

# 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"

NJSC0001

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 N16 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 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. SRS wiring harnesses can be identified by yellow harness connector.

### Wiring Diagrams and Trouble Diagnoses

NJSC0002

When you read wiring diagrams, refer to the following:

- GI-12, "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 GROUPS IN TROUBLE DIAGNOSES"
- GI-21, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

# BATTERY

How to Handle Battery

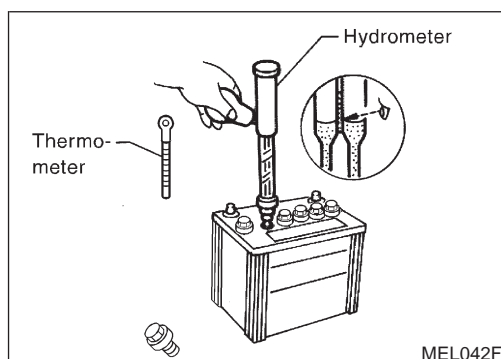
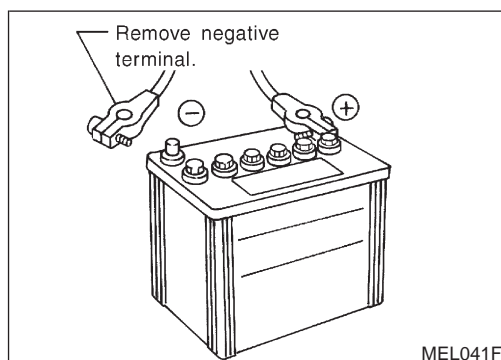
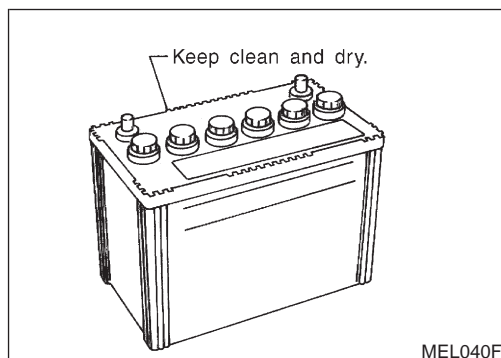
## How to Handle Battery

NJSC0003

### 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

NJSC0003S01

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

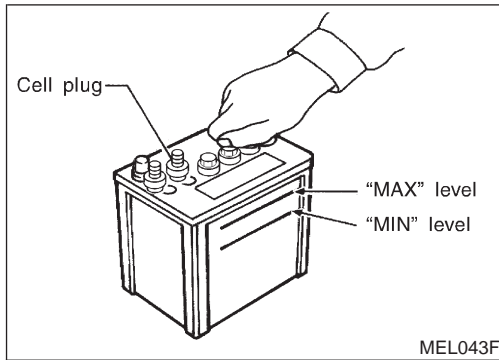
NJSC0003S02

### WARNING:

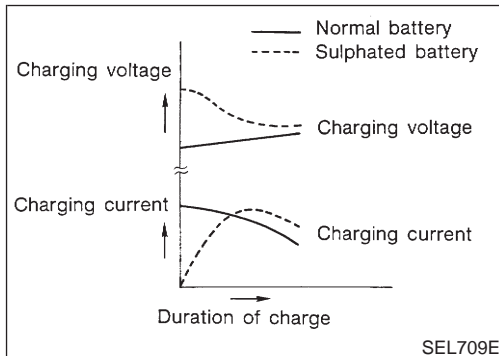
Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

# BATTERY

## How to Handle Battery (Cont'd)



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



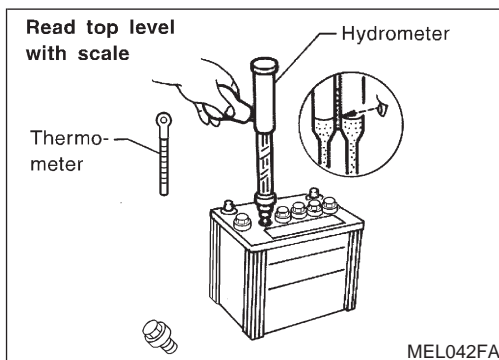
## Sulphation

NJSC0003S0201

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

NJSC0003S03

1. Read hydrometer and thermometer indications at eye level.

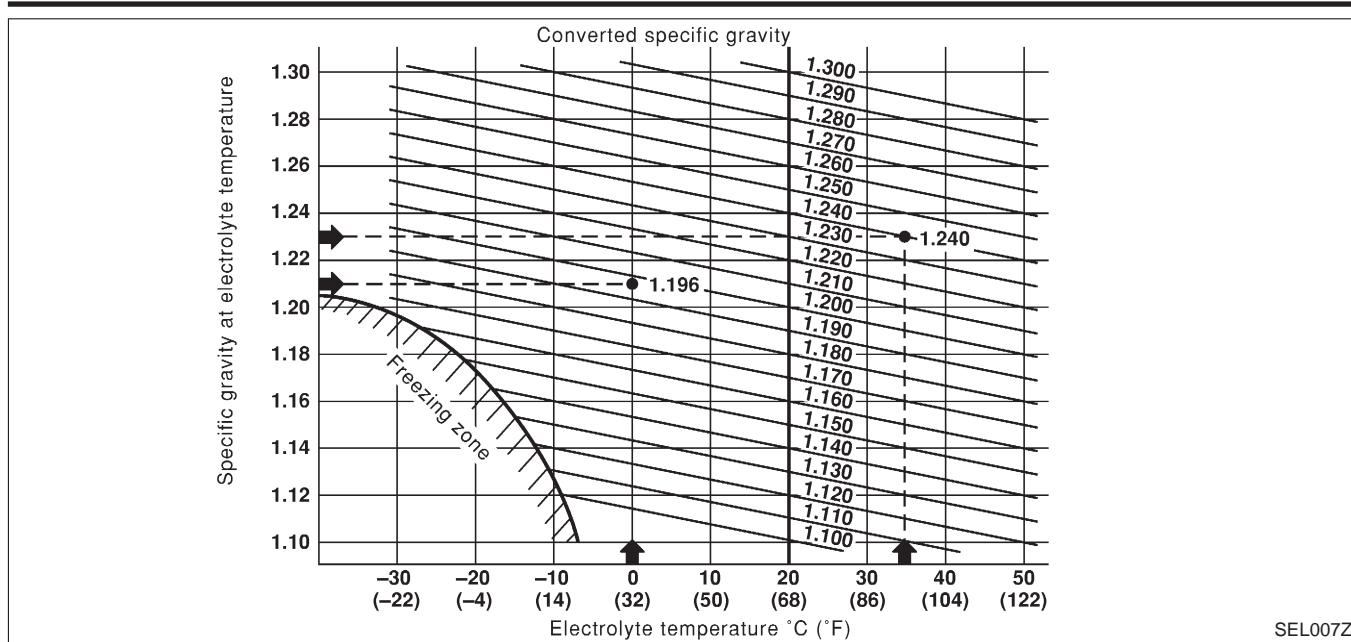
2. Convert into specific gravity at 20°C (68°F).

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

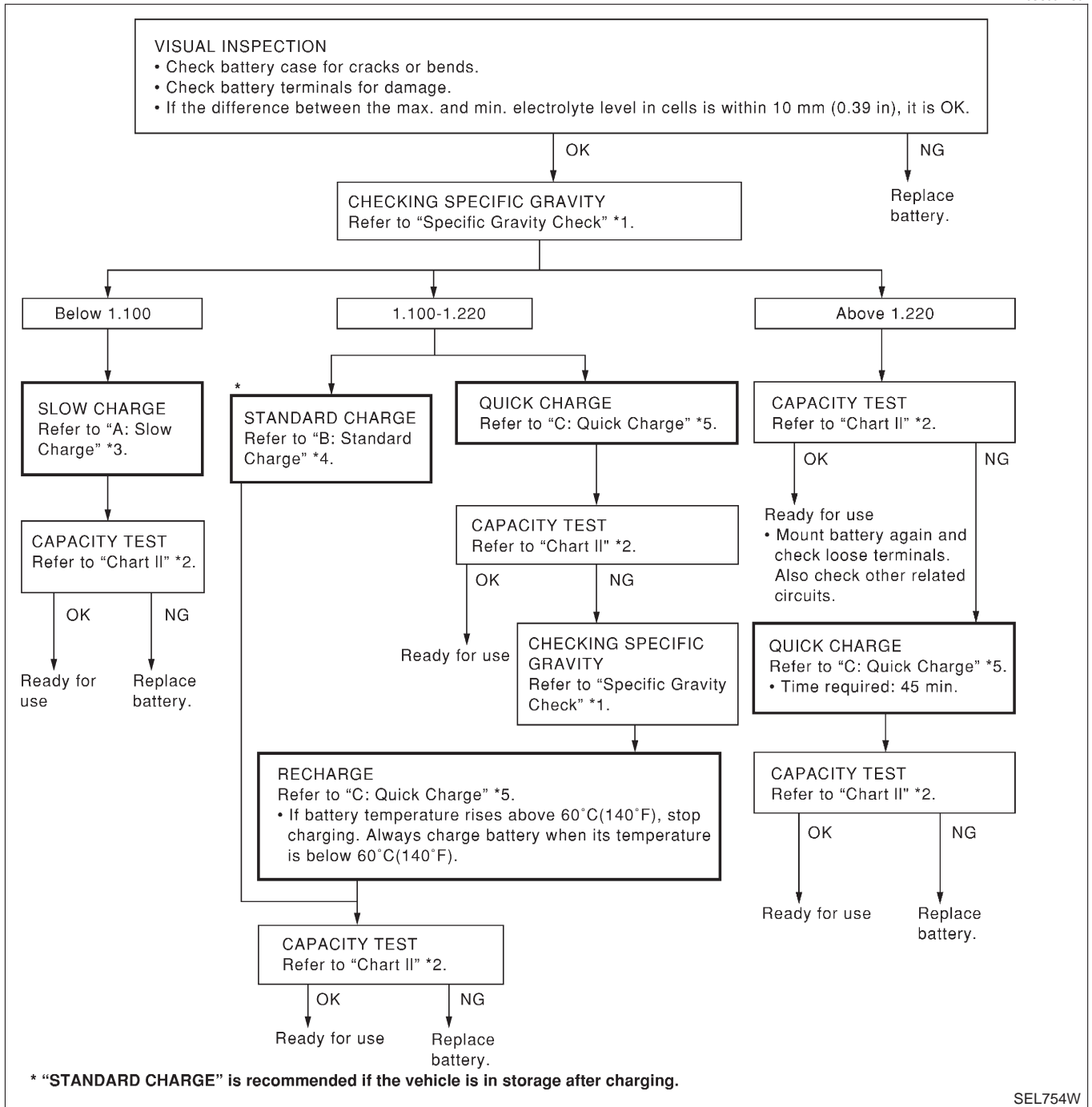
# BATTERY

## Battery Test and Charging Chart

NJSC0017

### CHART I

NJSC0017S01



SEL754W

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

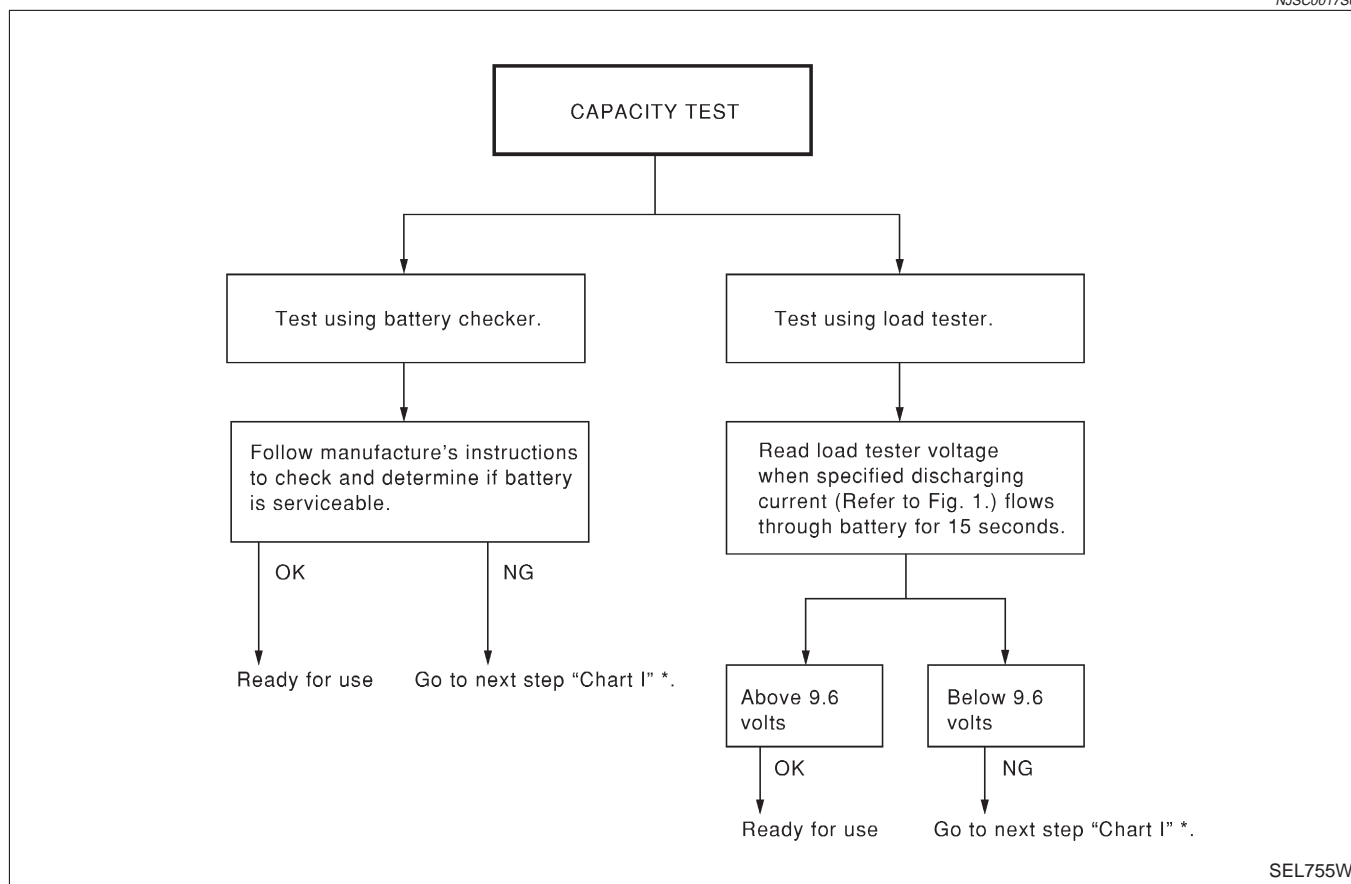
\*3: SC-8  
\*4: SC-10

\*5: SC-11

# BATTERY

## CHART II

NJSC0017S02



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
50D23R(L)	150
55D23R(L)	180
65D26R(L)	195
80D26R(L)	195
75D31R(L)	210
063 [YUASA type code]	210
95D31R(L)	240
115D31R(L)	240
025 [YUASA type code]	240
065 [YUASA type code]	255

