

SECTION

SC

STARTING & CHARGING SYSTEM

CONTENTS

<b>PRECAUTIONS</b> .....	2	REAR BEARING .....	18	F
Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" .....	2	Inspection .....	18	
Wiring Diagrams and Trouble Diagnosis .....	2	ROTOR CHECK .....	18	
<b>BATTERY</b> .....	3	BRUSH CHECK .....	18	G
How to Handle Battery .....	3	PULLEY CHECK (WITH CLUTCH TYPE) .....	18	
METHODS OF PREVENTING OVER-DISCHARGE .....	3	STATOR CHECK .....	18	
CHECKING ELECTROLYTE LEVEL .....	3	Assembly .....	19	H
SPECIFIC GRAVITY CHECK .....	4	RING FITTING IN REAR BEARING .....	19	
Battery Test and Charging Chart .....	5	REAR COVER INSTALLATION .....	19	
CHART I .....	5	<b>STARTING SYSTEM</b> .....	20	I
CHART II .....	6	System Description .....	20	
A: SLOW CHARGE .....	7	YD ENGINE MODELS .....	20	J
B: STANDARD CHARGE .....	8	F9Q ENGINE MODELS .....	20	
C: QUICK CHARGE .....	10	Wiring Diagram — START —/For YD Engine .....	21	
Removal and Installation .....	11	Wiring Diagram — START —/For F9Q Engine .....	22	
<b>CHARGING SYSTEM</b> .....	12	Trouble Diagnoses .....	23	
System Description .....	12	Removal and Installation .....	24	
YD ENGINE MODELS .....	12	REMOVAL .....	24	SC
F9Q ENGINE MODELS .....	12	INSTALLATION .....	24	
Wiring Diagram — CHARGE —/For YD Engine ...	13	Disassembly and Assembly .....	25	L
Wiring Diagram — CHARGE —/For F9Q Engine...	14	Inspection .....	26	
Trouble Diagnoses .....	15	MAGNETIC SWITCH CHECK .....	26	
WITH IC REGULATOR .....	15	PINION/CLUTCH CHECK .....	27	
MALFUNCTION INDICATOR .....	15	BRUSH CHECK .....	27	M
Removal and Installation .....	16	YOKE CHECK .....	28	
REMOVAL (YD ENGINE MODELS) .....	16	ARMATURE CHECK .....	29	
REMOVAL (F9Q ENGINE MODELS) .....	16	Assembly .....	30	
INSTALLATION .....	16	PINION PROTRUSION LENGTH ADJUSTMENT .....	30	
Disassembly and Assembly .....	17	<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	32	
Disassembly .....	17	Battery .....	32	
REAR COVER .....	17	Starter .....	32	
		Alternator .....	32	

# PRECAUTIONS

## PRECAUTIONS

PFP:00011

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

EKS009KU

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

EKS009KV

When you read wiring diagrams, refer to the followings:

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

When you perform trouble diagnosis, refer to the followings:

- [GI-10, "How to Follow Trouble Diagnoses"](#) and [GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident"](#) in GI section

# BATTERY

## BATTERY

PFP:00011

### How to Handle Battery

EKS009KW

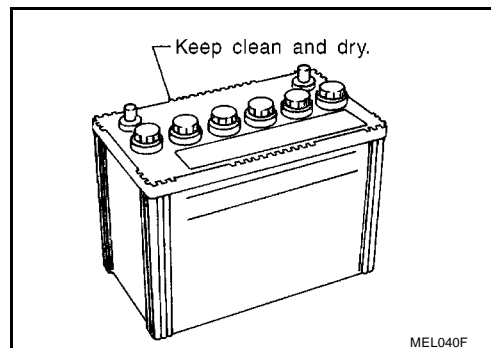
#### CAUTION:

- 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.

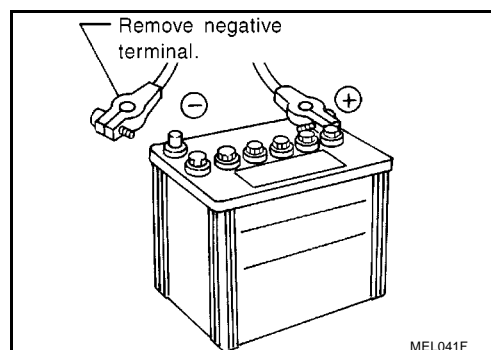
#### METHODS OF PREVENTING OVER-DISCHARGE

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

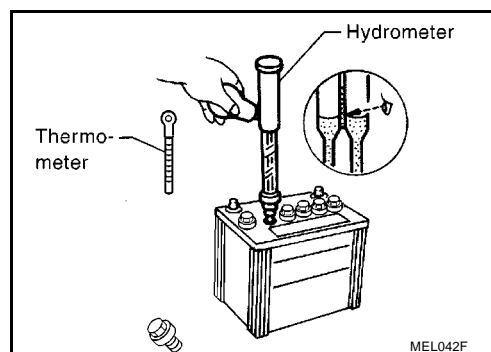
- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level. This also applies to batteries designated as "low maintenance" and "maintenance-free".



- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal. (If the vehicle has an extended storage switch, turn it off.)



- 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.



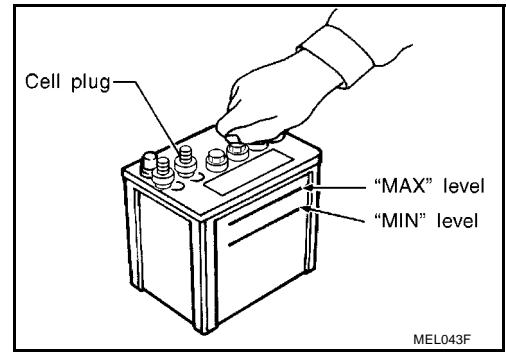
#### CHECKING ELECTROLYTE LEVEL

#### 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.

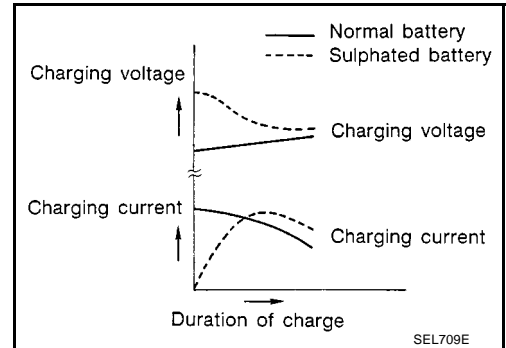


## Sulphation

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.

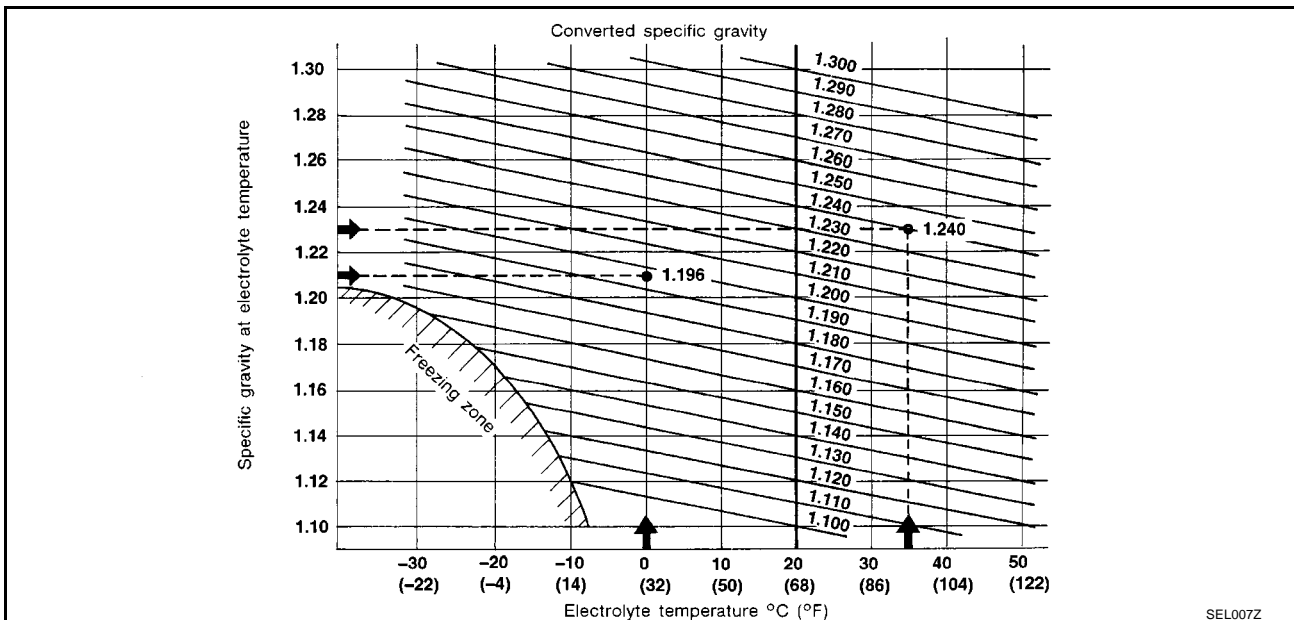
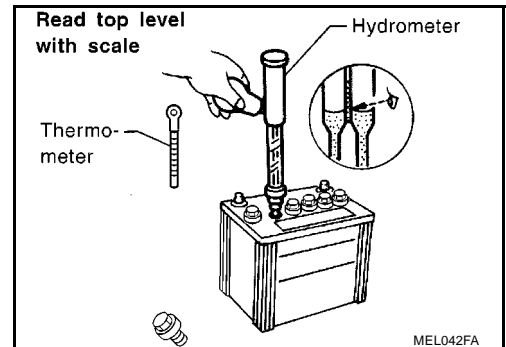


