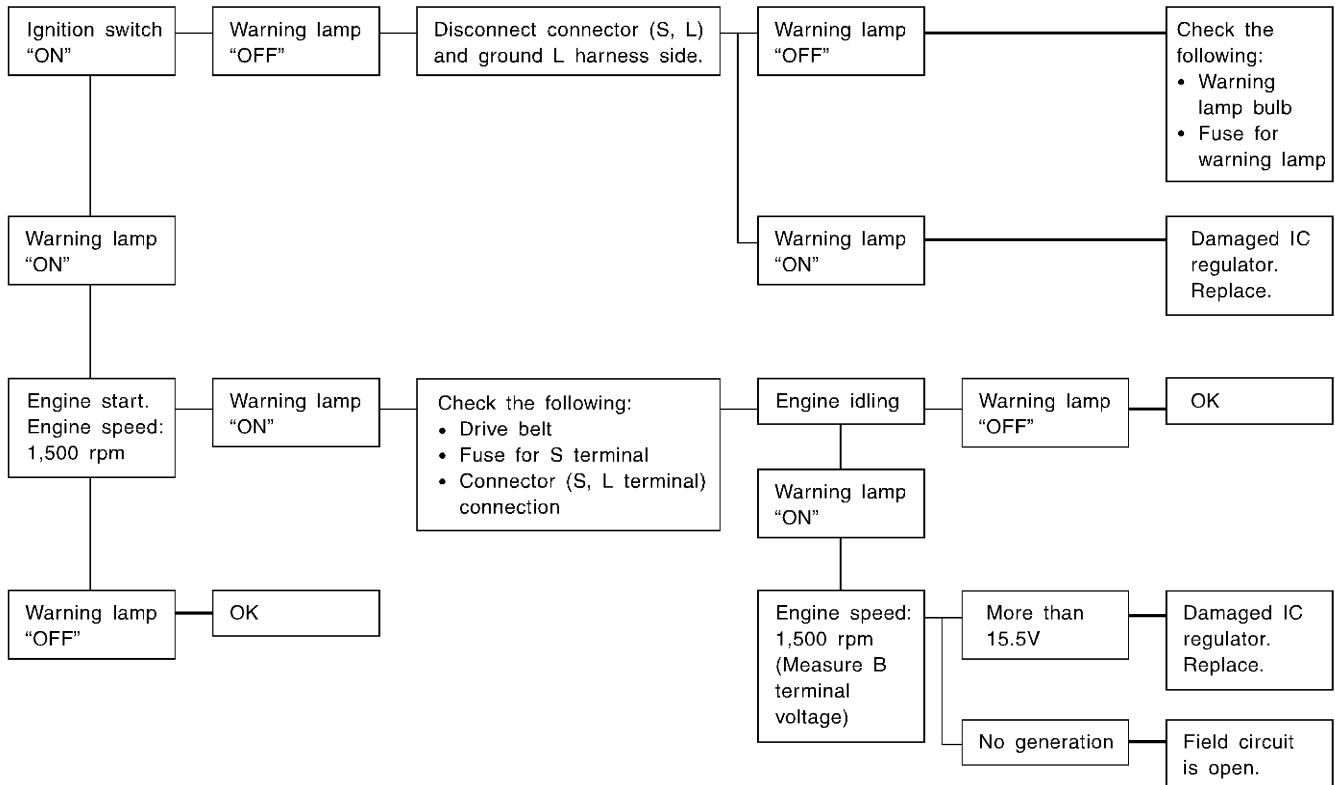
NLSC0011

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

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

### WITH IC REGULATOR

NLSC0011S01



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.)
- 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