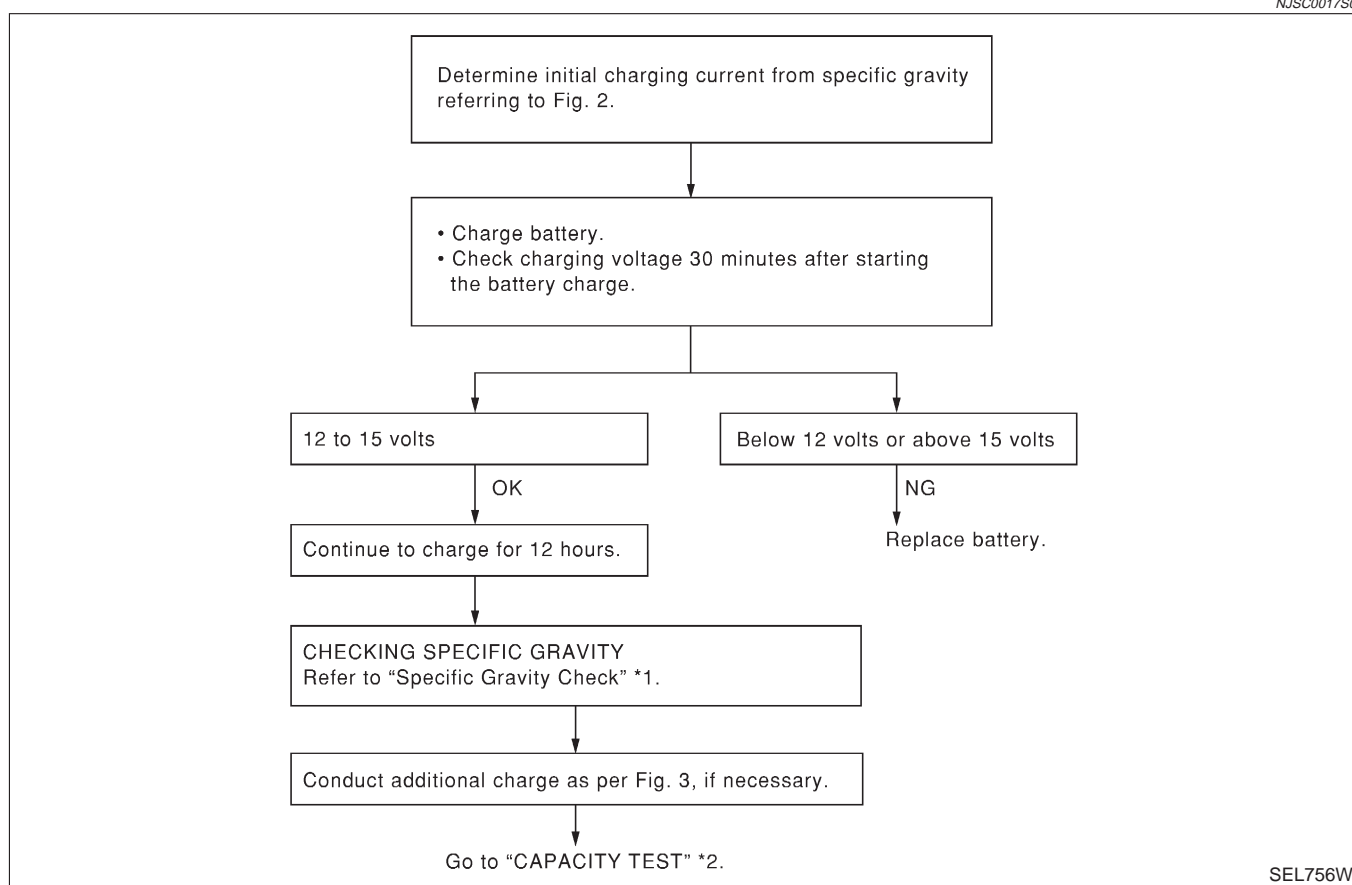
# BATTERY

## 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
096L [YUASA type code]	375
010S [YUASA type code]	360

### A: SLOW CHARGE

NJSC0017S03



SEL756W

\*1: SC-4

\*2: SC-7



# BATTERY

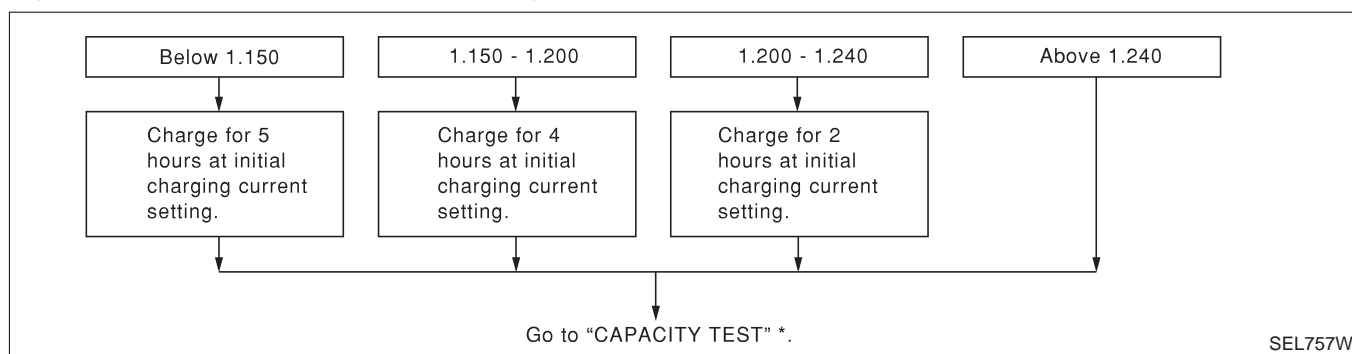
Battery Test and Charging Chart (Cont'd)

Fig. 2 INITIAL CHARGING CURRENT SETTING (Slow charge)

CON- VERTED SPECIFIC GRAVITY	BATTERY TYPE																					
	28B19R(L)	34B19R(L)	46B24R(L)	55B24R(L)	50D23R(L)	55D23R(L)	025 [YUASA type code]	027 [YUASA type code]	65D26R(L)	80D26R(L)	063 [YUASA type code]	067 [YUASA type code]	096 [YUASA type code]	75D31R(L)	95D31R(L)	115D31R(L)	110D26R(L)	95E41R(L)	065 [YUASA type code]	075 [YUASA type code]	096L [YUASA type code]	010S [YUASA type code]
Below 1.100	4.0 (A)	5.0 (A)	7.0 (A)					8.0 (A)					8.5 (A)	9.0 (A)	10.0 (A)					11.0 (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:

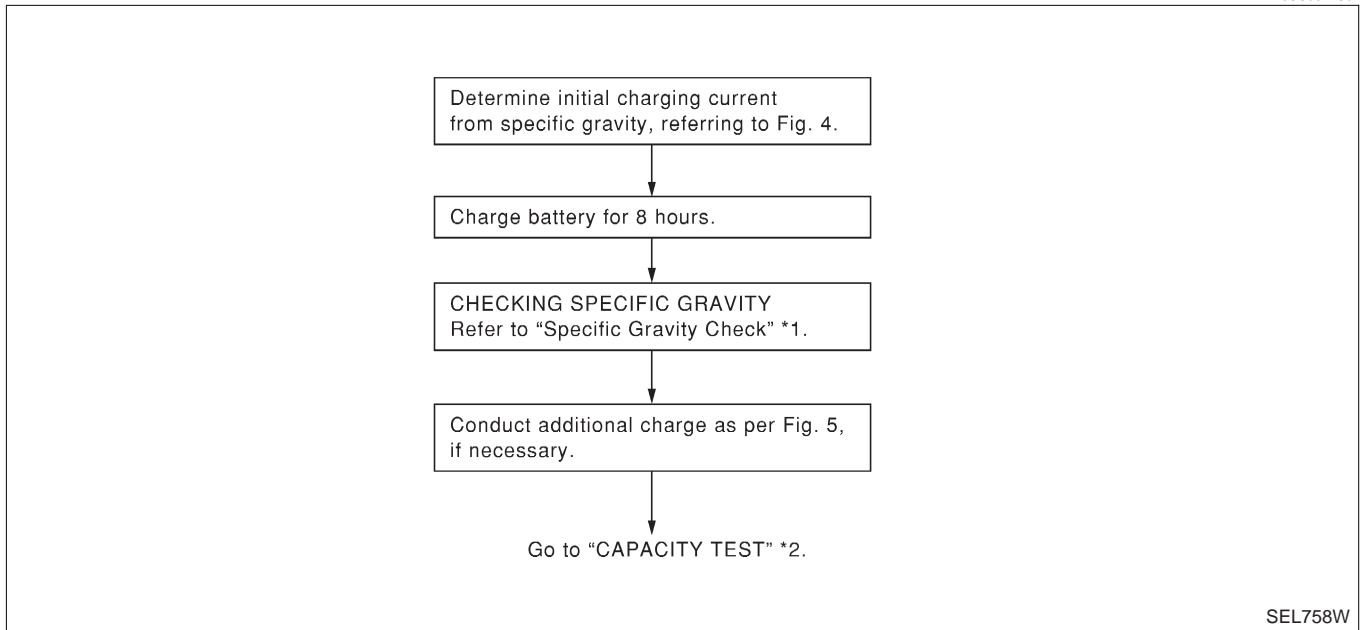
- Set charging current to value specified in Fig. 2. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on 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

NJSC0017S04



SEL758W

\*1: SC-4

\*2: SC-7

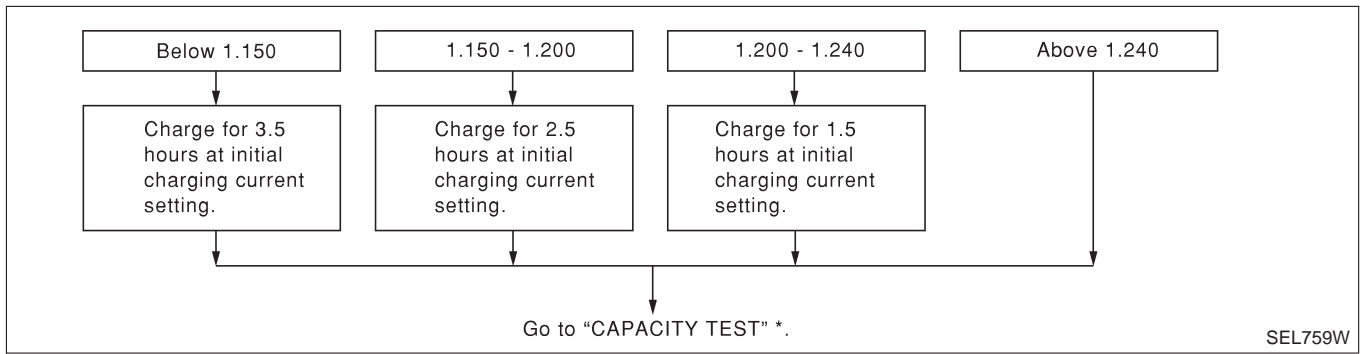
Fig. 4 INITIAL CHARGING CURRENT SETTING (Standard charge)

CON- VERTED SPECIFIC GRAVITY	BATTERY TYPE																					
	28B19R(L)	34B19R(L)	46E24R(L)	55B24R(L)	50D23R(L)	55D23R(L)	025 [YUASA type code]	027 [YUASA type code]	65D26R(L)	80D26R(L)	063 [YUASA type code]	067 [YUASA type code]	096 [YUASA type code]	75D31R(L)	95D31R(L)	115D31R(L)	110D26R(L)	95E41R(L)	065 [YUASA type code]	075 [YUASA type code]	096L [YUASA type code]	010S [YUASA type code]
1.100 - 1.130	4.0 (A)	5.0 (A)	6.0 (A)		7.0 (A)			8.0 (A)	9.0 (A)			10.0 (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)			9.0 (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)			8.0 (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)			6.0 (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)