## SPECIFIC GRAVITY CHECK

1. Read hydrometer and thermometer indications at eye level.
2. 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.

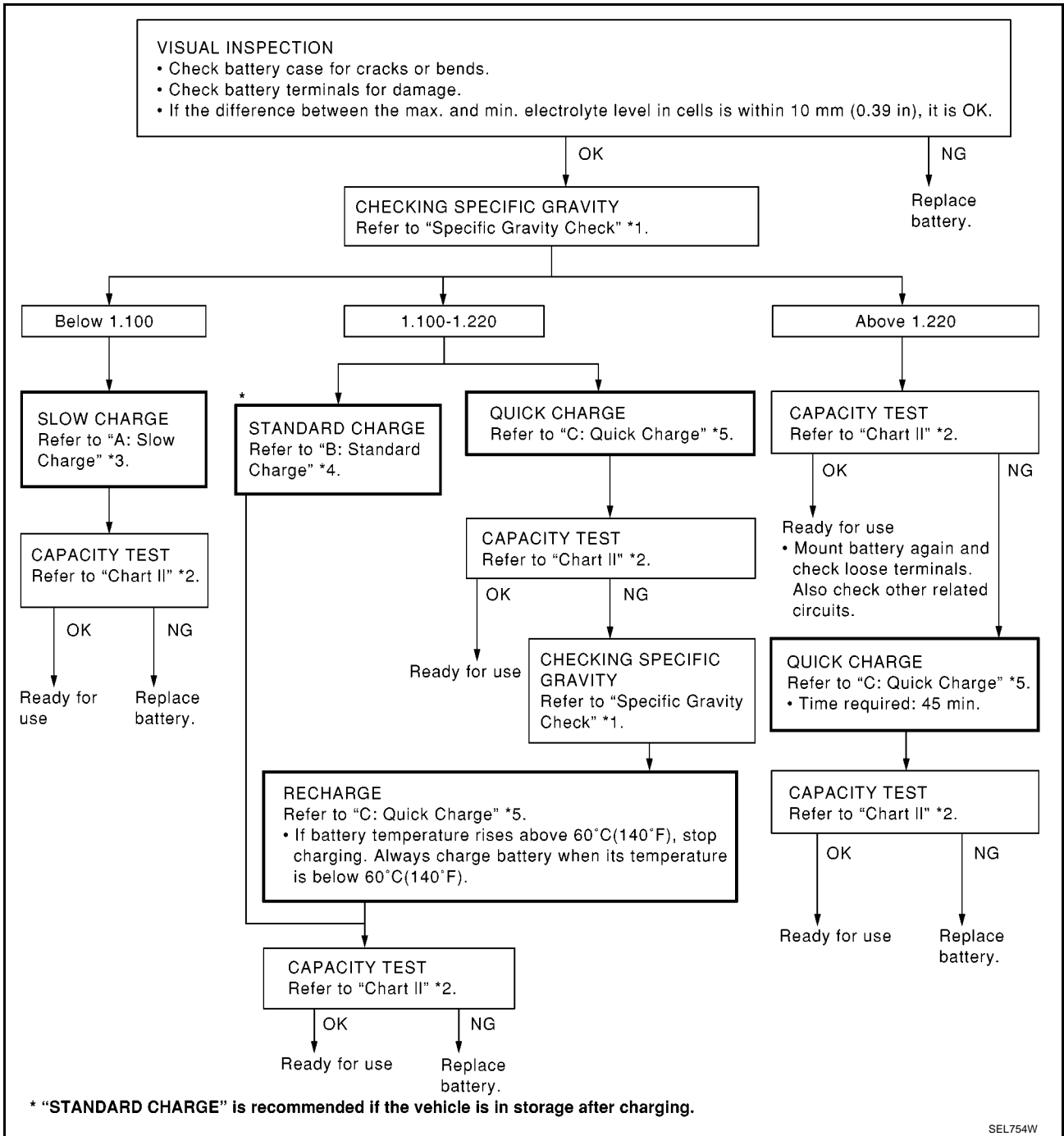


# BATTERY

## Battery Test and Charging Chart CHART I

EKS009KX

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



SEL754W

\*1. [SC-4](#)

\*2. [SC-6](#)

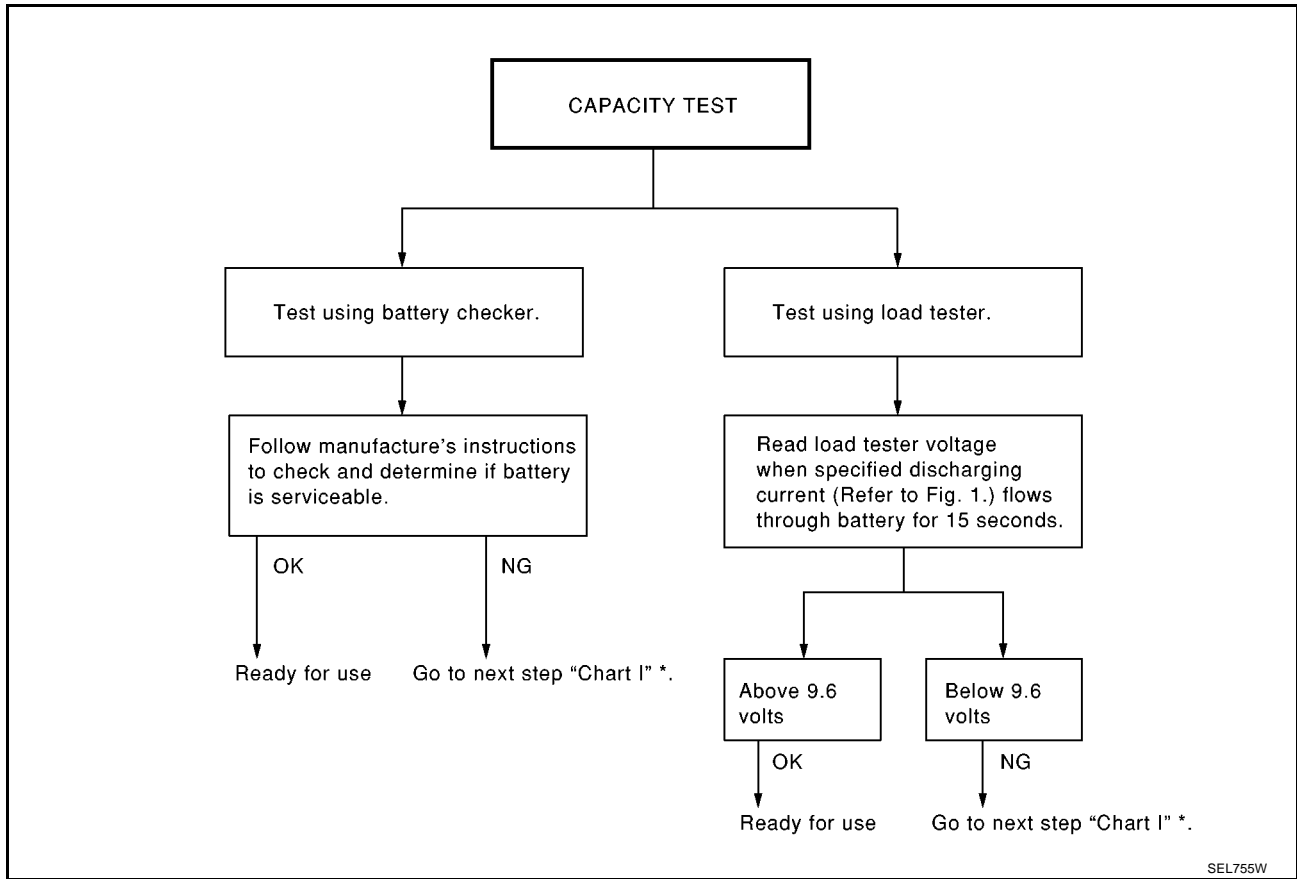
\*3. [SC-7](#)

\*4. [SC-8](#)

\*5. [SC-10](#)

# BATTERY

**CHART II**



\*. [SC-5](#)