NLSC0011S02

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

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

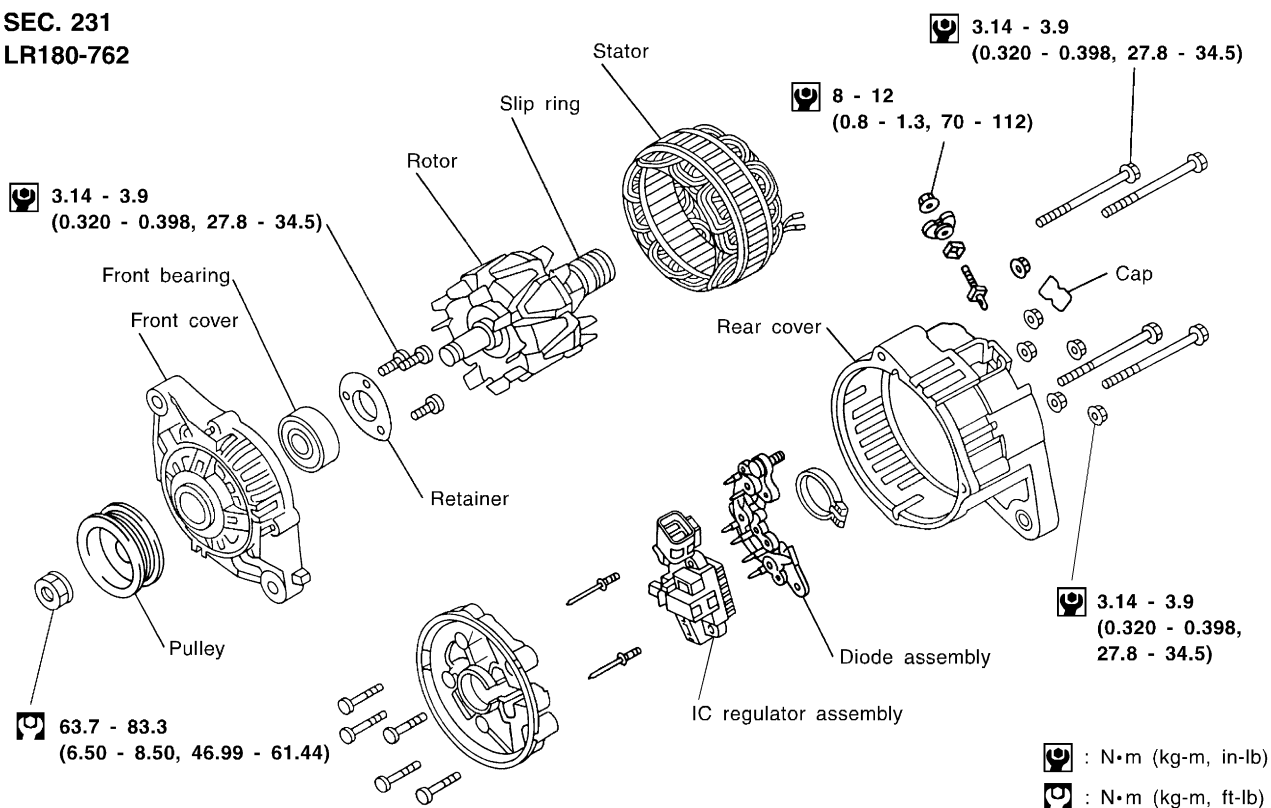