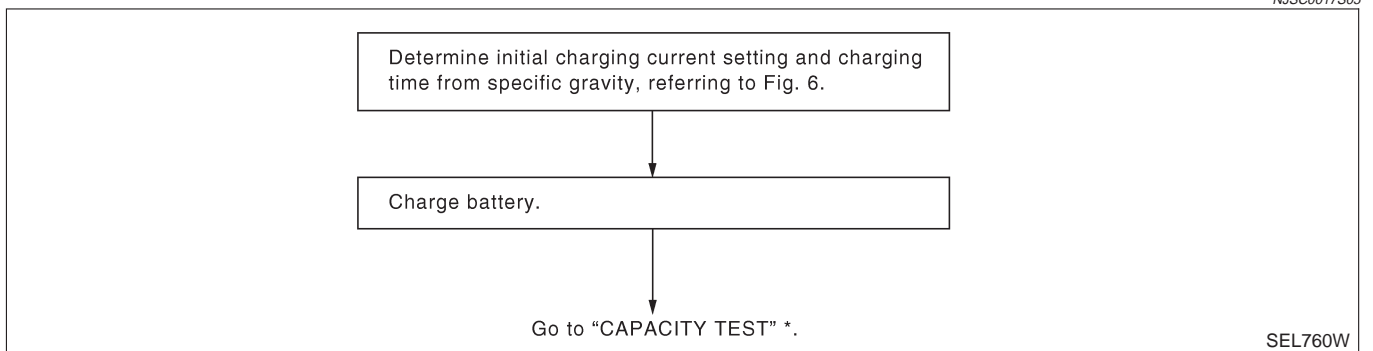


\*: SC-7

## 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



\*: SC-7

## BATTERY

Battery Test and Charging Chart (Cont'd)

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

BATTERY TYPE		CURRENT [A]		CONVERTED SPECIFIC GRAVITY	CHARGING TIME
28B19R(L)	34B19R(L)	10 (A)	15 (A)		
46B24R(L)	55B24R(L)	20 (A)		1.130 - 1.160	2.0 hours
50D23R(L)	55D23R(L)	25 (A)		1.160 - 1.190	1.5 hours
65D26R(L)	80D26R(L)	30 (A)		1.190 - 1.220	1.0 hours
025 [YUASA type code]	027 [YUASA type code]	40 (A)		Above 1.220	0.75 hours (45 min.)
063 [YUASA type code]	067 [YUASA type code]				
096 [YUASA type code]	065 [YUASA type code]				
075 [YUASA type code]	096L [YUASA type code]				
010S [YUASA type code]	010S [YUASA type code]				
75D31R(L)	95D31R(L)				
115D31R(L)	110D26R(L)				
95E41R(L)	130E41R(L)				

- 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

NJSC0004

### M/T MODELS

NJSC0004S01

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

NJSC0004S02

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.

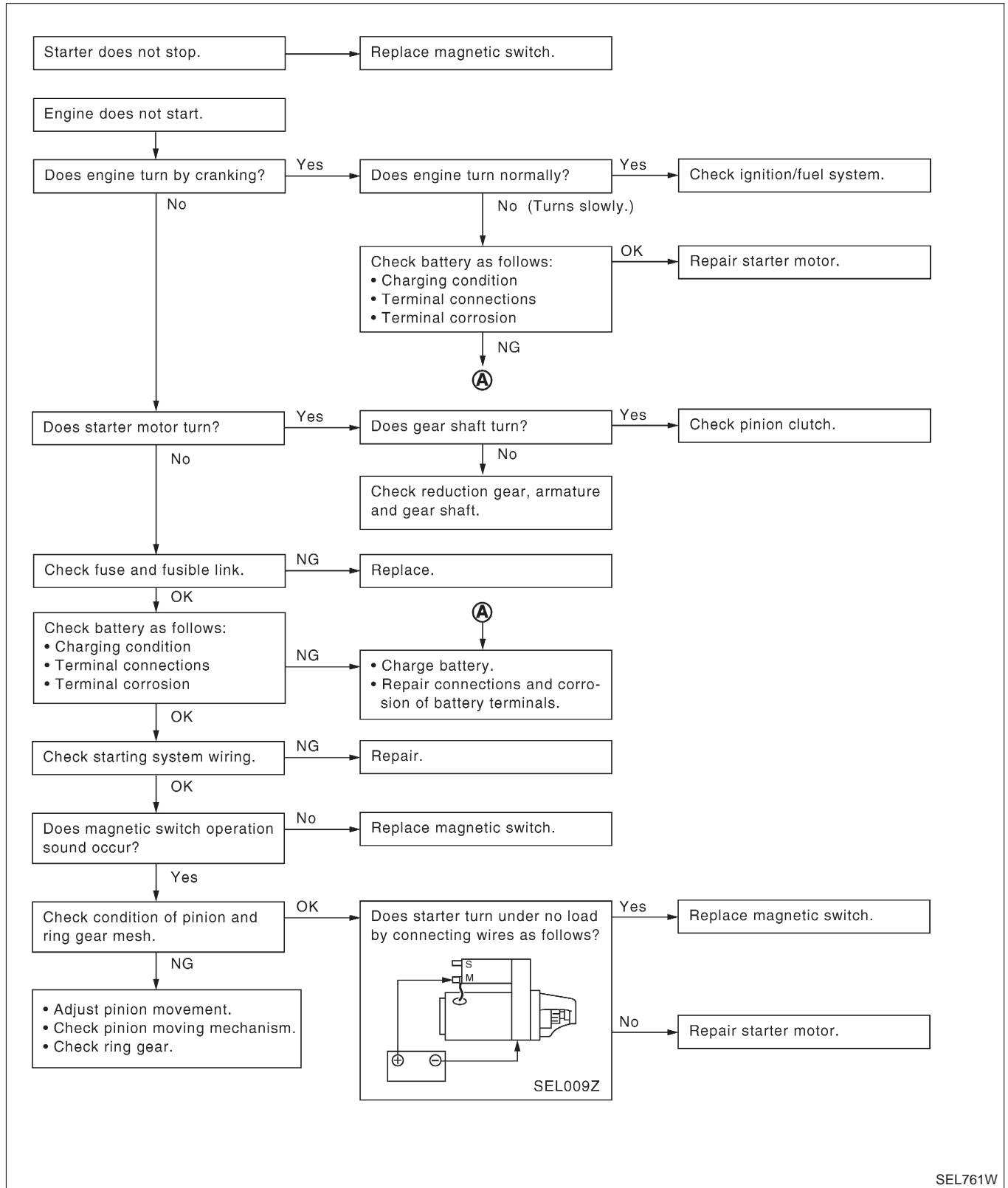


# STARTING SYSTEM

## Trouble Diagnoses

NJSC0018

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



SEL761W

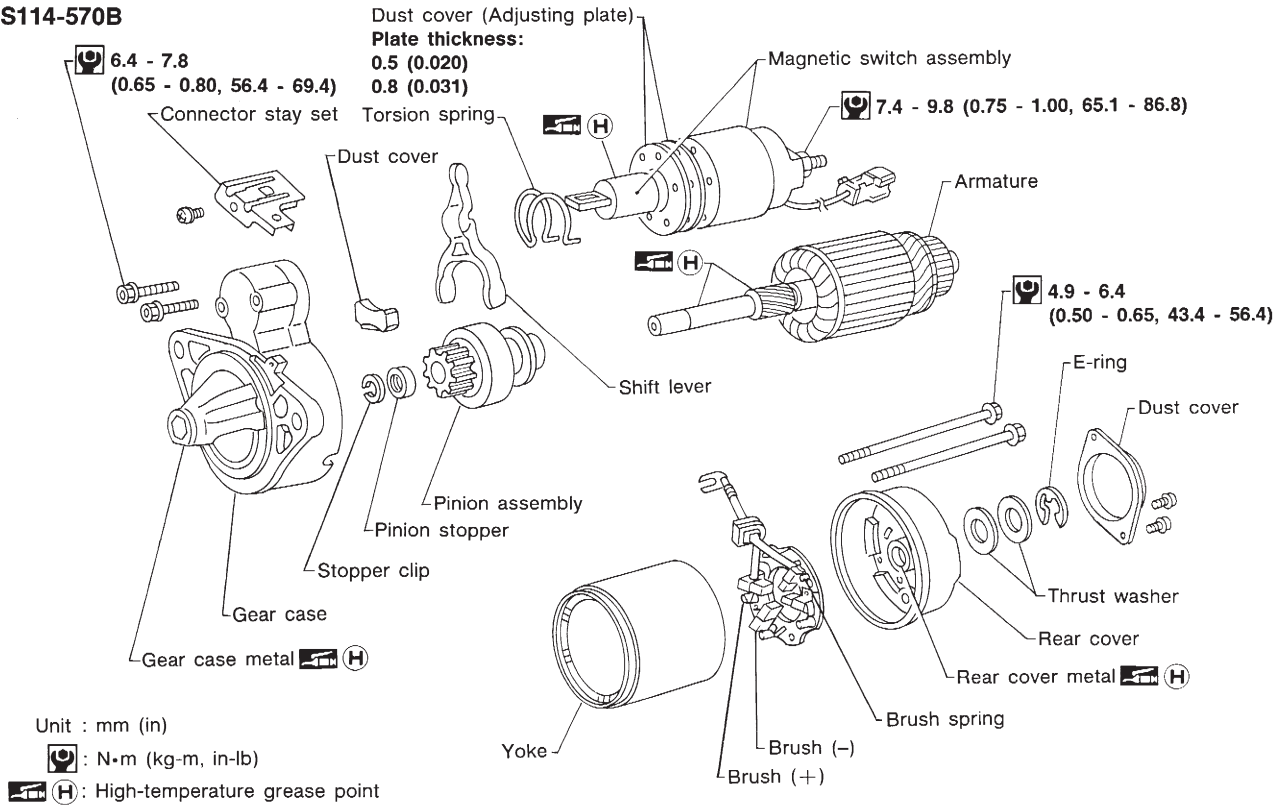
# STARTING SYSTEM

Construction

## Construction

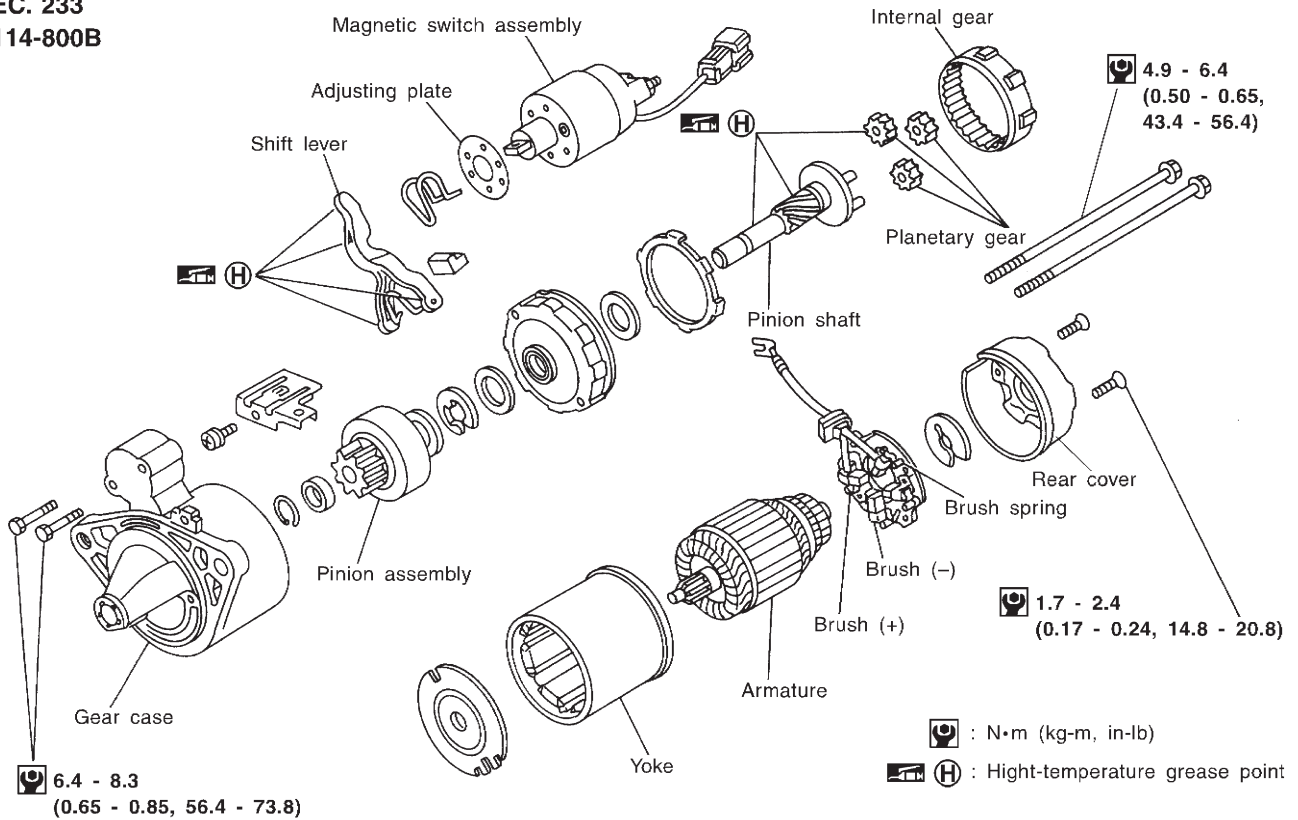
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### SEC. 233 S114-570B