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

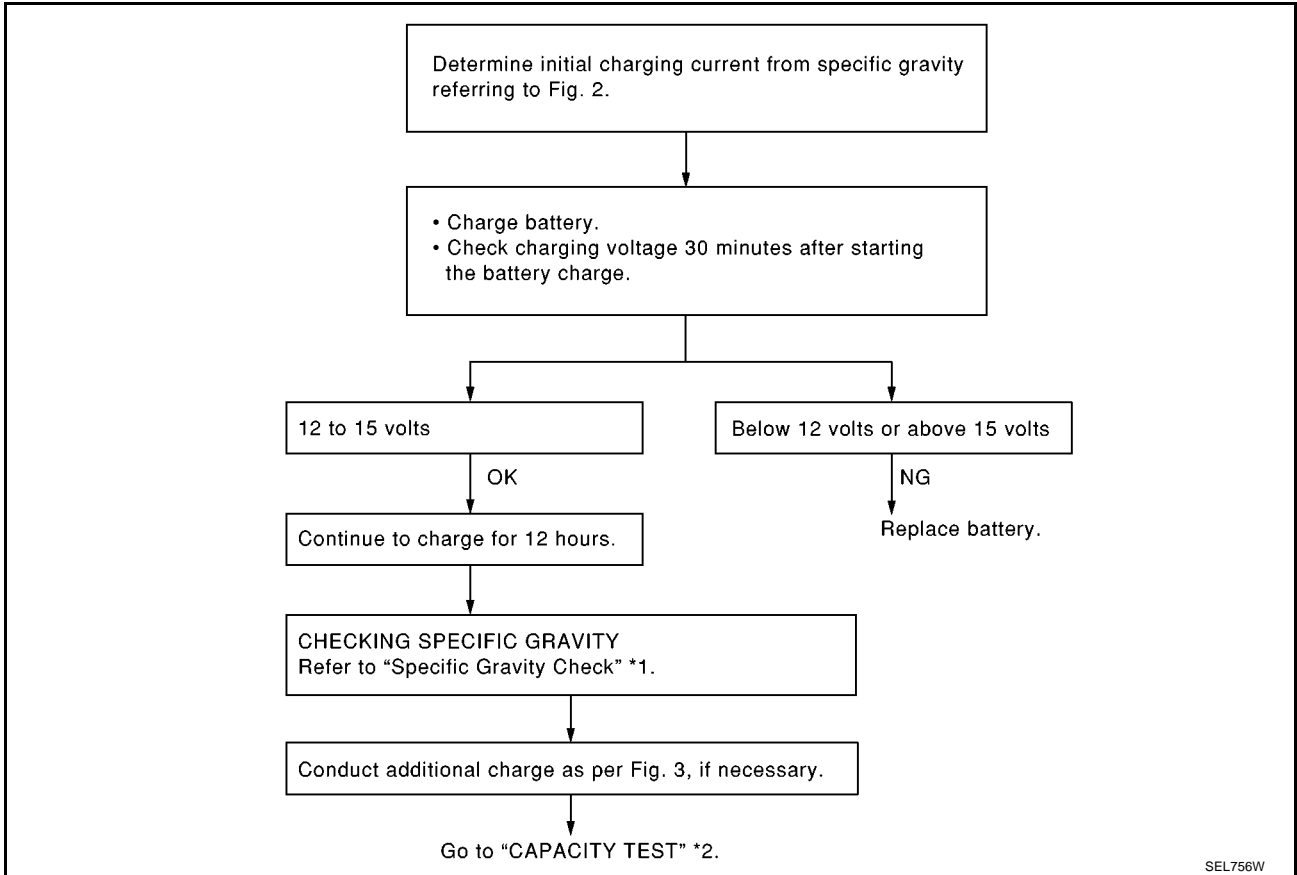
**Fig. 1 Discharging Current (Load Tester)**

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
027 [YUASA type code]	285
075 [YUASA type code]	300
110D26R(L)	300
95E41R(L)	300
067 [YUASA type code]	325

# BATTERY

Type	Current (A)
130E41R(L)	330
096 [YUASA type code]	375
096 [YUASA type code]	375
010S [YUASA type code]	360

## A: SLOW CHARGE



\*1. [SC-4](#)

\*2. [SC-6](#)

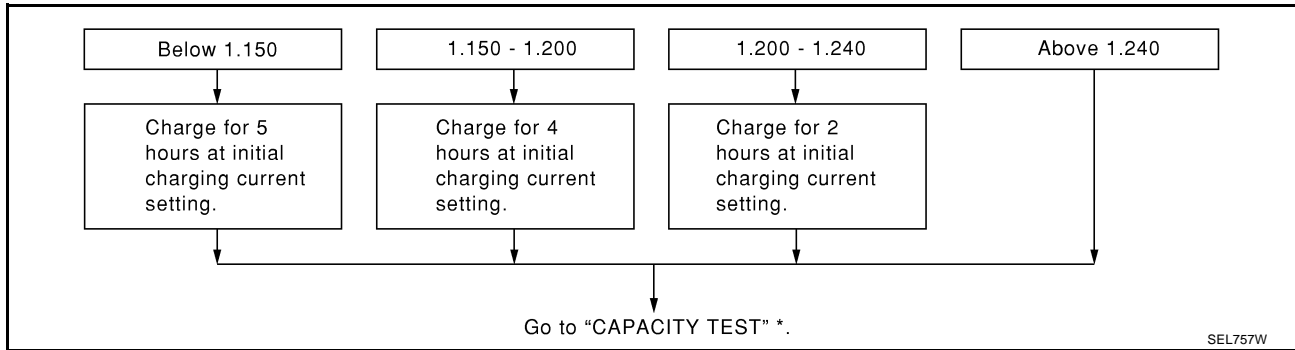
**Fig. 2 Initial Charging Current Setting (Slow Charge)**

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]	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)				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.

# BATTERY

**Fig. 3 Additional Charge (Slow Charge)**

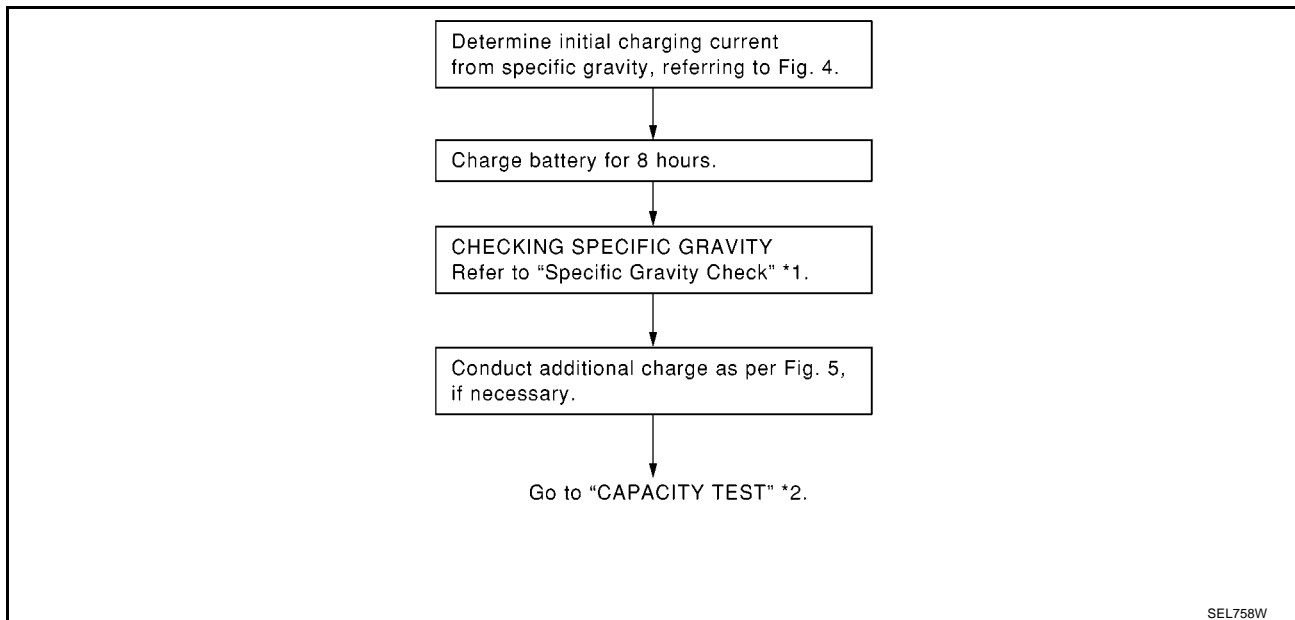


\*. [SC-6](#)

## 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).

## B: STANDARD CHARGE



\*1. [SC-4](#)

\*2. [SC-6](#)



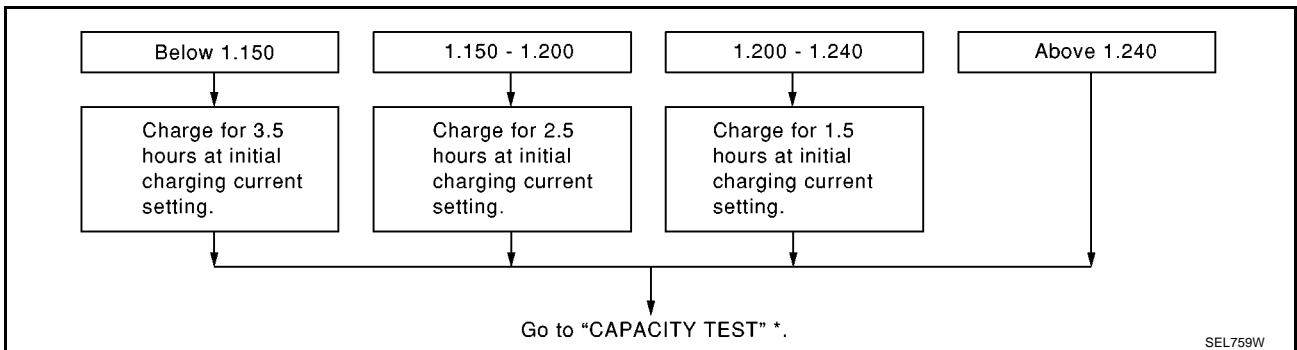
# BATTERY

**Fig. 4 Initial Charging Current Setting (Standard 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]	130E41R(L)
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.