# CHARGING SYSTEM

Construction

## Construction

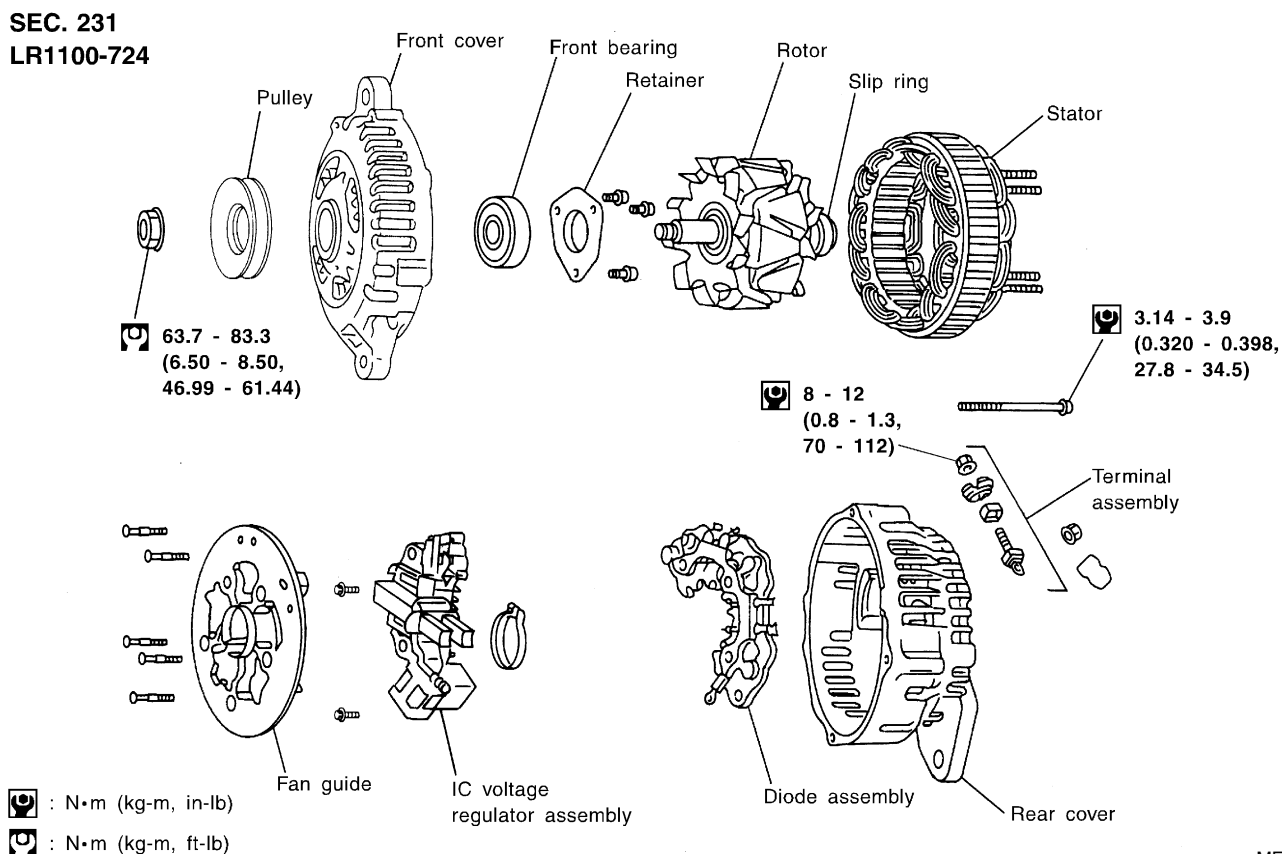
NLSC0012

### SEC. 231 LR180-762



MEL141LA