MEL674E

### SEC. 233 S114-800B



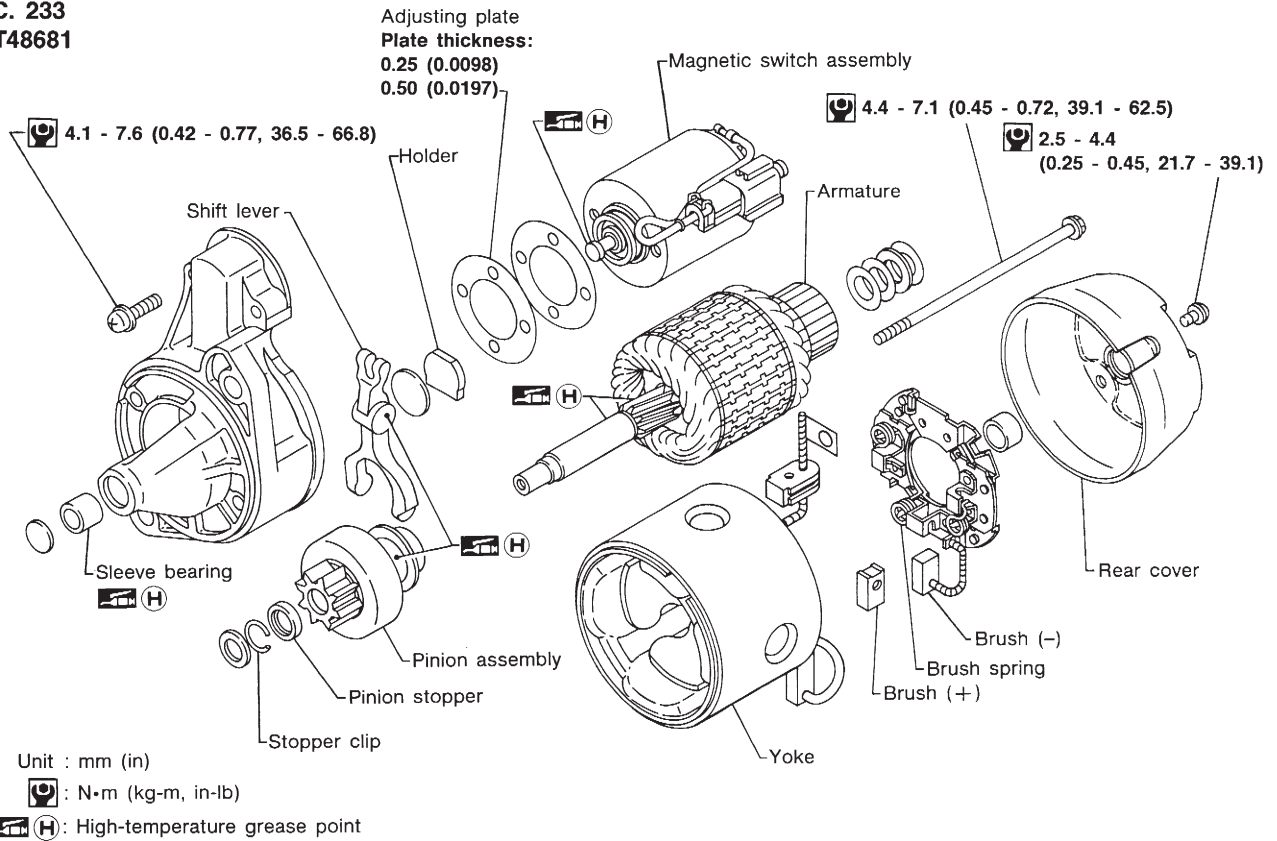
SEL027UC



# STARTING SYSTEM

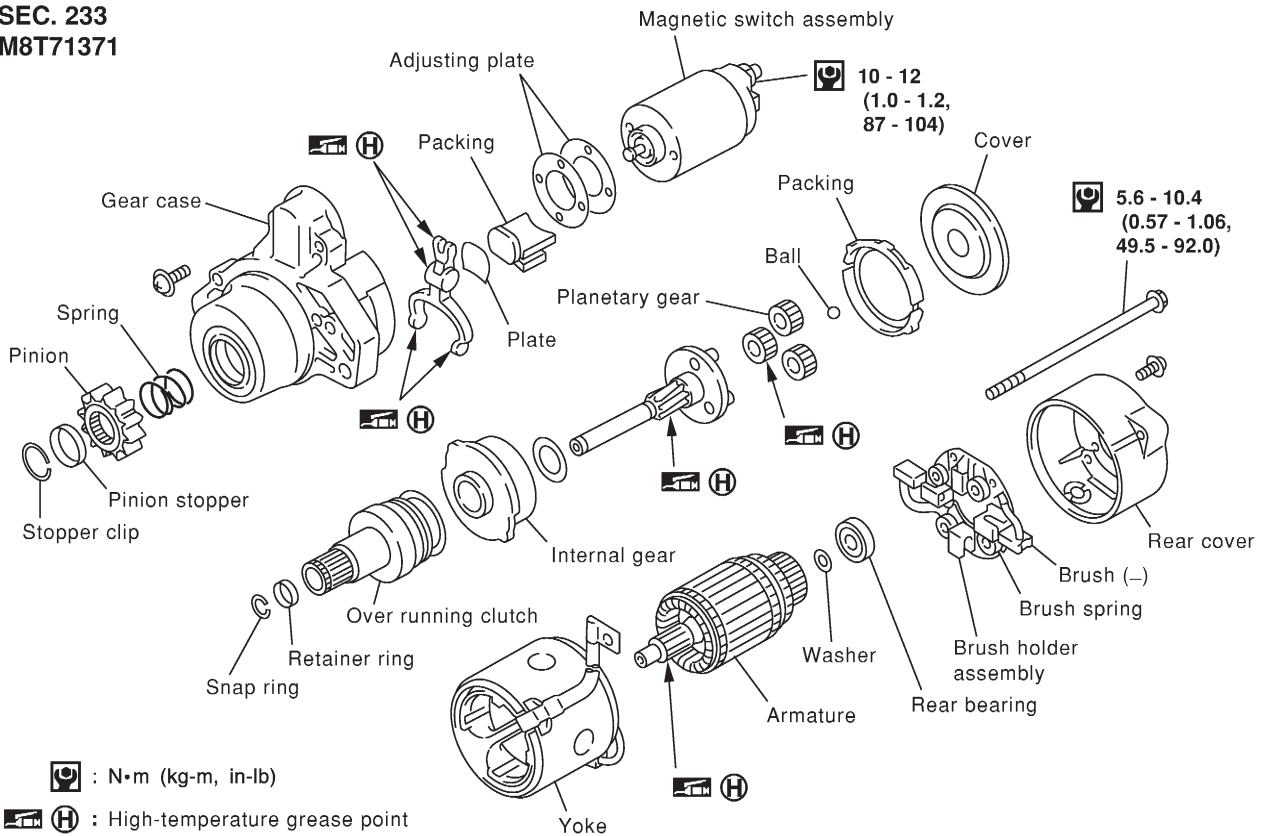
Construction (Cont'd)

**SEC. 233**  
**M2T48681**



MEL673E

**SEC. 233**  
**M8T71371**

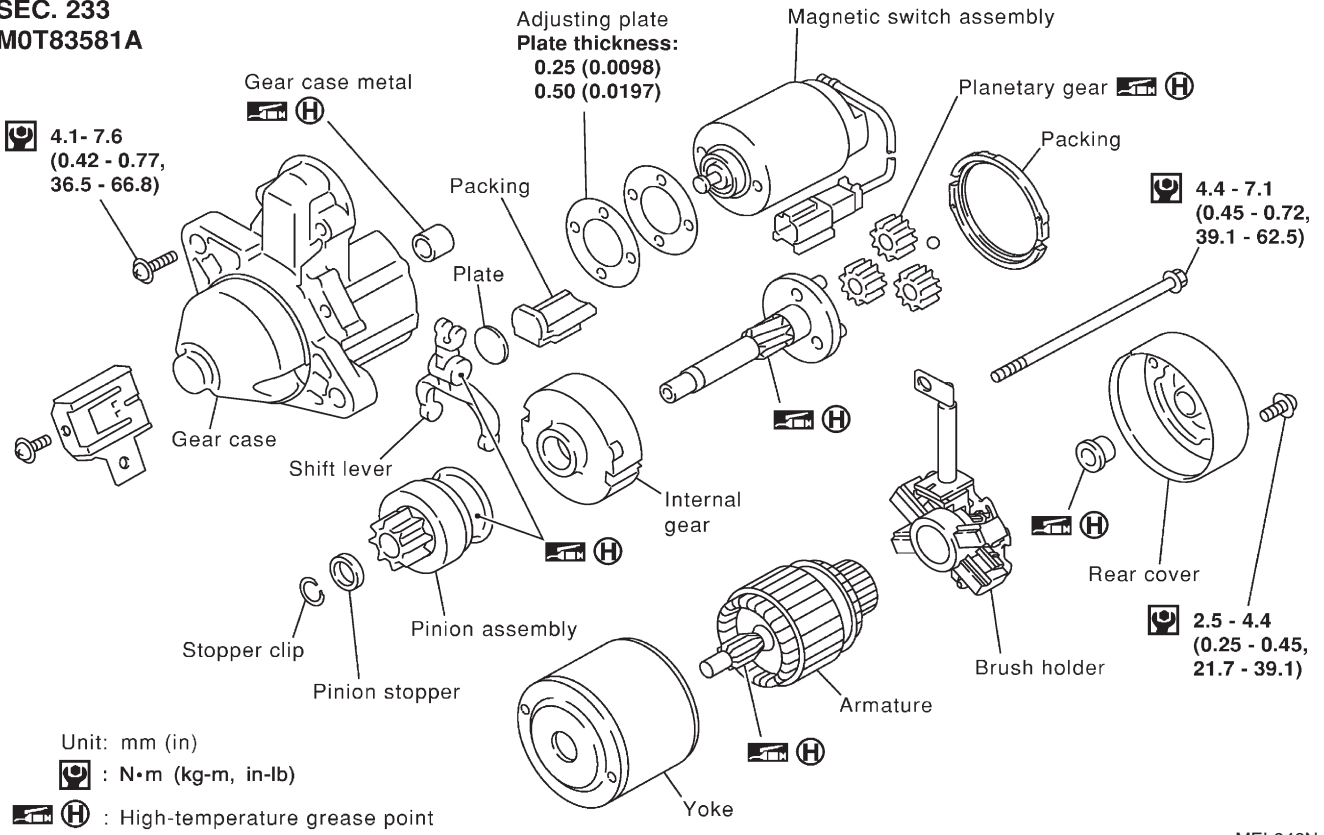


MEL136LB

# STARTING SYSTEM

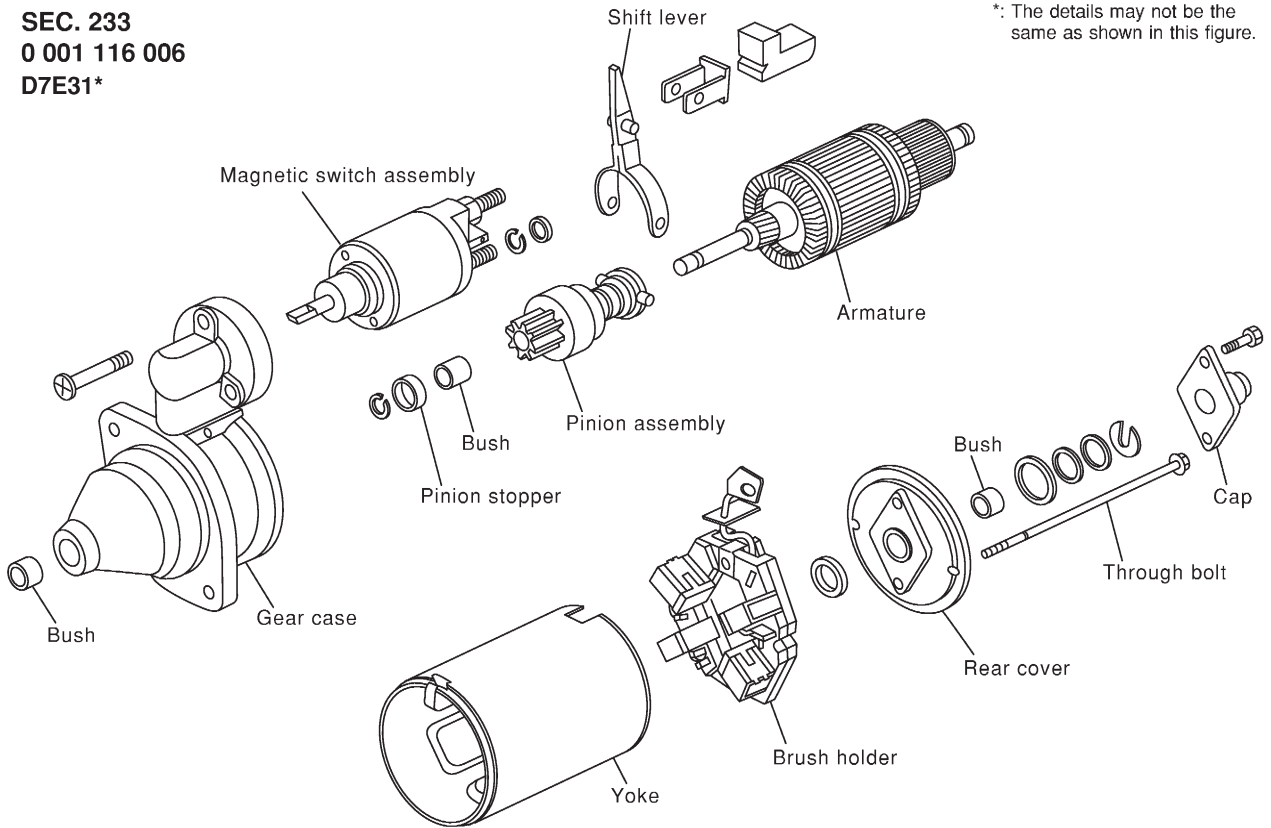
Construction (Cont'd)