**Fig. 5 Additional Charge (Standard Charge)**



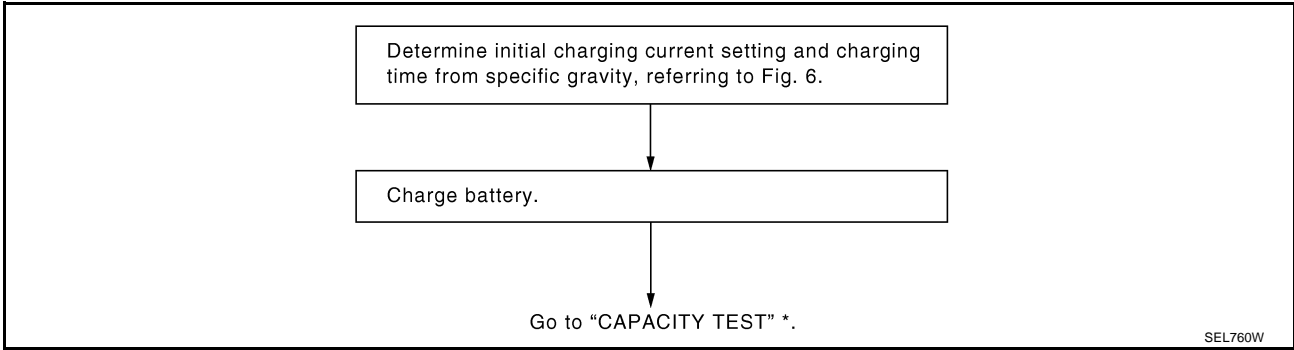
\*. [SC-6](#)

## 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).

# BATTERY

## C: QUICK CHARGE



\*. SC-6

**Fig. 6 Initial Charging Current Setting and Charging Time (Quick Charge)**

BATTERY TYPE		28B19R(L)	34B19R(L)	46B24R(L)	55B24R(L)	50D23R(L)	55D23R(L)	65D26R(L)	80D26R(L)	025 [YUASA type code]	027 [YUASA type code]	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]	75D31R(L)	95D31R(L)	115D31R(L)	110D26R(L)	95E41R(L)	130E41R(L)	
CUR-RENT [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.

# BATTERY

## Removal and Installation


EKS009KY

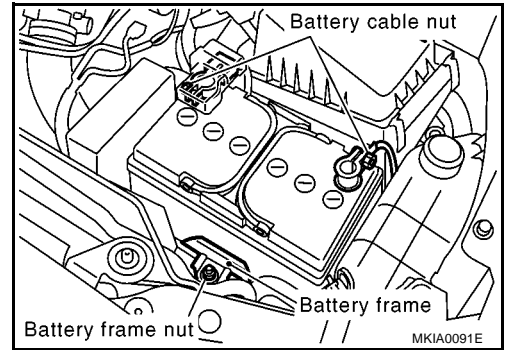
Observe the following to ensure proper servicing.

### CAUTION:

- When removing, remove negative terminal first. But for installation, install positive terminal first.
- Tighten parts to the specified torque shown below.

Battery cable tightening nut:

 : 3.0 - 5.0 N·m (0.31 - 0.51 kg-m, 27 - 44 in-lb)



A

B

C

D

E

F

G

H

I

J

SC

L

M

## CHARGING SYSTEM

PFP:00011

### System Description YD ENGINE MODELS

EKS009KZ

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 through:

- 120A fusible link (letter A, located in the fuse and fusible link box), and
- 10A fuse (No.35, 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 120A fusible link.

The alternator is grounded to the engine block.

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

- 10A fuse [No.30, located in the fuse block (J/B)]
- to combination meter terminal No.26 (LHD models) or No.13 (RHD models) for the charge warning lamp.

Ground is supplied:

- through combination meter terminal No.17 (LHD models) or No.4 (RHD models)
- to terminal 3 (L) of the alternator.

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.

### F9Q ENGINE MODELS

The alternator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged. Power is supplied at all times to alternator terminal through 250A fusible link.

Terminal B supplies power to charge the battery and operate the vehicle's electrical system. The charging circuit is protected by the 250A fusible link.

The alternator is grounded to the engine block.

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

- 10A fuse [No.30, located in the fuse block (J/B)]
- to combination meter terminal No.26 for the charge warning lamp.

Ground is supplied:

- through combination meter terminal No.17
- to terminal 3 (L) of the alternator.

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.

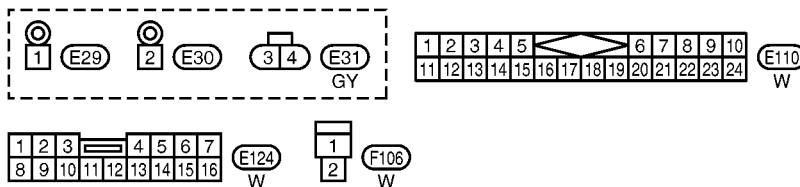
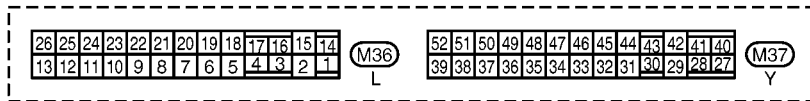
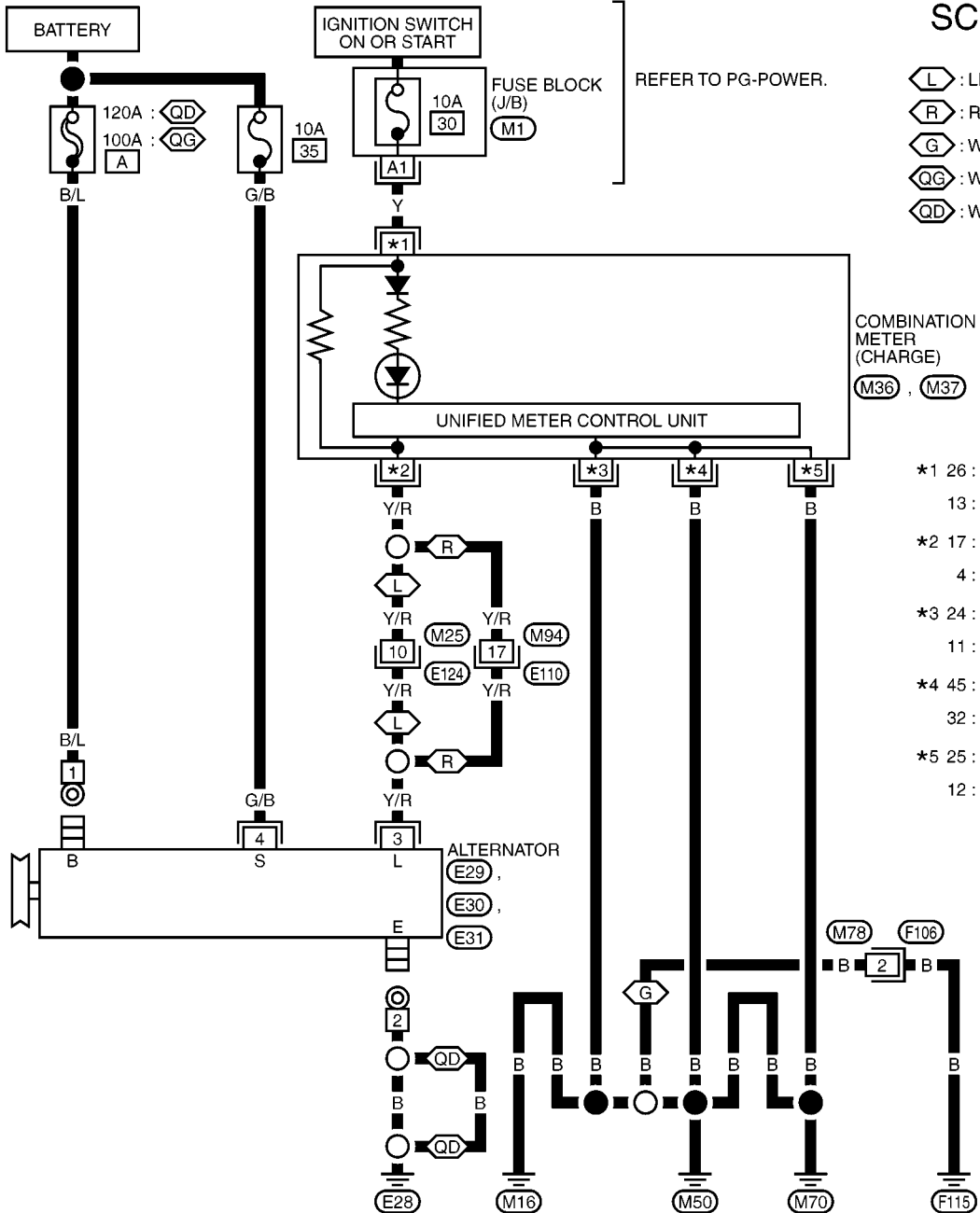
# CHARGING SYSTEM