### SEC. 231 LR1100-724

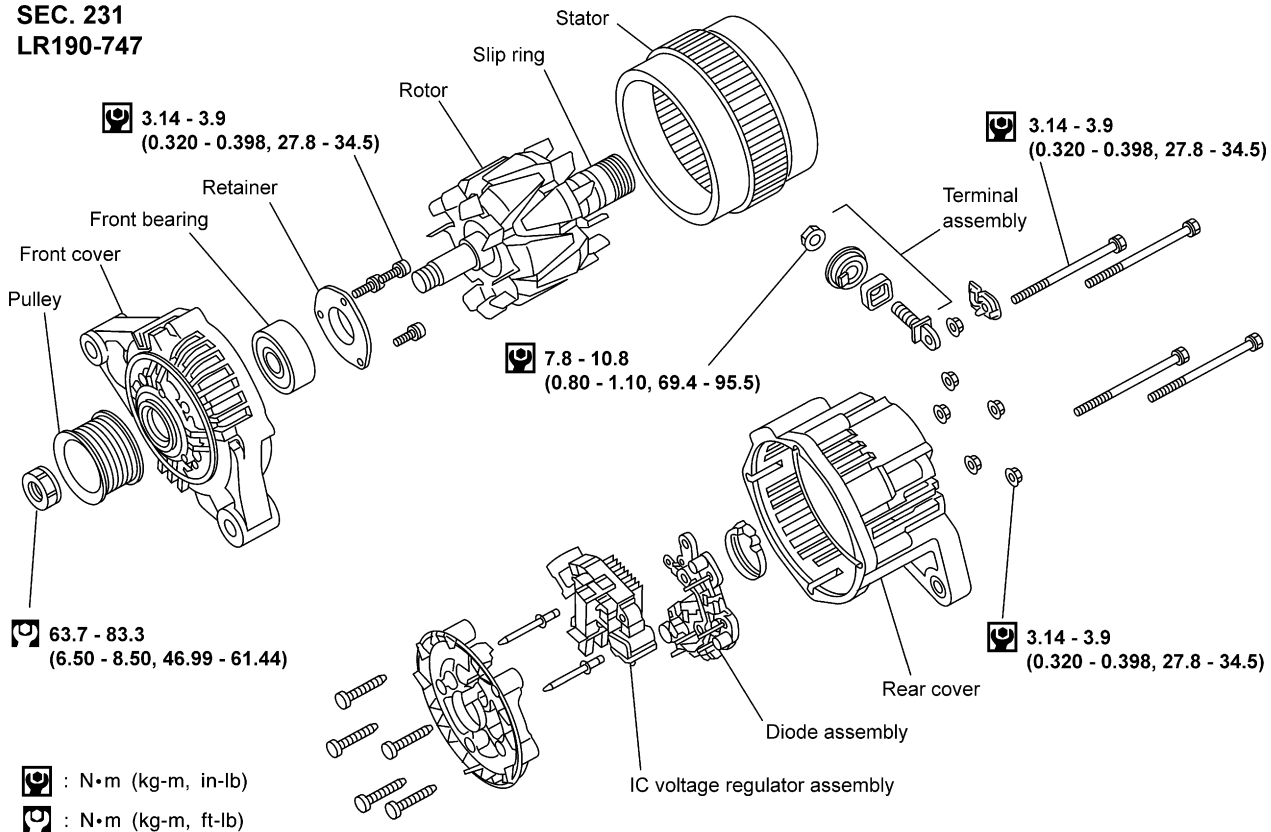


MEL497L

# CHARGING SYSTEM

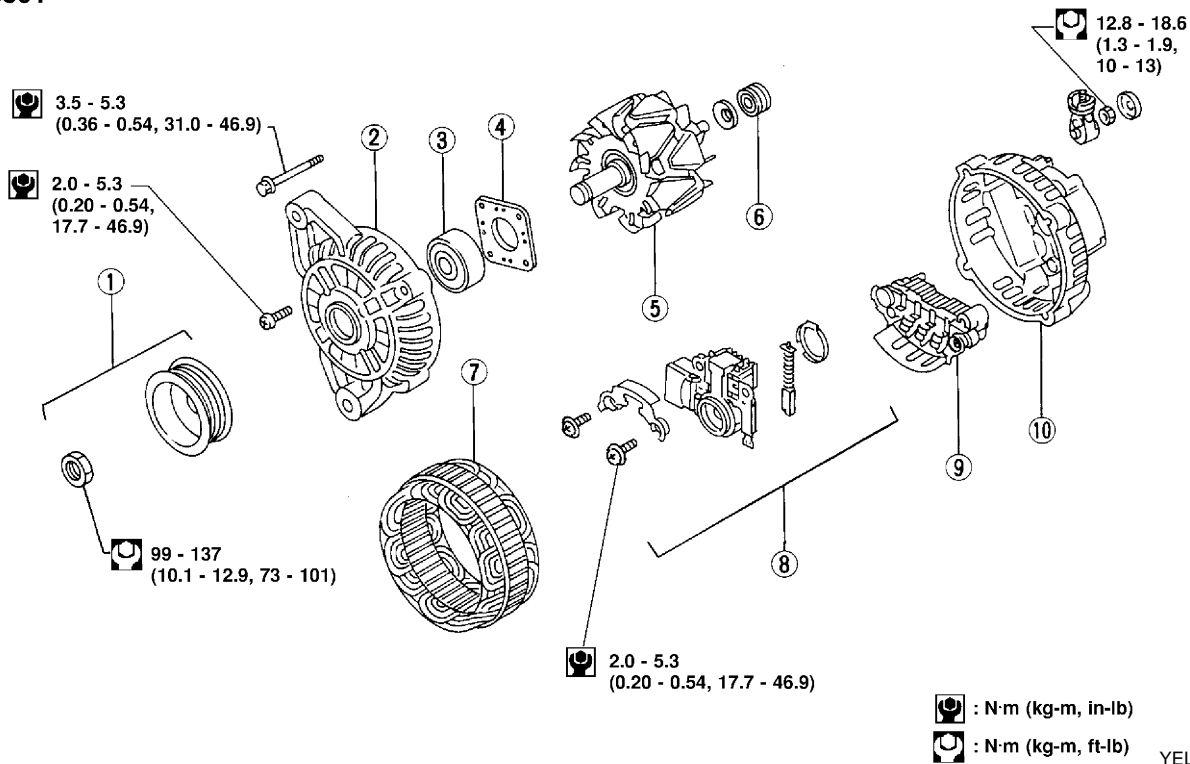
Construction (Cont'd)