## SEC. 233 M0T83581A



MEL946N

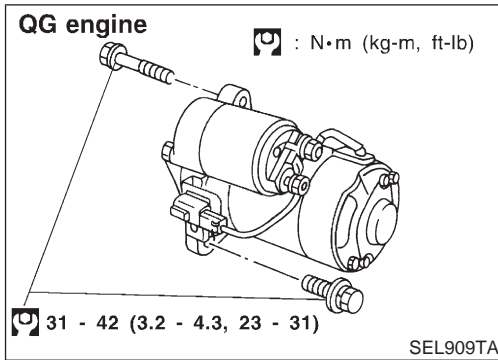
## SEC. 233 0 001 116 006 D7E31\*



NEL791

# STARTING SYSTEM

Removal and Installation



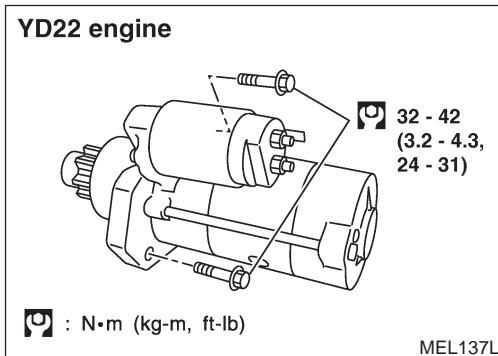
## Removal and Installation

NJSC0007

### REMOVAL

NJSC0007S01

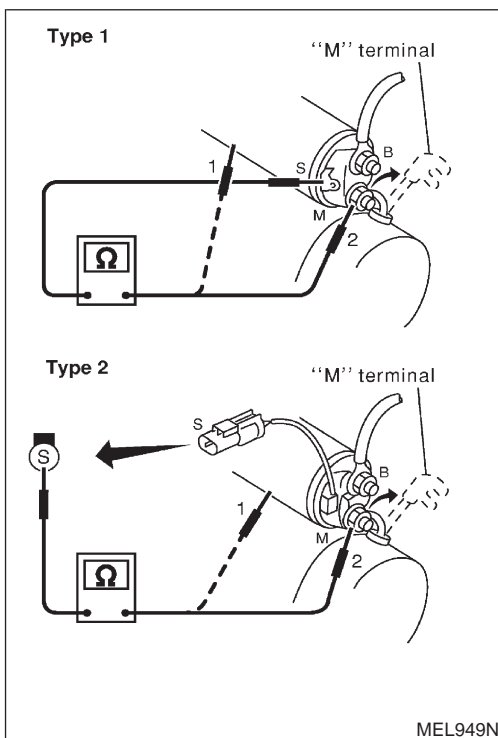
1. Remove intake air duct and air cleaner assembly.
2. Disconnect starter harness.
3. Remove starter bolts (two).
4. Remove starter.



### INSTALLATION

NJSC0007S02

To install, reverse the removal procedure.



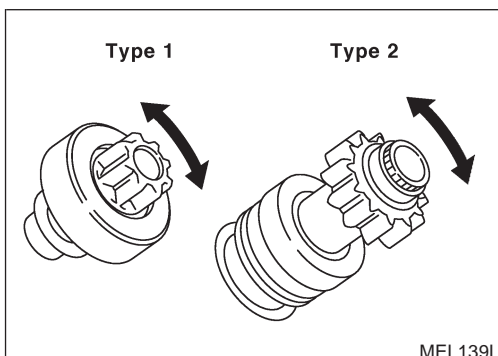
## Inspection

NJSC0019

### MAGNETIC SWITCH CHECK

NJSC0019S01

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



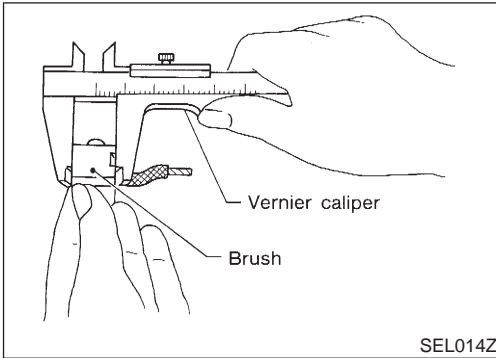
### PINION/CLUTCH CHECK

NJSC0019S02

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.

# STARTING SYSTEM

Inspection (Cont'd)



## BRUSH CHECK

### Brush

NJSC0019S03

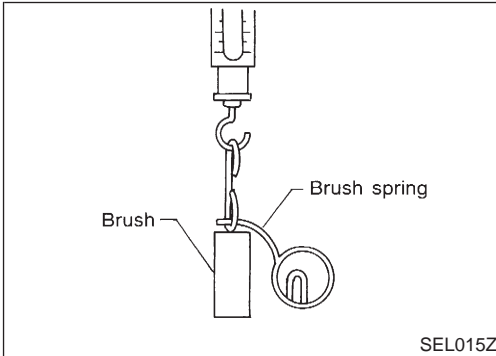
NJSC0019S0301

Check wear of brush.

**Wear limit length:**

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

- Excessive wear ... Replace.



## Brush Spring Check

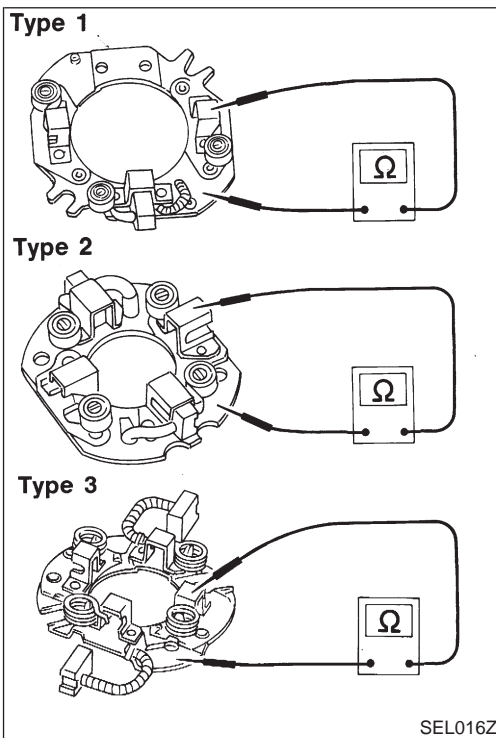
NJSC0019S0302

Check brush spring pressure with brush spring detached from brush.

**Spring pressure (with new brush):**

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

- Not within the specified values ... Replace.

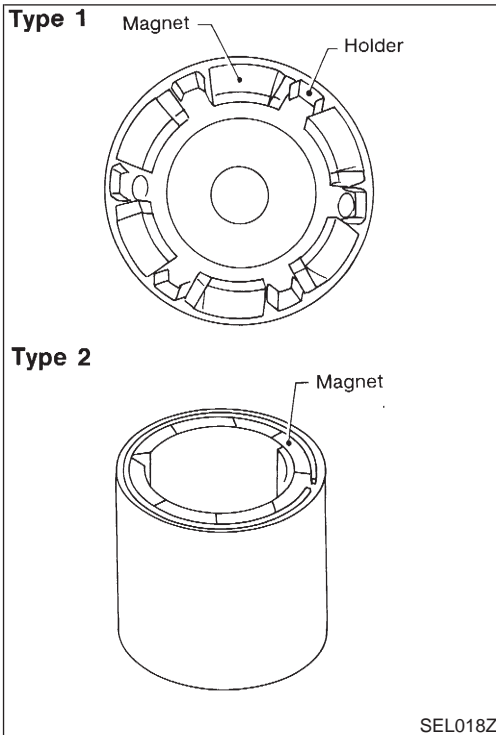


## Brush Holder

NJSC0019S0303

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

- 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.

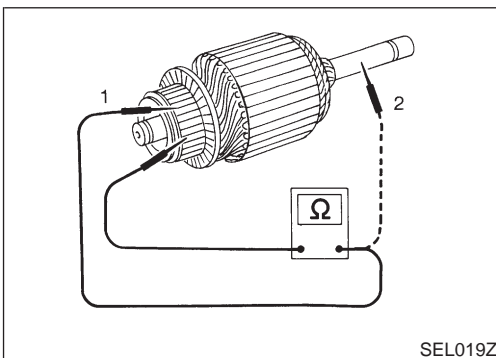


## YOKE CHECK

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. NJSC0019S04

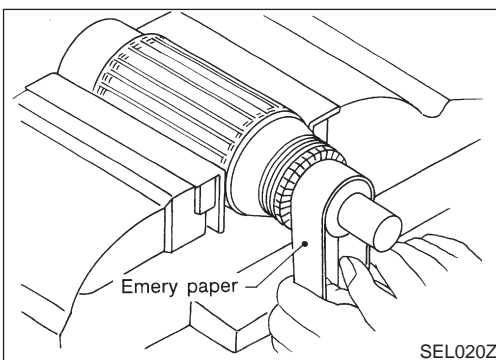
### CAUTION:

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

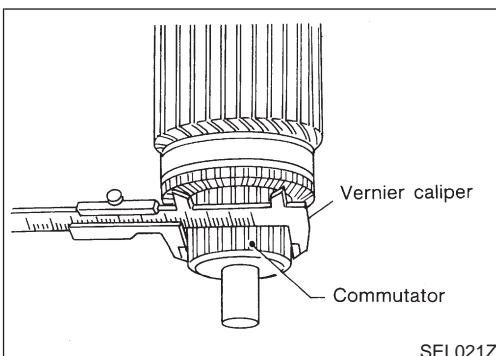


## ARMATURE CHECK

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.



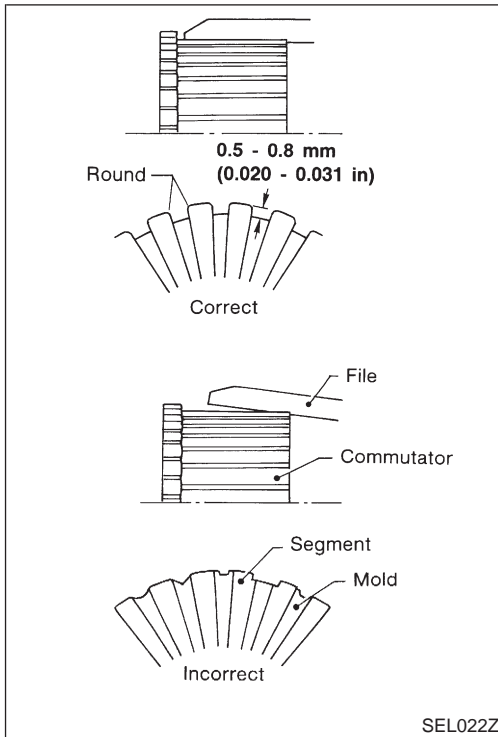
4. Check diameter of commutator.
 

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

  - Less than specified value ... Replace.

# STARTING SYSTEM

Inspection (Cont'd)

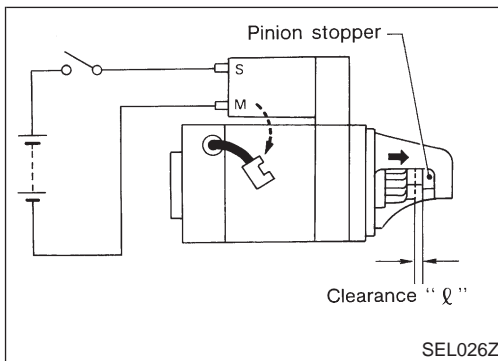


5. Check depth of insulating mold from commutator surface.
  - Less than 0.2 mm (0.008 in) ... Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in)

## Assembly

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

NJSC0020



## PINION PROTRUSION LENGTH ADJUSTMENT

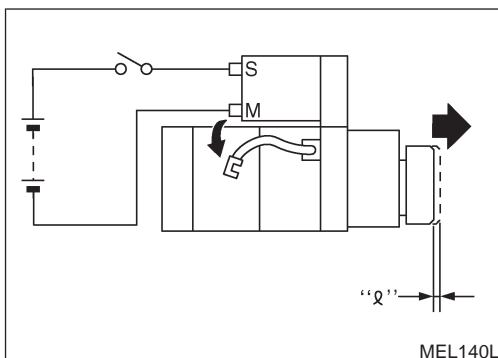
NJSC0020S01

### Clearance (QG engine models)

NJSC0020S0101

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)

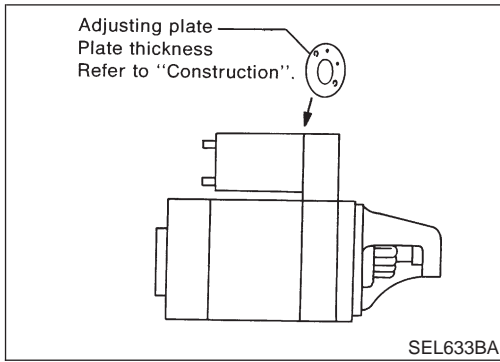
NJSC0020S0102

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).