## Wiring Diagram — CHARGE —/For YD Engine

EKS009L0

### SC-CHARGE-01

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



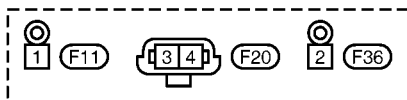
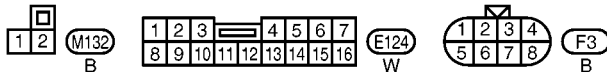
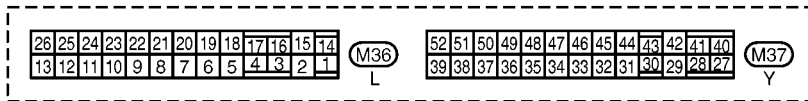
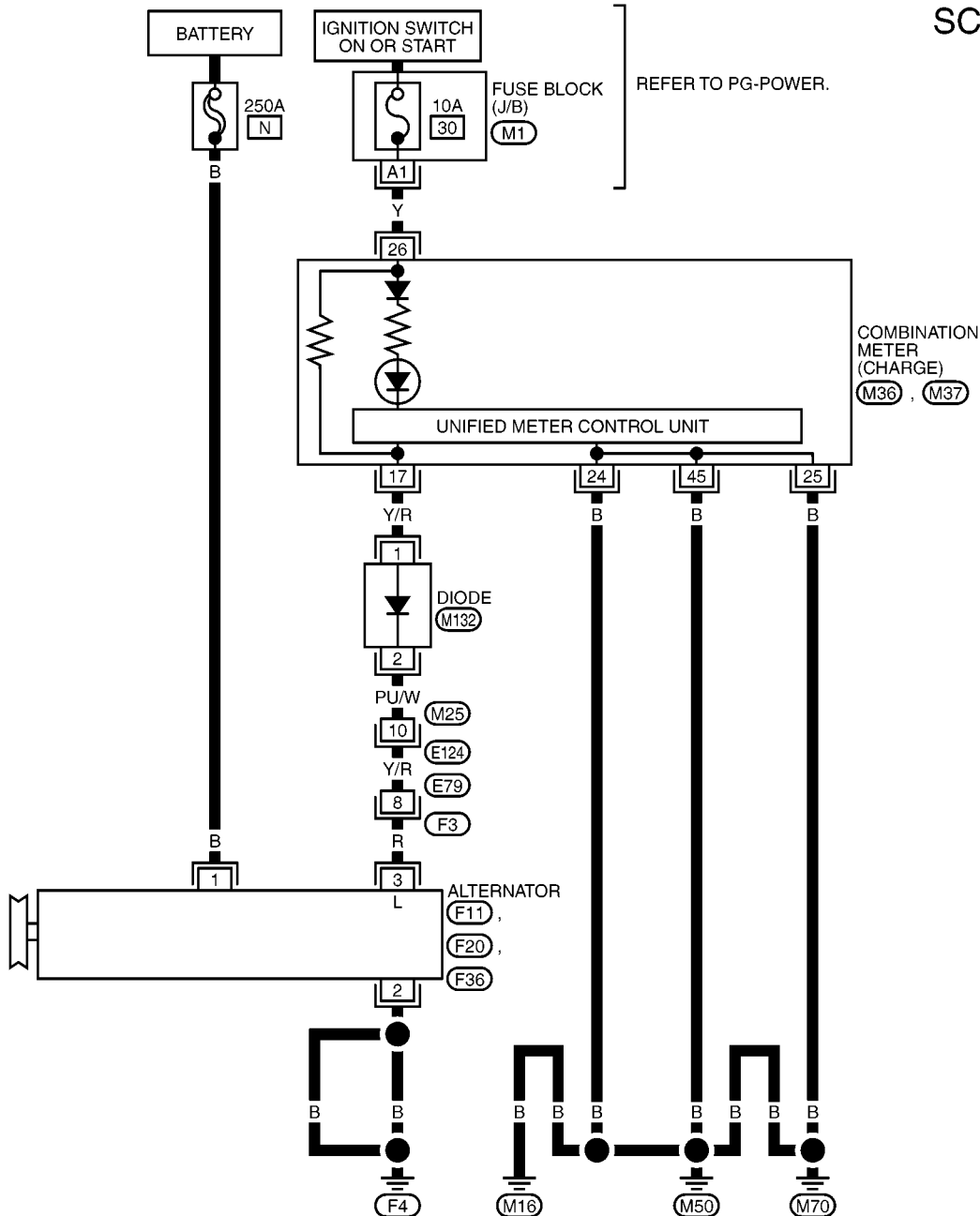
REFER TO THE FOLLOWING.  
(M1) -FUSE BLOCK-JUNCTION BOX (J/B)

# CHARGING SYSTEM

## Wiring Diagram — CHARGE —/For F9Q Engine

EKS00ATI

SC-CHARGE-02



REFER TO THE FOLLOWING.

(M1) -FUSE BLOCK-JUNCTION BOX (J/B)

MKWA1001E

# CHARGING SYSTEM

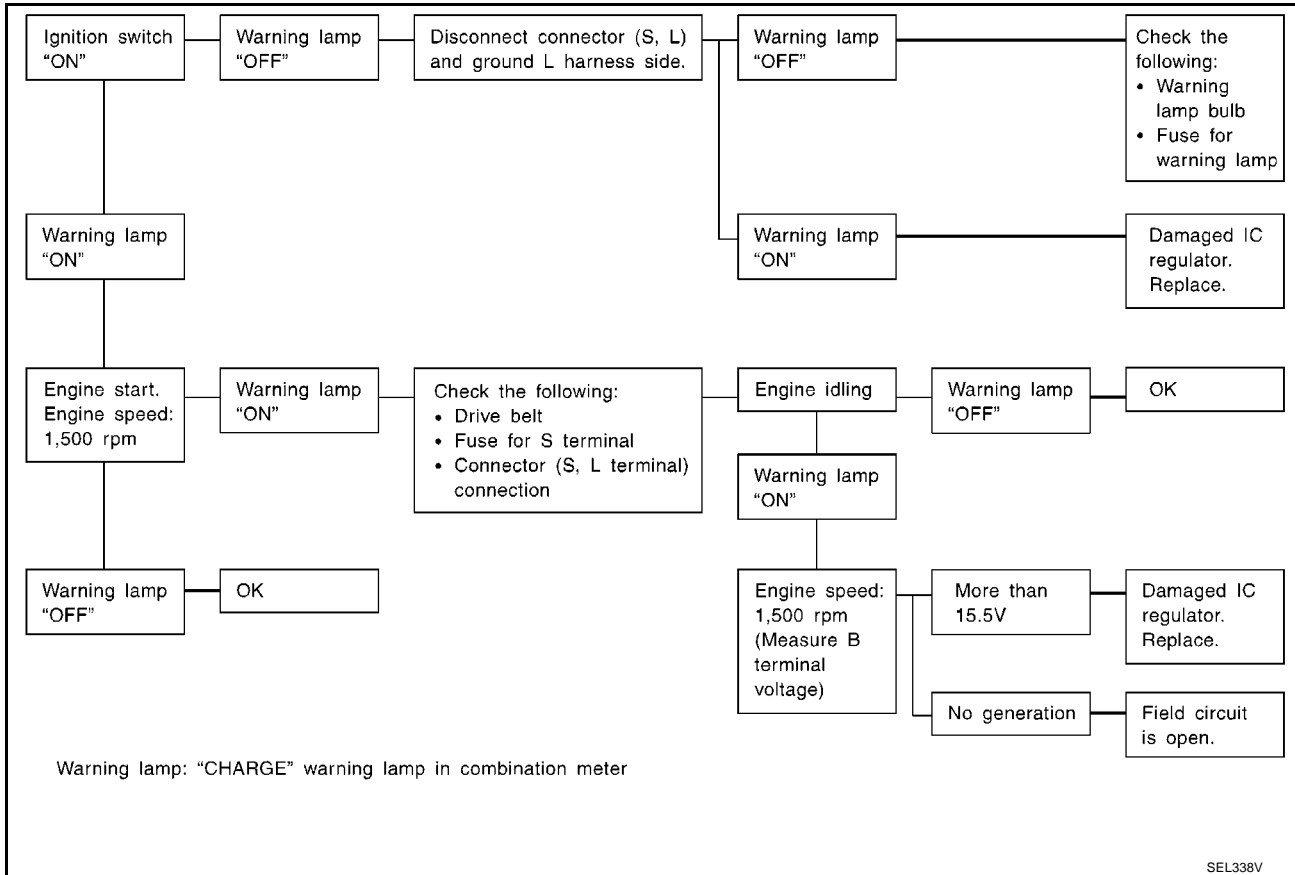
## Trouble Diagnoses

EKS009L1

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



#### 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

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

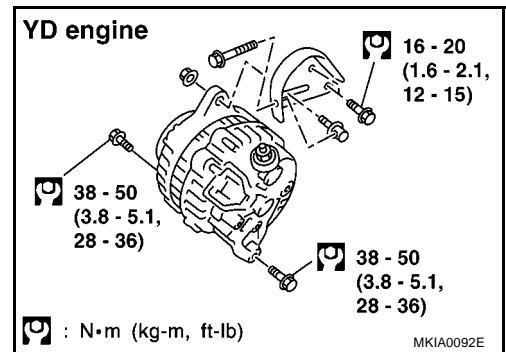
- Excessive voltage is produced.
- No voltage is produced.

# CHARGING SYSTEM

EKS009L2

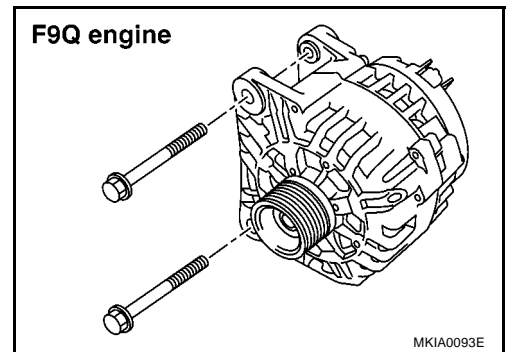
## Removal and Installation REMOVAL (YD ENGINE MODELS)

1. Disconnect negative battery cable.
2. Disconnect alternator harness.
3. Loosen alternator upper nut and lower bolt.
4. Remove drive belt. Refer to [EM-13, "Checking Drive Belts"](#).
5. Remove alternator bracket bolts (two).
6. Remove alternator upper nut and lower bolt.
7. Remove alternator.



## REMOVAL (F9Q ENGINE MODELS)

1. Disconnect negative battery cable.
2. Disconnect alternator harness.
3. Remove drive belt. Refer to [EM-142, "Checking Drive Belts"](#).
4. Remove drive belt idler pulley.
5. Remove cooling fan assembly.
6. Remove alternator mounting bolts (two).
7. Remove alternator.



## INSTALLATION

Install in the reverse order of removal, taking care of the following point.

- Install alternator, and check tension of drive belt. Refer to [EM-13, "Tension Adjustment"](#) (YD engine models) or [EM-142, "Tension Adjustment"](#) (F9Q engine models).

### CAUTION:

Be sure to tighten B terminal mounting nut carefully.