## SEC. 231 LR190-747



NEL733

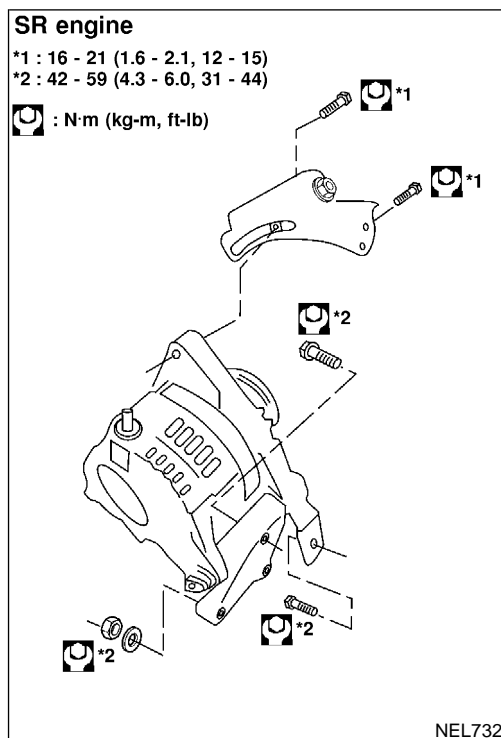
## SEC. 231 A2TB3691 A2TB3891



YEL427B

# CHARGING SYSTEM

## Removal and Installation



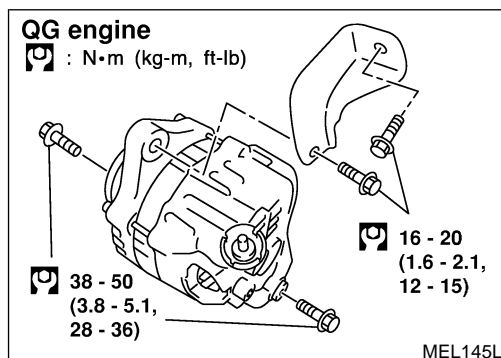
## Removal and Installation

### REMOVAL (SR ENGINE)

NLSC0013

NLSC0013S04

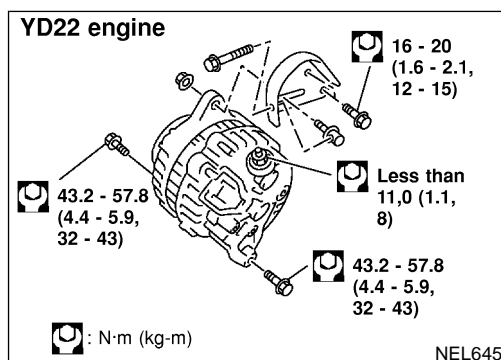
1. Disconnect alternator connector, the terminal and A/C compressor.
2. Loosen alternator upper (lock) bolt and the adjusting bolt.
3. Remove engine under cover RH.
4. Remove A/C compressor bolts × 4.
5. Remove alternator mounting bracket bolt × 1 and the nuts × 2.
6. Loosen alternator lower bolt (long bolt).
7. Remove alternator upper bolt.
8. Move alternator toward vehicle front.
9. Remove alternator mounting bracket bolt × 1.
10. Remove alternator with mounting bracket.



### REMOVAL (QG ENGINE)

NLSC0013S01

1. Loosen drive belt idler pulley.
2. Remove drive belt idler pulley (include tightening screw).
3. Remove alternator harness.
4. Remove alternator upper bolt and lower bolt.
5. Remove alternator.



### REMOVAL (YD ENGINE)

NLSC0013S03

1. Remove alternator harness.
2. Loosen alternator upper nut and lower bolt.
3. Loosen drive belt.
4. Remove alternator bracket bolts (two).
5. Remove alternator upper nut and lower bolt.
6. Remove alternator.

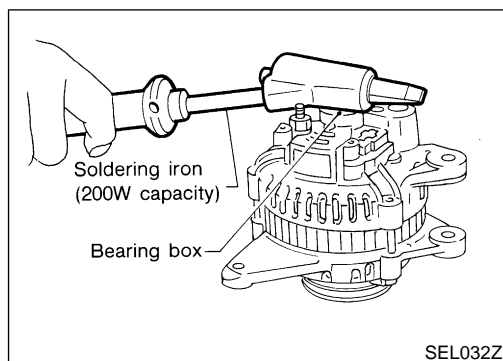
## INSTALLATION

To install, reverse the removal procedure.

NLSC0013S02

# CHARGING SYSTEM

Disassembly



## Disassembly

### REAR COVER

NLSC0021

NLSC0021S01

#### CAUTION:

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 just bearing box section with a 200W soldering iron.