## STARTING SYSTEM

Assembly (Cont'd)



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

# CHARGING SYSTEM

System Description

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## System Description

NJSC0009

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 (Gasoline engine models for Europe without daytime light system) or 100A (Except gasoline engine models for Europe without daytime light system) 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 1

Ground is supplied to terminal 28 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

Trouble Diagnoses

## Trouble Diagnoses

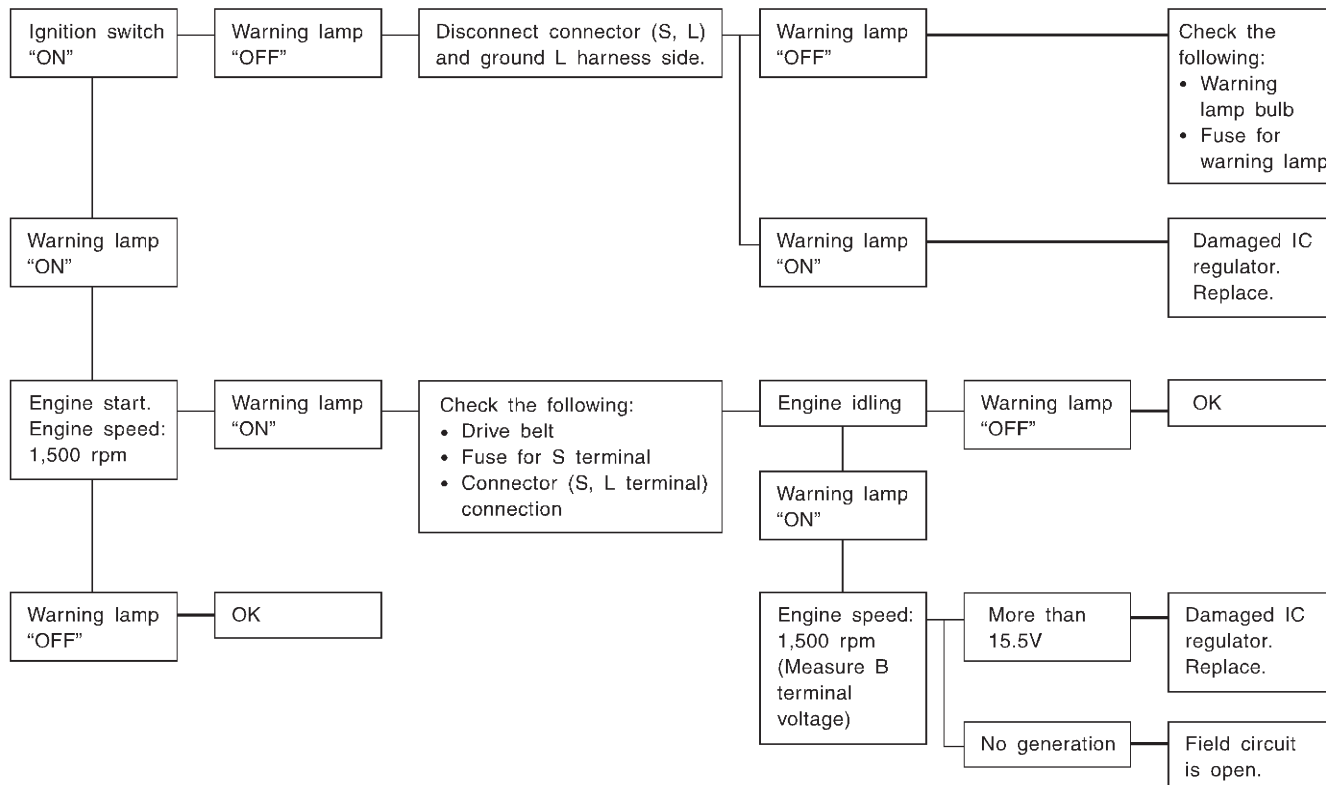
NJSC0011

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

NJSC0011S01



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

NJSC0011S02

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.