### YD Engine Models

B terminal nut:

: 7.9 - 11.0 N·m (0.8 - 1.11 kg-m, 70 - 97 in-lb)

Ground bolt:

: 2.3 - 2.6 N·m (0.23 - 0.27 kg-m, 20 - 23 in-lb)

Alternator mounting bolt (lower side):

: 38 - 50 N·m (3.8 - 5.1 kg-m, 28 - 36 ft-lb)



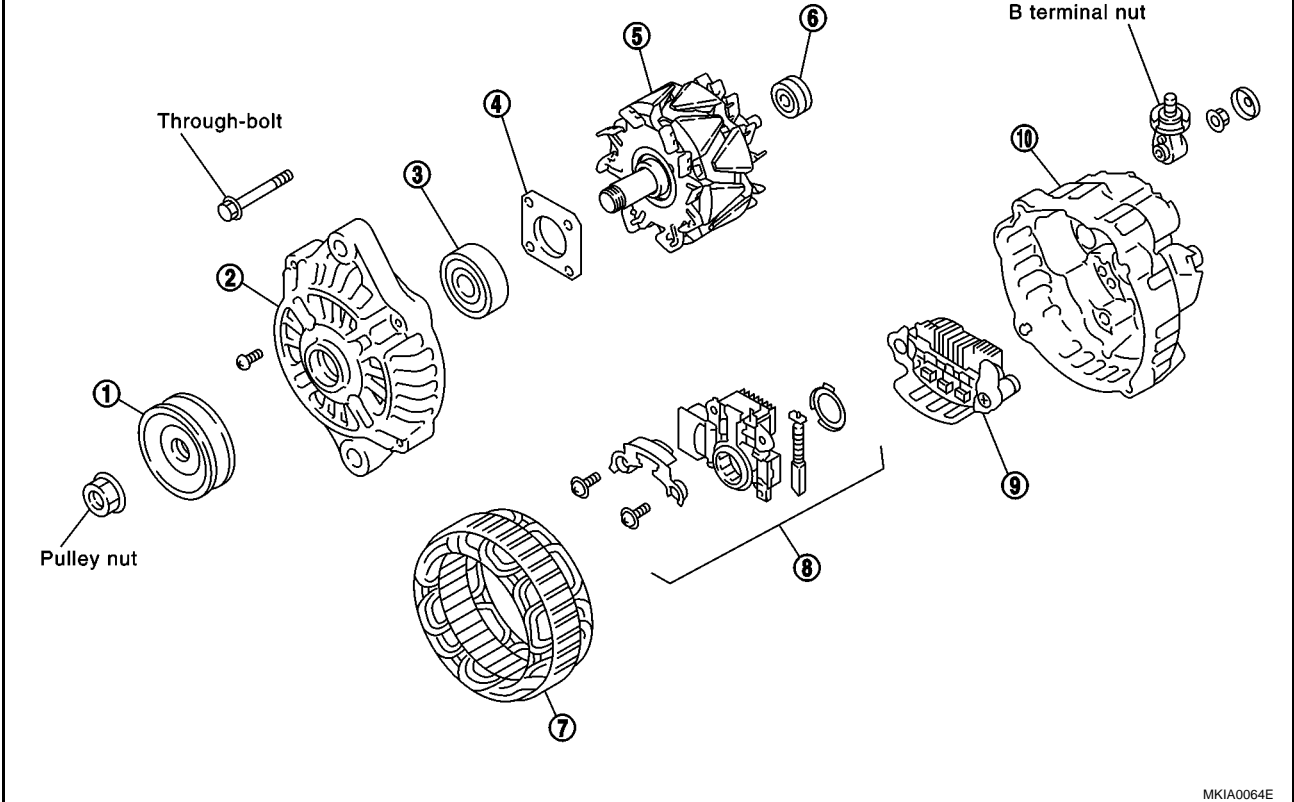
# CHARGING SYSTEM

## Disassembly and Assembly

EKS009L3

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

### SEC. 231 A3TA6581A



- |                |                                  |                   |
|----------------|----------------------------------|-------------------|
| 1. Pulley      | 2. Front cover                   | 3. Front bearing  |
| 4. Retainer    | 5. Rotor                         | 6. Rear bearing   |
| 7. Stator      | 8. IC voltage regulator assembly | 9. Diode assembly |
| 10. Rear cover |                                  |                   |

#### Through-bolt & nut:

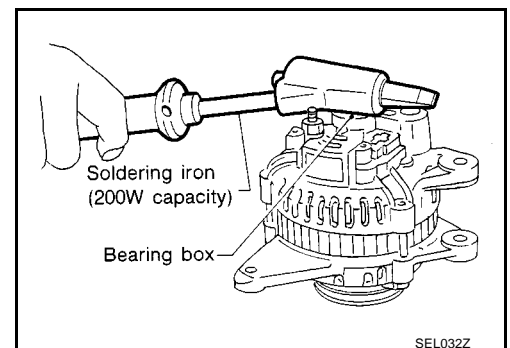
: 3.5 - 5.3 N·m (0.36 - 0.54 kg-m, 31.0 - 46.9 in-lb)

#### Pulley mounting nut:

: 99 - 137 N·m (10.1 - 14.0 kg-m, 73.0 - 101.1 ft-lb)

## Disassembly REAR COVER

EKS009L4



### 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.

# CHARGING SYSTEM

## REAR BEARING

### CAUTION:

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

## Inspection

### ROTOR CHECK

1. Resistance test

Resistance

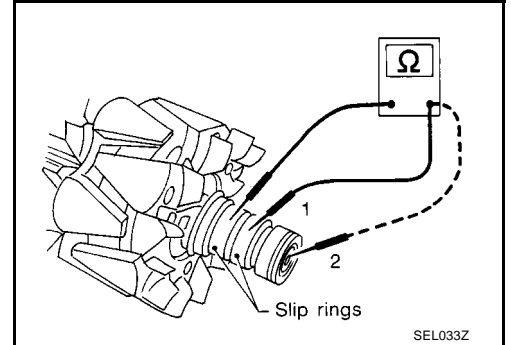
: Refer to SDS [SC-32](#),  
"Alternator"

- 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

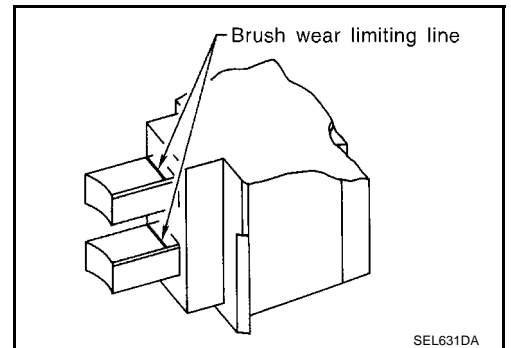
: Refer to SDS [SC-32](#),  
"Alternator"

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



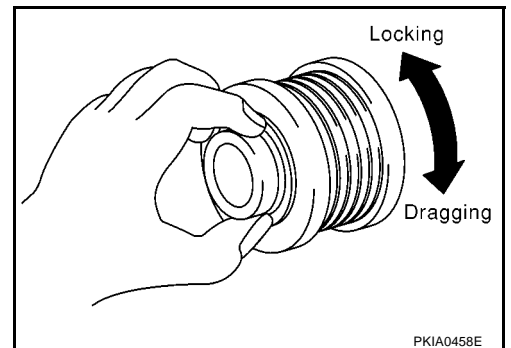
### BRUSH CHECK

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.



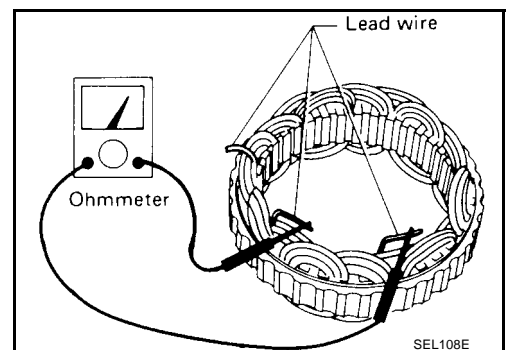
### PULLEY CHECK (WITH CLUTCH TYPE)

1. Check for locking (Outer ring is turned counterclockwise when viewed from the rear).
  - If it rotates in both directions... Replace pulley.
2. Check for dragging (Outer ring is turned clockwise when viewed from the rear).
  - If it locks or unusual resistance is felt... Replace pulley.



### STATOR CHECK

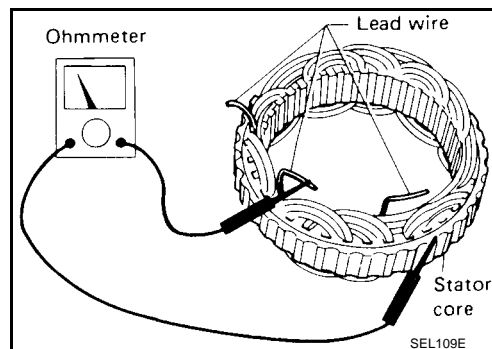
1. Continuity test
  - No continuity... Replace stator.



# CHARGING SYSTEM

## 2. Ground test

- Continuity exists... Replace stator.



EKS009L6

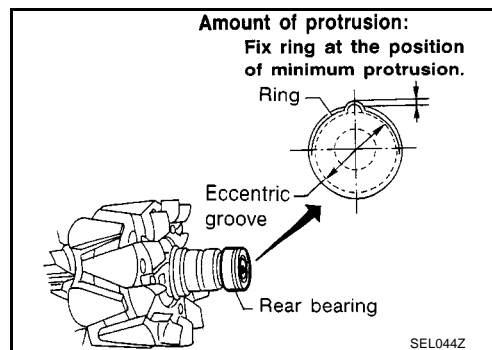
## Assembly

### RING FITTING IN REAR BEARING

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

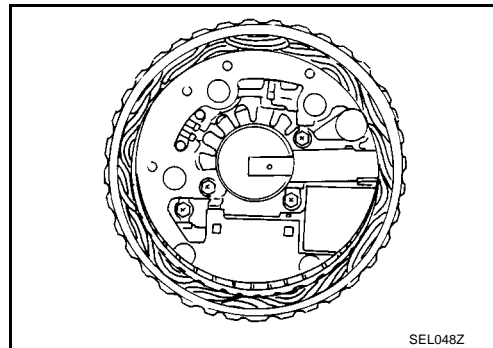
#### CAUTION:

Do not reuse rear bearing after removal.