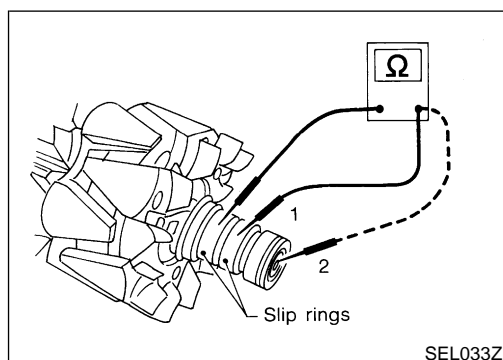
Do not use a heat gun, as it can damage diode assembly.

### REAR BEARING

NLSC0021S02

#### CAUTION:

- Do not reuse rear bearing after removal. Replace with a new one.
- Do not lubricate rear bearing outer race.



## Inspection

### ROTOR CHECK

NLSC0022

NLSC0022S01

1. Resistance test

**Resistance: Refer to SDS (SC-34).**

- Not within the specified values ... Replace rotor.
2. Insulator test
  - Continuity exists ... Replace rotor.
  3. Check slip ring for wear.

**Slip ring minimum outer diameter:**

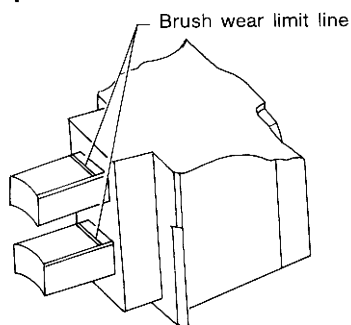
**Refer to SDS (SC-34).**

- Not within the specified values ... Replace rotor.

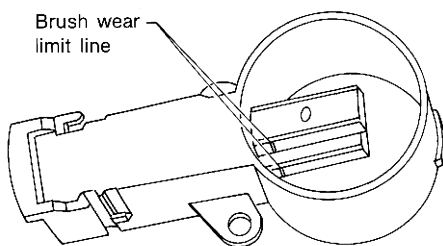
# CHARGING SYSTEM

Inspection (Cont'd)

## Type 1



## Type 2



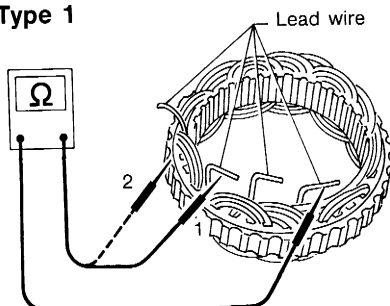
SEL034Z

## BRUSH CHECK

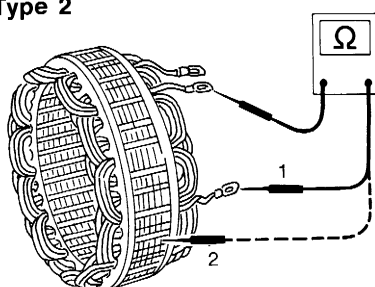
NLSC0022S02

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

## Type 1



## Type 2



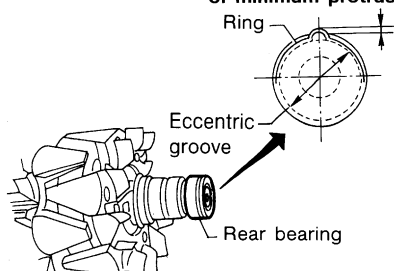
SEL037Z

## STATOR CHECK

NLSC0022S03

1. Continuity test
  - No continuity ... Replace stator.
2. Ground test
  - Continuity exists ... Replace stator.

Amount of protrusion:  
Fix ring at the position  
of minimum protrusion.



SEL044Z

## Assembly

### RING FITTING IN REAR BEARING

NLSC0023

NLSC0023S01

- Fix ring into groove in rear bearing so that it is as close to the adjacent area as possible.

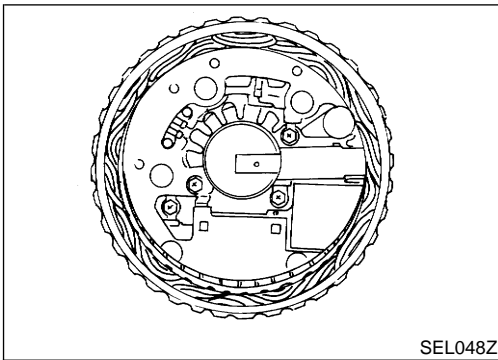
### CAUTION:

Do not reuse rear bearing after removal.