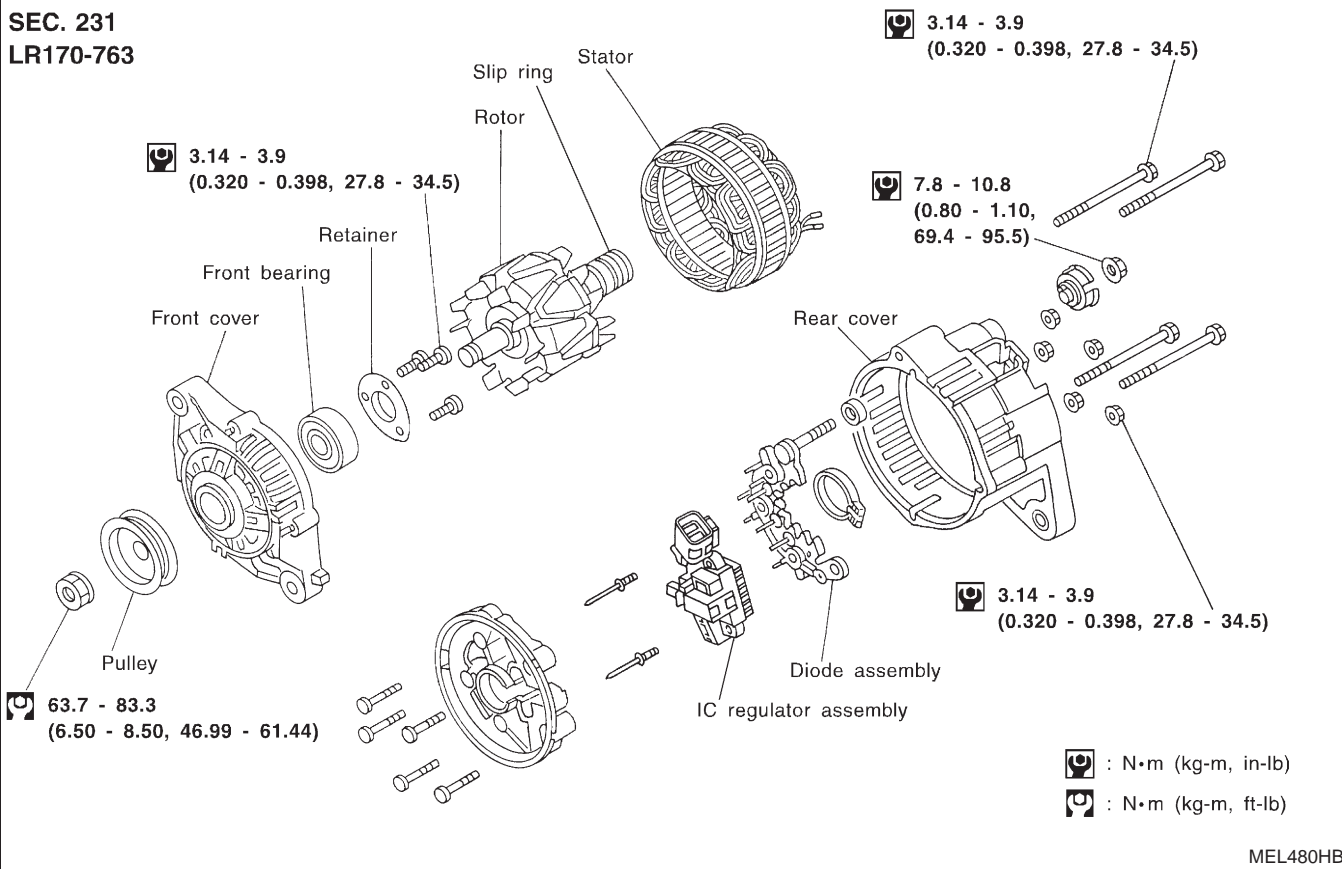
# CHARGING SYSTEM

Construction

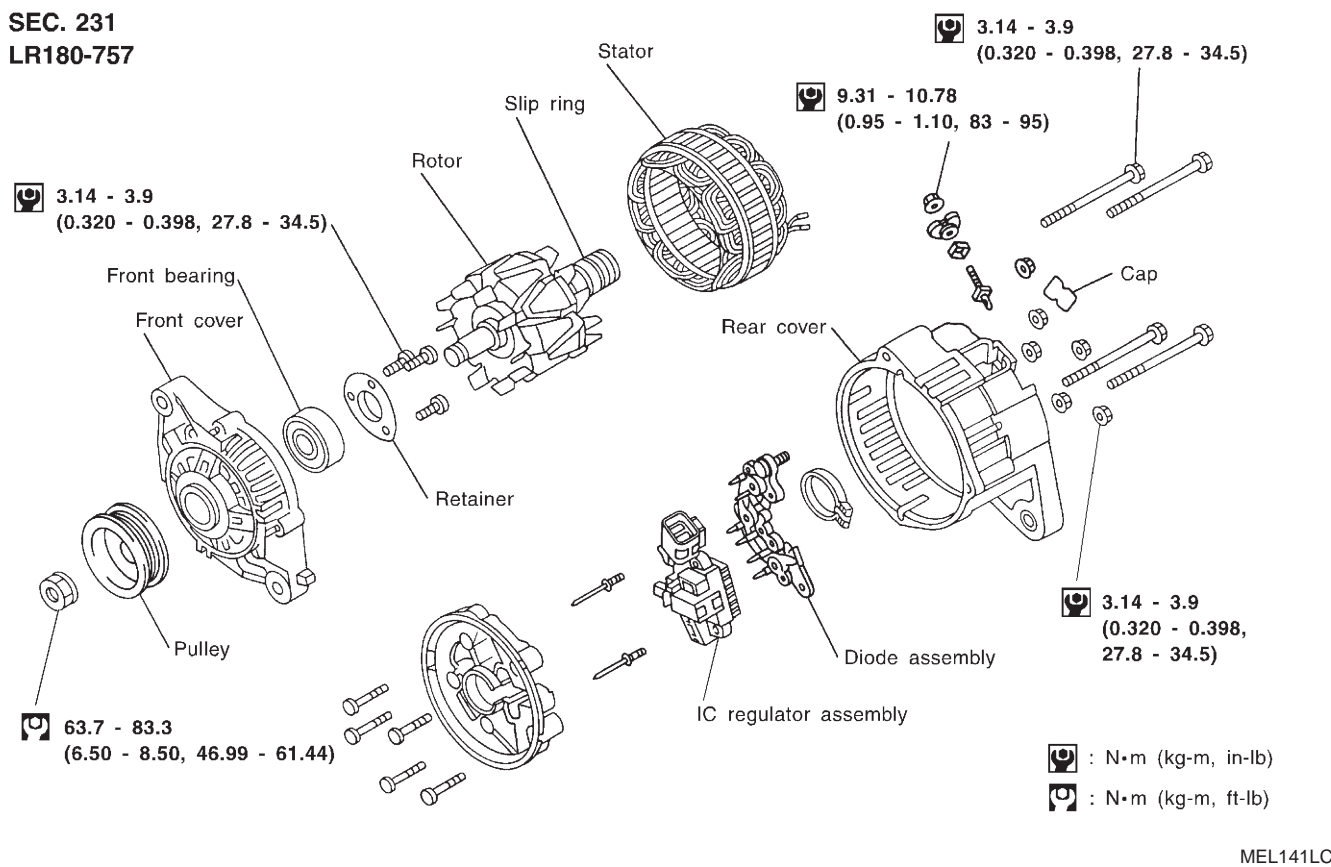
## Construction

NJSC0012

### SEC. 231 LR170-763

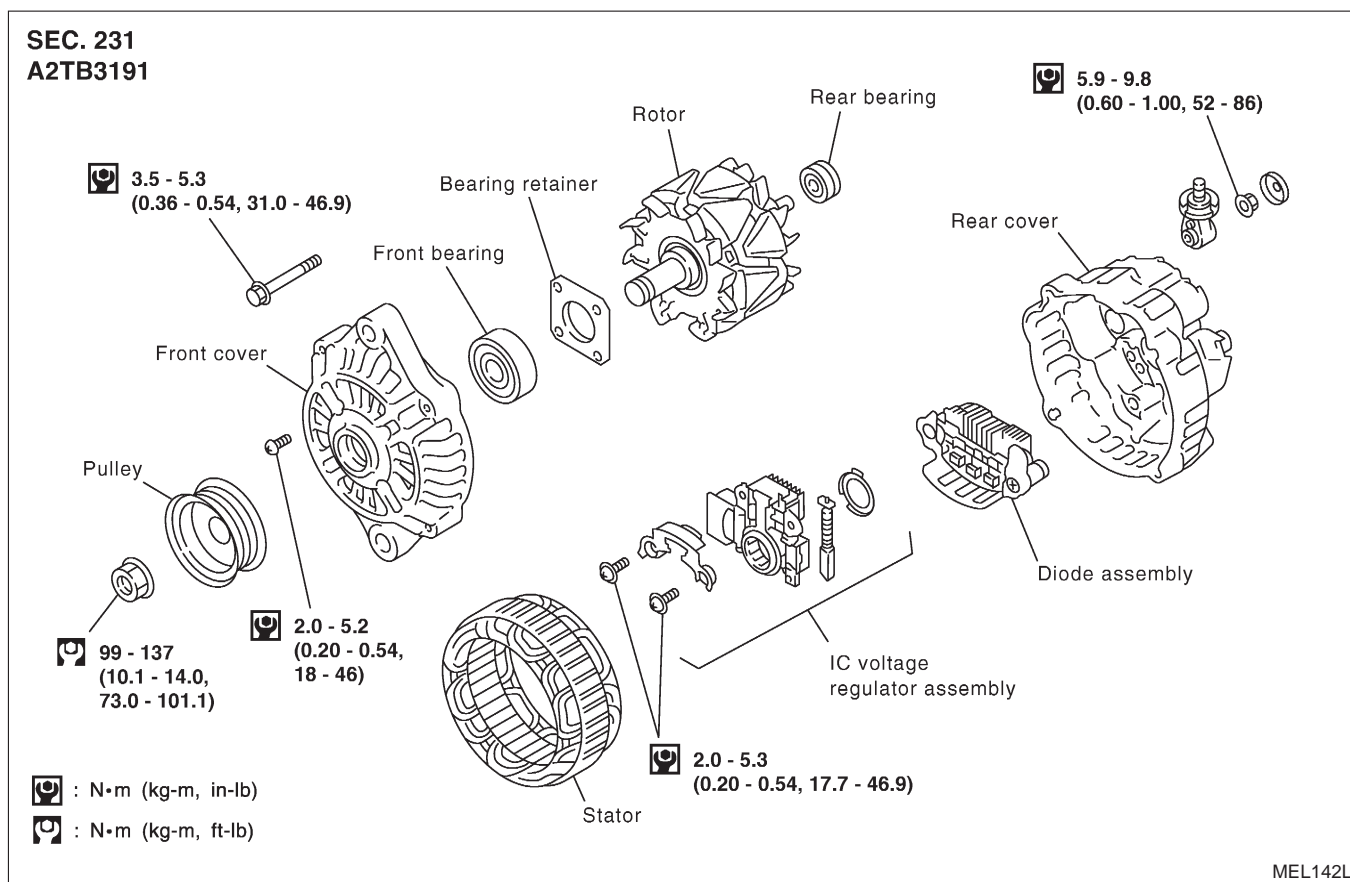
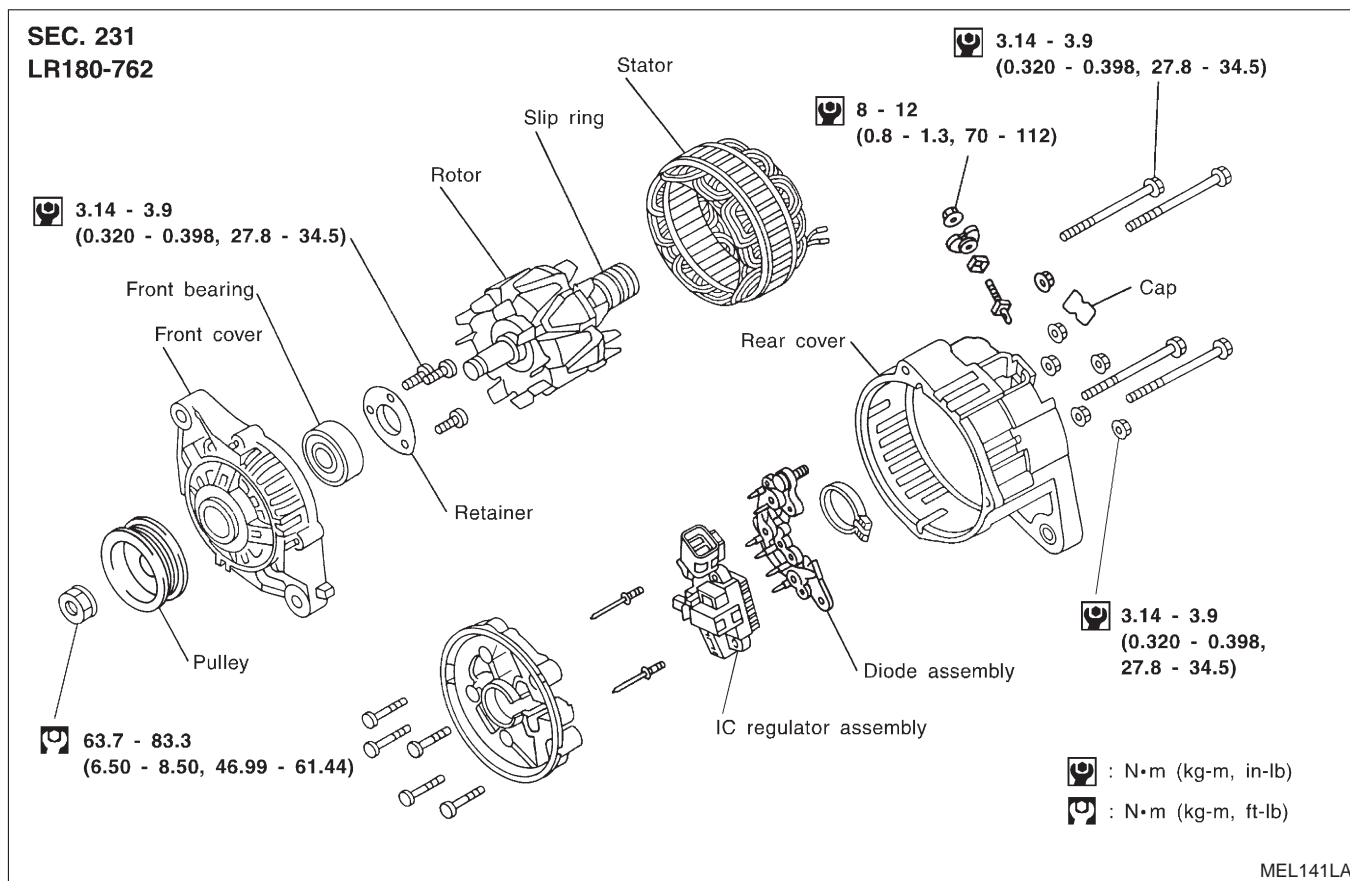


### SEC. 231 LR180-757



# CHARGING SYSTEM

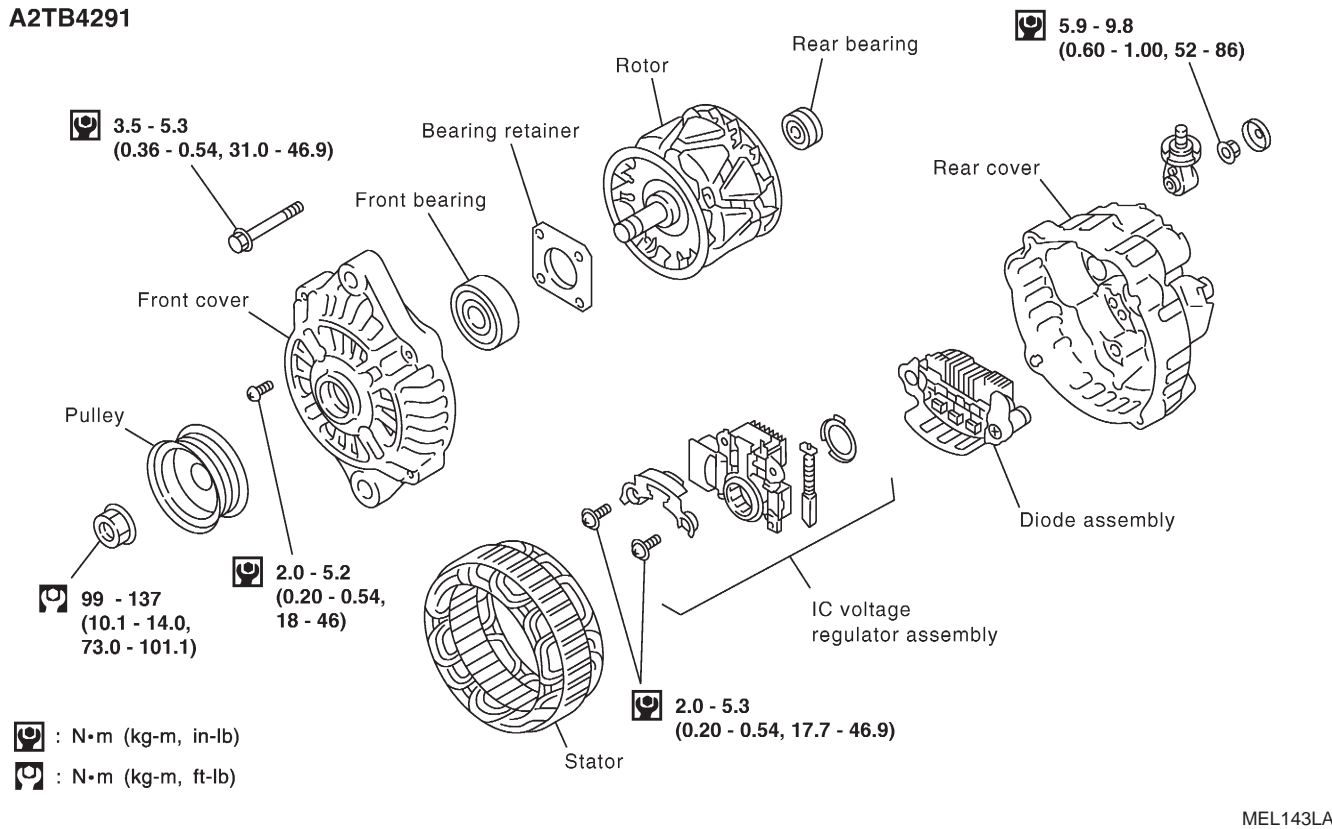
Construction (Cont'd)



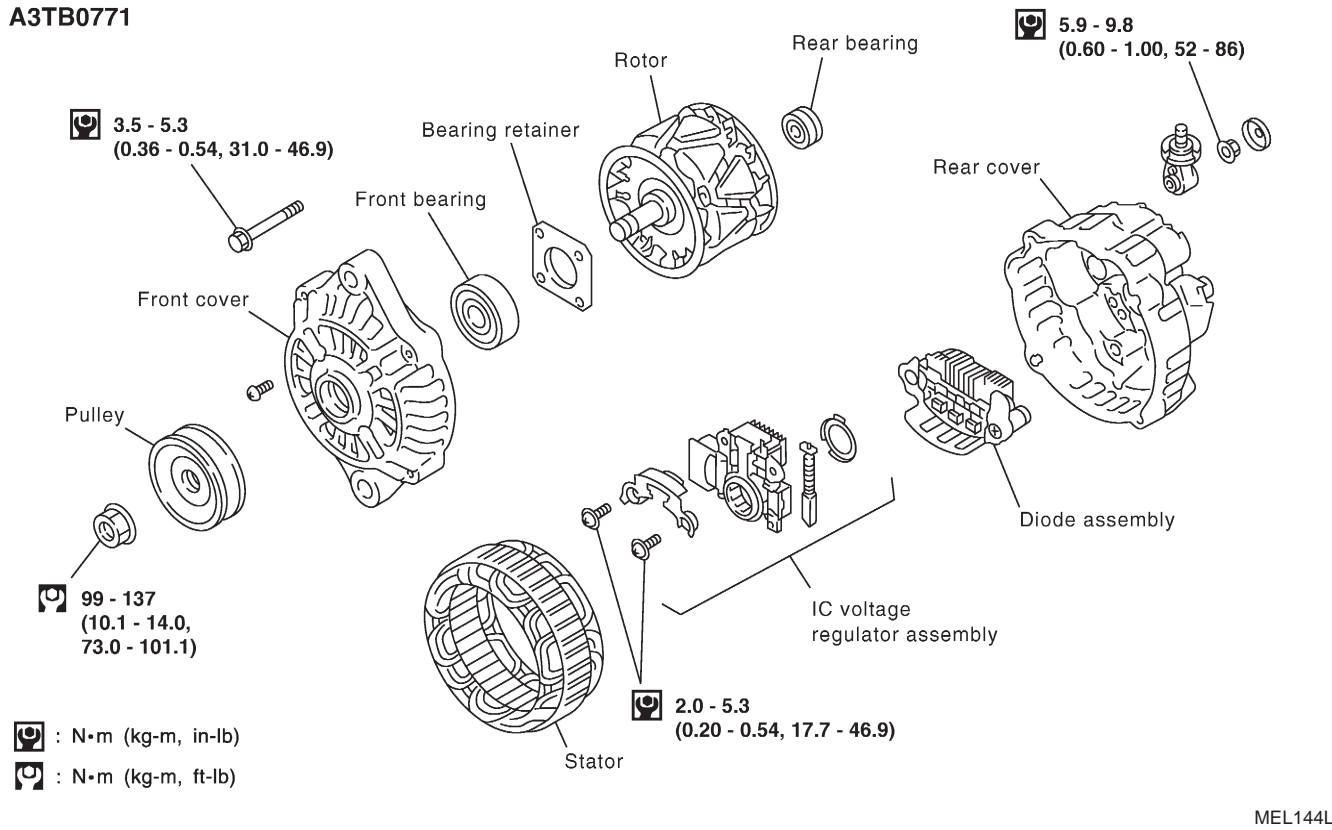
# CHARGING SYSTEM

Construction (Cont'd)