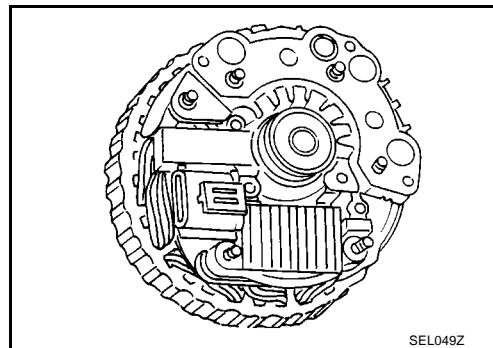


### REAR COVER INSTALLATION

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.**



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## STARTING SYSTEM

PFP:00011

### System Description YD ENGINE MODELS

EKS009L7

Power is supplied at all times

- through 40A fusible link (letter J, located in the fuse and fusible link box)
- to ignition switch terminal No.1.

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

- from ignition switch terminal No.5
- to smart entrance control unit terminal No.58
- from smart entrance control unit terminal No.59
- to starter motor harness connector terminal No.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.

### F9Q ENGINE MODELS

Power is supplied at all times

- through 250A fusible link
- to starter motor harness connector terminal No.2.
- through 40A fusible link (letter J, located in the fuse and fusible link box)
- to ignition switch terminal No.1.

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

- from ignition switch terminal No.5
- to smart entrance control unit terminal No.58
- from smart entrance control unit terminal No.59
- to starter motor harness connector terminal No.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.