## CHARGING SYSTEM

Assembly (Cont'd)



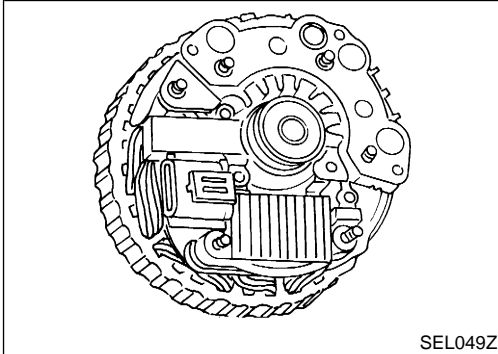
SEL048Z

### REAR COVER INSTALLATION

NLSC0023S02

1. Fit brush assembly, diode assembly, regulator assembly and stator.
2. Push brushes up with fingers and install them to rotor.

**Take care not to damage slip ring sliding surface.**



SEL049Z

## SERVICE DATA AND SPECIFICATIONS (SDS)

### Battery

<b>Battery</b>							
<small>NLSC0014</small>							
Applied model	QG engine					YD22 engine	
Type	YUASA type code					YUASA type code	
	025	027	065	075	079	067	096
Capacity V-AH	12 - 52		12-55	12-50	12-42	12-60	12-64

### Starter

<small>NLSC0015</small>							
Type	0 001 116 006		D7E31	S114-800B	S1114-871	M8T75371	
	BOSCH make		VALEO make	HITACHI make	MITSUBISHI make		
	Non-reduction		Non-reduction	Reduction	Reduction	Reduction	
Applied model	QG engine				SR engine	YD22 engine	
System voltage V	12						
No-load	Terminal voltage V	11.5	11.0	11.0	11.0	11.0	
	Current A	Less than 48	45	Less than 90	Less than 90	Less than 145	
	Revolution rpm	More than 5,800	12,000	More than 2,700	More than 2,300	More than 3,400	
Minimum diameter of commutator mm (in)	33.5 (1.319)		28.2 (1,110)	28.0 (1.102)		31.4 (1.236)	
Minimum length of brush mm (in)	3.5 (0.138)		6.15 (0.242)	10.5 (0.413)		11.0 (0.433)	
Brush spring tension N (kg, lb)	5.2 (0.53, 1.17) at 7.5 mm (0.295 in) brush length		16.2 - 19.8 (1.65 - 2.02, 3.46 - 4.45)	12.7 - 17.7 (1.3 - 1.8, 2.9 - 4.0)		26.5 - 36.3 (2.7 - 3.7, 6.0 - 8.2)	
Clearance between bearing metal and armature shaft mm (in)	—		0.05 (0.002)	Less than 0.2 (0.008)		—	
Clearance "ℓ" between pinion front edge and pinion stopper mm (in)	0.0 - 3.9 (0 - 0.154)		Max. 1 (0.039)	0.3 - 2.5 (0.012 - 0.098)		—	
Movement "ℓ" in height of pinion assembly mm (in)	—		Max. 12.2 (0.480)	—		0.5 - 2.0 (0.020 - 0.079)	

### Alternator

<small>NLSC0016</small>							
Type	LR180-762	LR190-747	LR1100-724	A2TB3891			
	HITACHI make				MITSUBISHI make		
Applied model	QG engine	SR engine	YD engine	SR engine			
Nominal rating V-A	12-80	12-90	12-100	12-90			
Ground polarity	Negative						
Minimum revolutions under no-load (When 13.5V is applied) rpm	Less than 1,000					Less than 1,300	
Hot output current (When 13.5V is applied) A/rpm	More than 23/1,300 More than 65/2,500 More than 87/5,000			More than 34/1,300 More than 83/2,500 More than 91/5,000		More than 22/1,300 More than 64/2,500 More than 85/5,000	
Regulated output voltage V	14.1 - 14.7						
Minimum length of brush mm (in)	6.0 (0.236)					5.0 (0.197)	
Brush spring pressure N (g, oz)	1.0 - 3.43 (102 - 350, 3.60 - 12.34)					4.8 - 5.0 (490 - 610, 17.28 - 21.51)	
Slip ring minimum diameter mm (in)	6.0 (1.024)					22.1 (0.870)	
Rotor coil resistance at 20°C (68°F) Ω	2.67			2.31		1.8 - 2.1	