## SEC. 231 A2TB4291

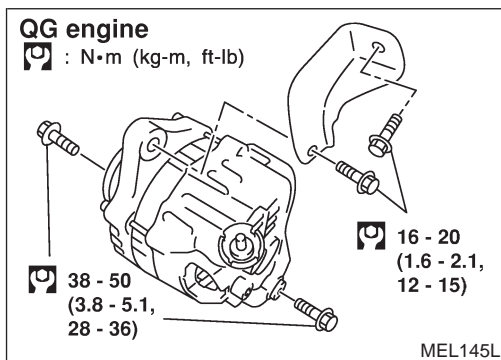
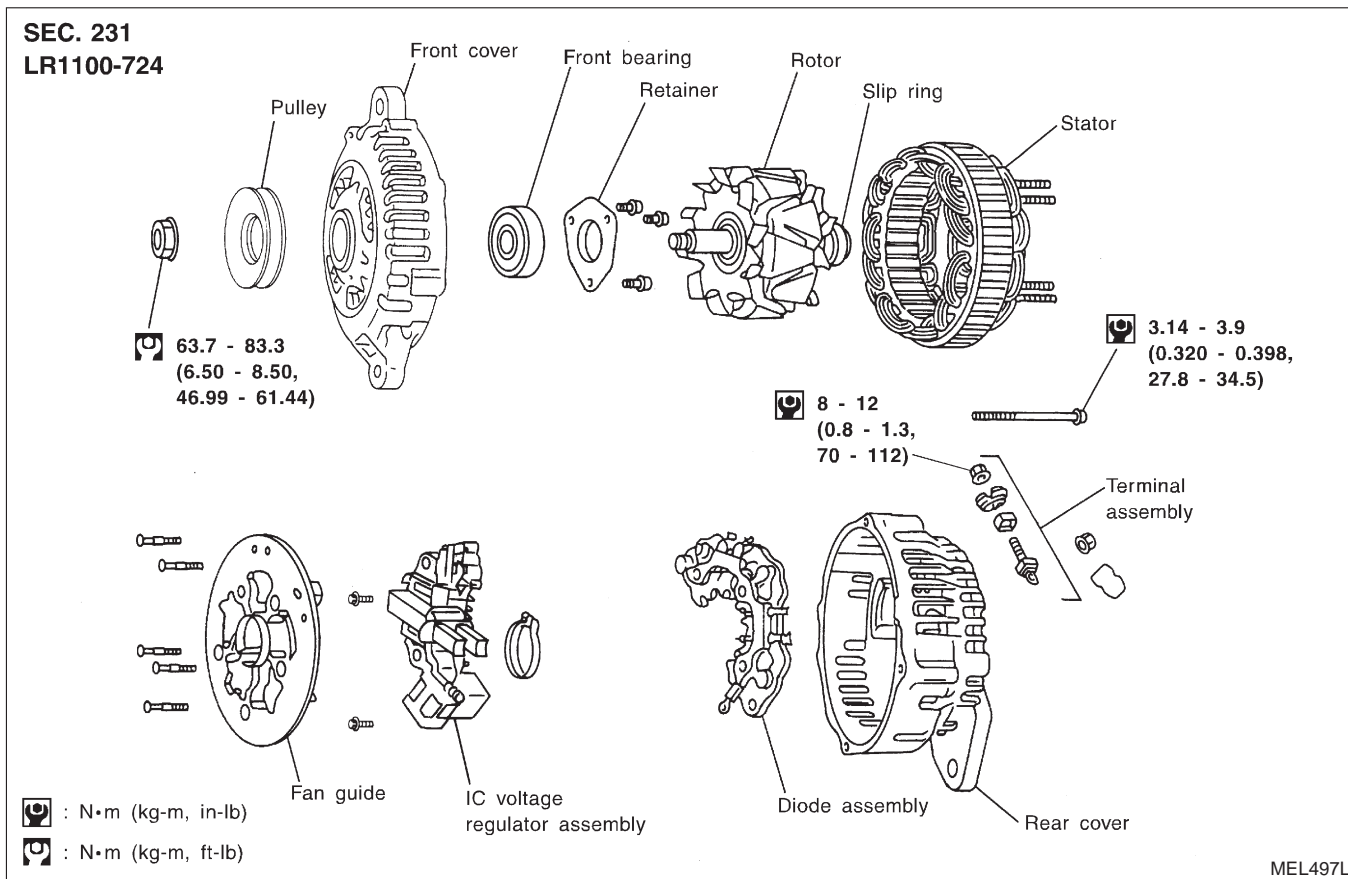


## SEC. 231 A3TB0771



# CHARGING SYSTEM

Construction (Cont'd)



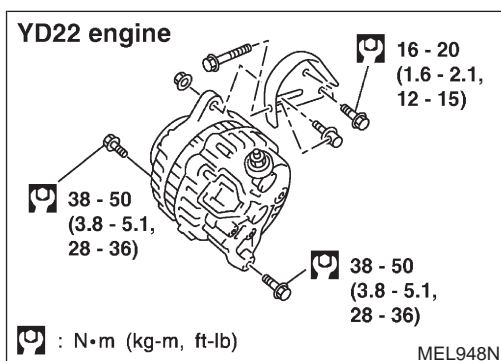
## Removal and Installation

### REMOVAL (QG ENGINE)

NJSC0013

NJSC0013S01

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)

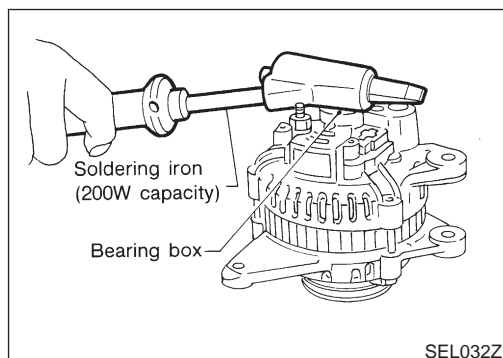
NJSC0013S03

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.

NJSC0013S02



## Disassembly REAR COVER

NJSC0021

NJSC0021S01

### 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.

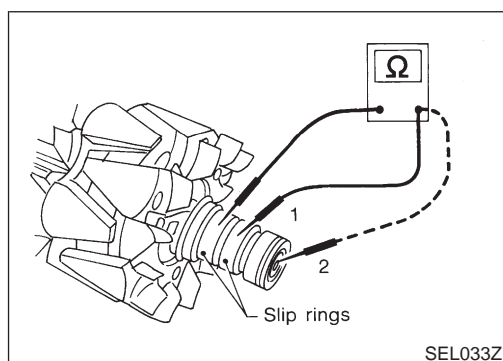
Do not use a heat gun, as it can damage diode assembly.

## REAR BEARING

NJSC0021S02

### CAUTION:

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



## Inspection

### ROTOR CHECK

NJSC0022

NJSC0022S01

1. Resistance test

**Resistance: Refer to SDS (SC-35).**

- 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:**

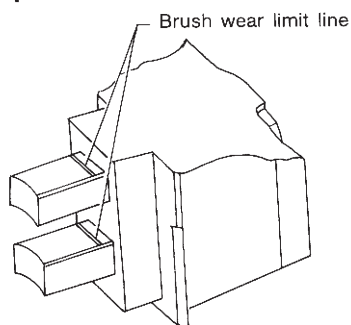
**Refer to SDS (SC-35).**

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

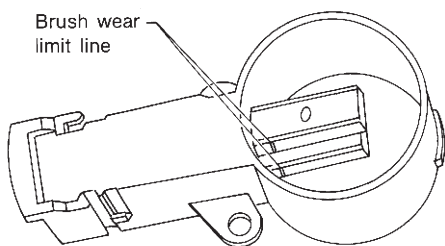
# CHARGING SYSTEM

Inspection (Cont'd)

## Type 1



## Type 2



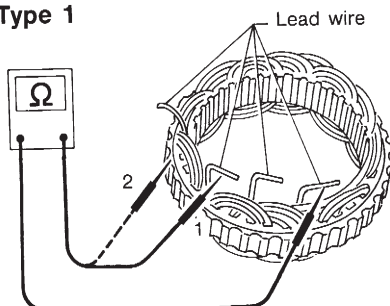
SEL034Z

## BRUSH CHECK

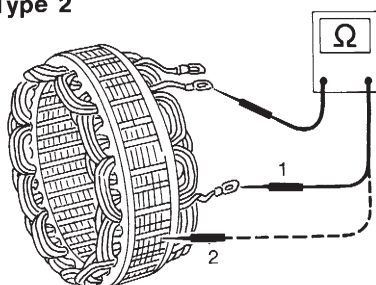
NJSC0022S02

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



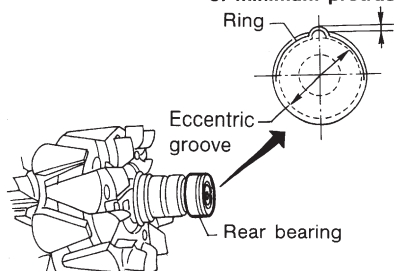
SEL037Z

## STATOR CHECK

NJSC0022S03

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

NJSC0023

NJSC0023S01

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

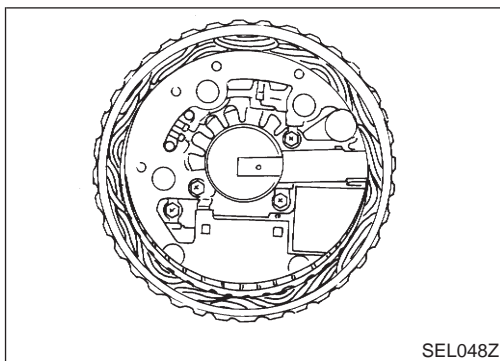
### CAUTION:

Do not reuse rear bearing after removal.



## CHARGING SYSTEM

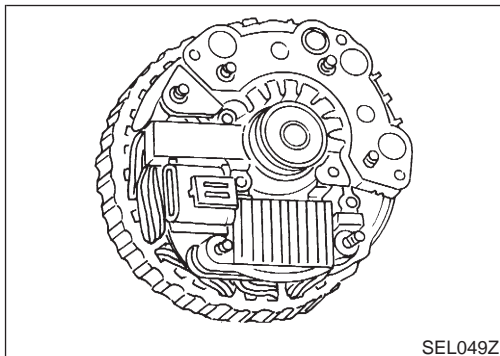
Assembly (Cont'd)



### REAR COVER INSTALLATION

NJSC0023S02

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.**



## SERVICE DATA AND SPECIFICATIONS (SDS)

### Battery

<b>Battery</b>														
Applied model	QG engine											YD engine		
Type	34B19L	46B24L	55D23L	65D26L	YUASA type code						YUASA type code		110D26L	
					025	027	063	065	075	096L	010S	067		096
Capacity V-AH	12-27	12-36	12-48	12-52			12-47	12-55	12-50	12-65		12-60	12-64	12-70

NJSC0014

### Starter

<b>Starter</b>								
Type	D7E31	S114-570B	S114-800B	M2T48681	M0T83581A	M8T71371		
	VALEO make		HITACHI make		MITSUBISHI make			
	Non-reduction		Non-reduction	Reduction	Non-reduction	Reduction	Reduction	
Applied model		QG engine					YD engine	
System voltage V		12						
No-load	Terminal voltage V		11.0	11.5	11.0	11.5	11.0	11.0
	Current A		45	Less than 60	Less than 90	Less than 53	Less than 90	Less than 145
	Revolution rpm		12,000	More than 6,000	More than 2,750	More than 6,000	More than 2,750	More than 3,400
Minimum diameter of commutator mm (in)		28.2 (1.110)	28.0 (1.102)		31.4 (1.236)	28.8 (1.134)	31.4 (1.236)	
Minimum length of brush mm (in)		6.15 (0.242)	9.0 (0.354)	10.5 (0.413)	11.5 (0.453)	7.0 (0.276)	11.0 (0.433)	
Brush spring tension N (kg, lb)		16.2 - 19.8 (1.65 - 2.02, 3.46 - 4.45)	9.8 - 13.7 (1.0 - 1.4, 2.2 - 3.1)	12.7 - 17.7 (1.3 - 1.8, 2.9 - 4.0)	13.7 - 25.5 (1.4 - 2.6, 3.1 - 5.7)	15.0 - 20.4 (1.5 - 2.1, 3.4 - 4.6)	26.5 - 36.3 (2.7 - 3.7, 6.0 - 8.2)	
Clearance between bearing metal and armature shaft mm (in)		0.05 (0.0020)	Less than 0.2 (0.008)			—		
Clearance "ℓ" between pinion front edge and pinion stopper mm (in)		Max. 1 (0.039)	0.3 - 2.5 (0.012 - 0.098)		0.5 - 2.0 (0.020 - 0.079)		—	
Movement "ℓ" in height of pinion assembly mm (in)		Max. 12.2 (0.480)	—				0.5 - 2.0 (0.020 - 0.079)	

NJSC0015

## SERVICE DATA AND SPECIFICATIONS (SDS)

Alternator

### Alternator

NJSC0016

Type	LR180-762	LR180-757	LR1100-724	A2TB3191	A3TB0771
	HITACHI make			MITSUBISHI make	
Applied model	QG engine		YD engine	QG engine	YD engine
Nominal rating V-A	12-80	12-80	12-100	12-80	12-90
Ground polarity	Negative				
Minimum revolutions under no-load (When 13.5V is applied) rpm	Less than 1,000	Less than 1,100	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 77/5,000	More than 17/1,300 More than 63/2,500 More than 76/5,000	More than 34/1,300 More than 80/2,500 More than 91/5,000	More than 23/1,300 More than 62/2,500 More than 72/5,000	More than 29/1,300 More than 76/2,500 More than 88/5,000
Regulated output voltage V	14.1 - 14.7				
Minimum length of brush mm (in)	More than 6.0 (0.236)			More than 5.0 (0.197)	
Brush spring pressure N (g, oz)	1.0 - 3.43 (102 - 350, 3.60 - 12.34)			4.8 - 6.0 (490 - 610, 17.28 - 21.51)	
Slip ring minimum diameter mm (in)	More than 26.0 (1.024)			More than 22.1 (0.870)	
Rotor coil resistance at 20° (68°F) Ω	2.67		2.31	2.2 - 2.6	2.1 - 2.5

**SERVICE DATA AND SPECIFICATIONS (SDS)**

*Alternator (Cont'd)*

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