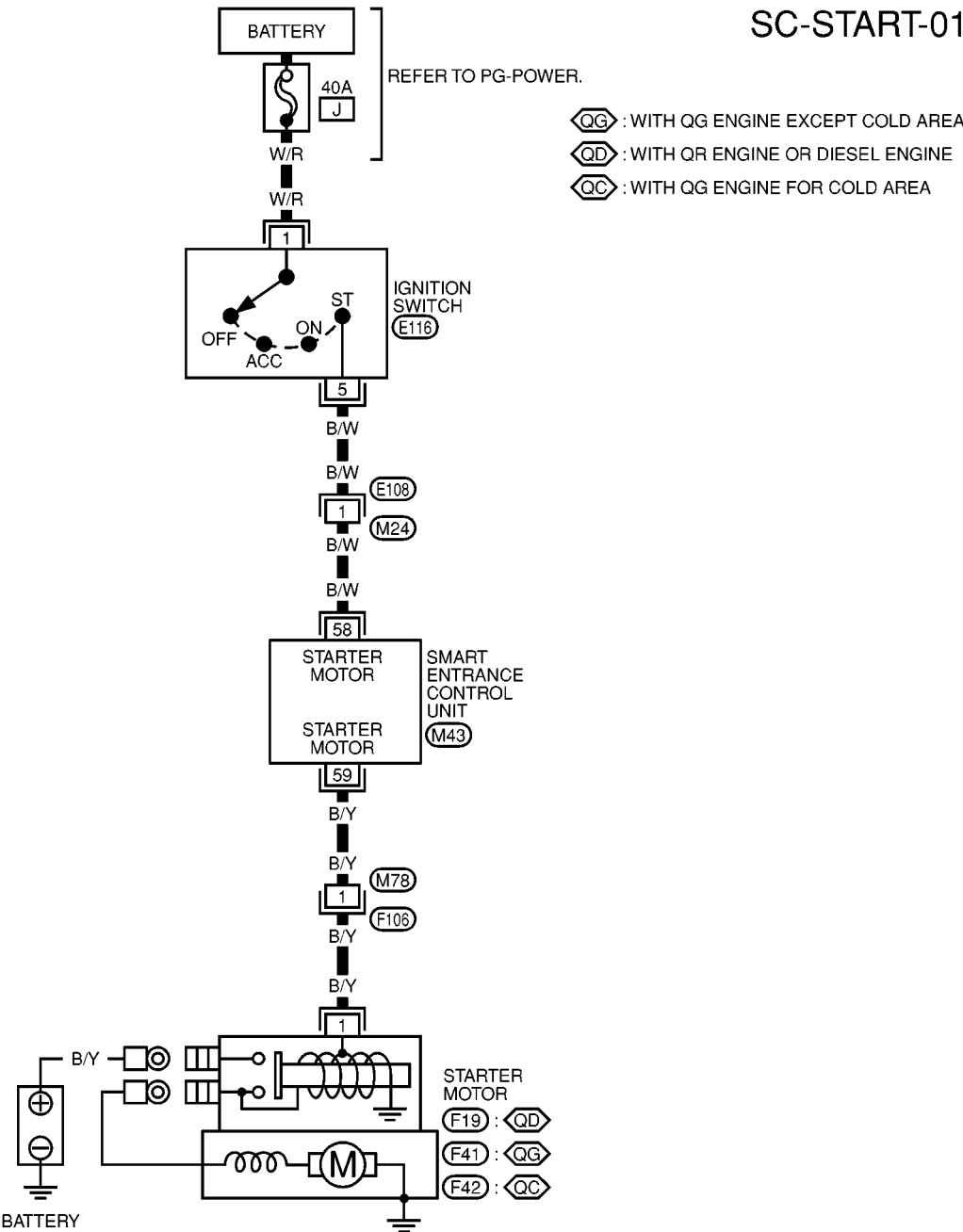
STARTING SYSTEM

Wiring Diagram — START —/For YD Engine

EKS009L8

SC-START-01

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



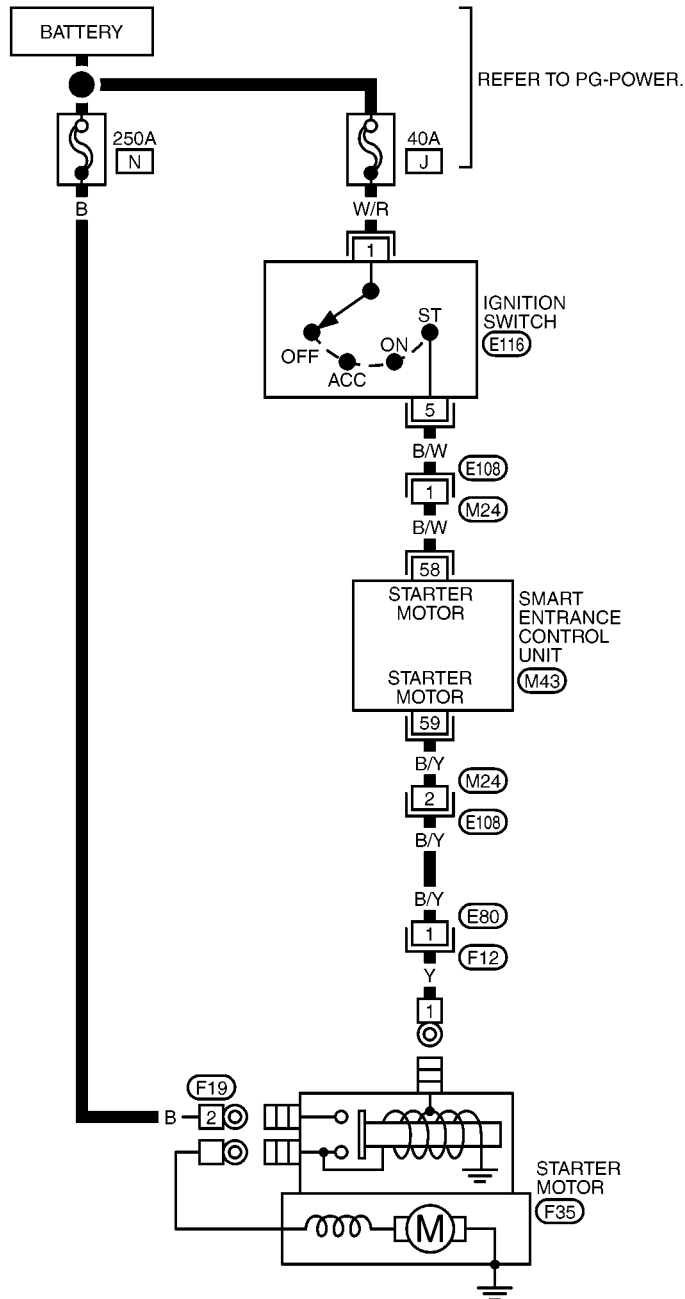
MKWA0039E

# STARTING SYSTEM

## Wiring Diagram — START —/For F9Q Engine

EKS009L9

SC-START-02



49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

(M43)  
GY



1
2

(E108)  
W

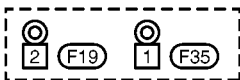
(F106)  
W

3	5	1
4	2	6

(E116)  
W

1	2	3	4	5
6	7	8	9	

(F12)  
GY



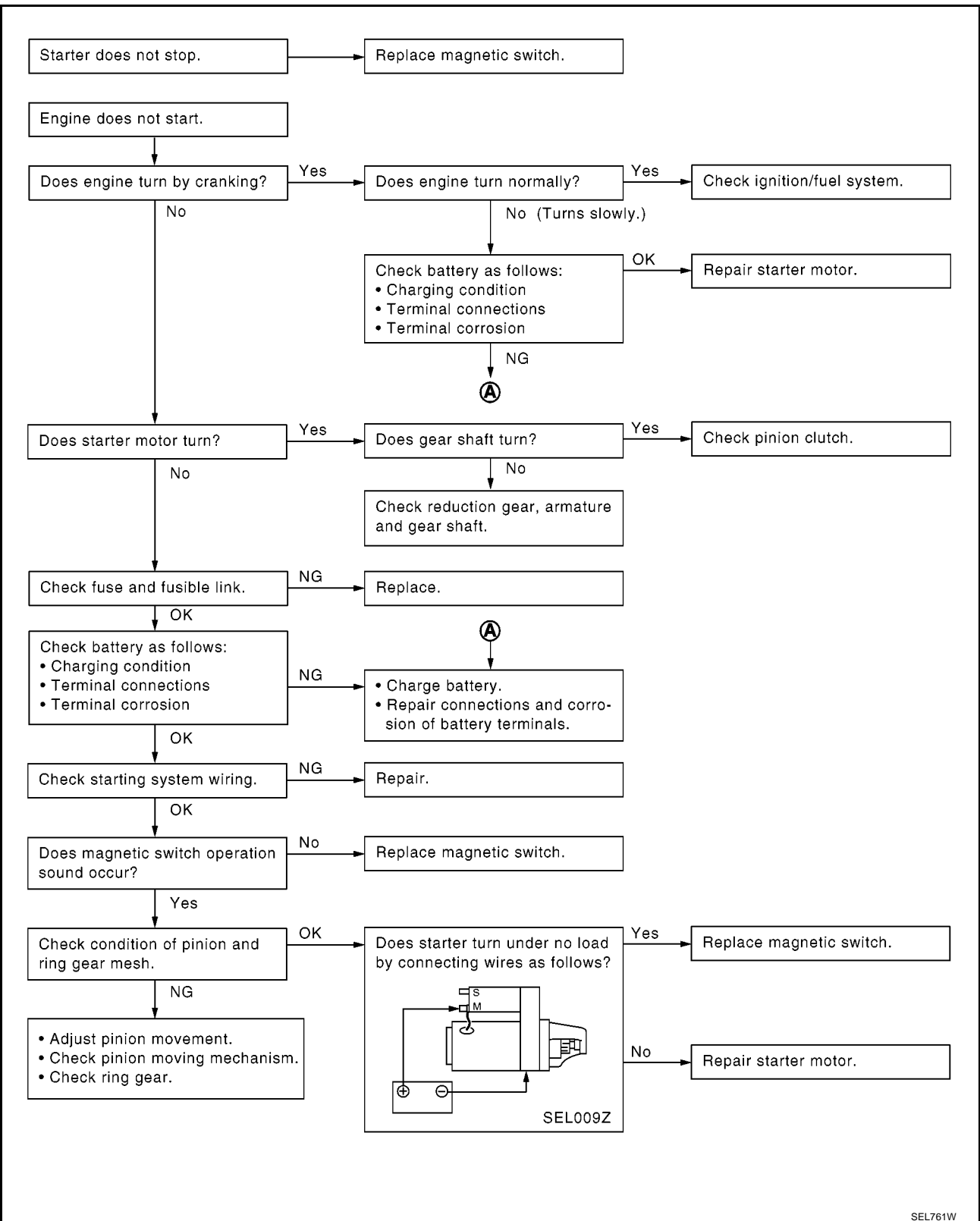
MKWA1002E

# STARTING SYSTEM

## Trouble Diagnoses

EKS009LB

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



SEL761W

# STARTING SYSTEM

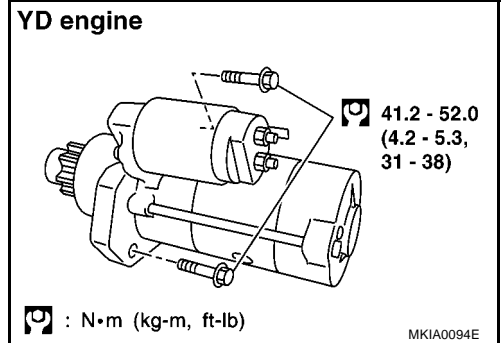
EKS009LC

## Removal and Installation

### REMOVAL

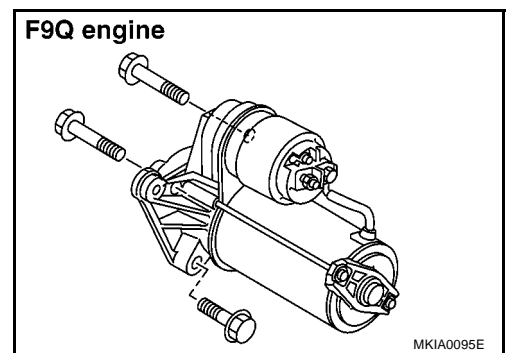
#### YD Engine Models

1. Disconnect negative battery cable.
2. Remove air duct. Refer to [EM-15, "AIR CLEANER AND AIR DUCT"](#).
3. Disconnect S terminal and B terminal from starter motor.
4. Remove starter motor mounting bolts.
5. Remove starter motor from upper side the vehicle.



#### F9Q Engine Models

1. Remove negative battery cable.
2. Remove suspension crossbar.
3. Remove catalyst bracket.
4. Remove catalytic converter to access starter motor.
5. Disconnect S terminal and B terminal from starter motor.
6. Remove starter motor mounting bolts.
7. Remove starter motor from under the vehicle.



### INSTALLATION

Install in the reverse order of removal.

#### YD Engine Models (M8T71471)

**B terminal nut:**

**⌘ : 9.81 - 11.8 N·m (1.0 - 1.2 kg-m, 87 - 112 in-lb)**

**Starter motor mounting bolt:**

**⌘ : 41.2 - 52.0 N·m (4.2 - 5.3 kg-m, 31 - 38 ft-lb)**

#### F9Q Engine Models (D7R 49)

**B terminal nut:**

**⌘ : 6.8 - 9.2 N·m (0.70 - 0.94 kg-m, 61 - 82 in-lb)**

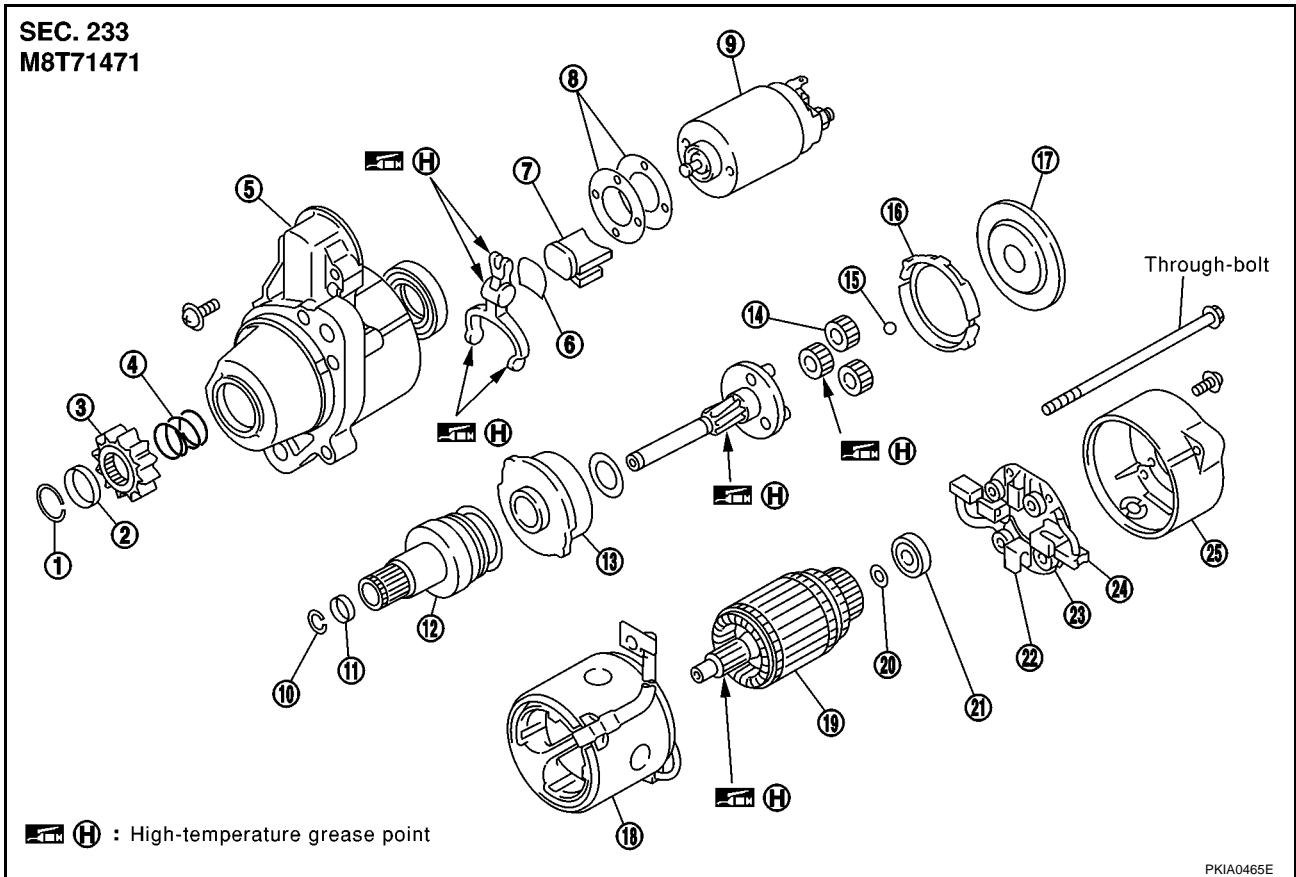


# STARTING SYSTEM

## Disassembly and Assembly

EKS009LD

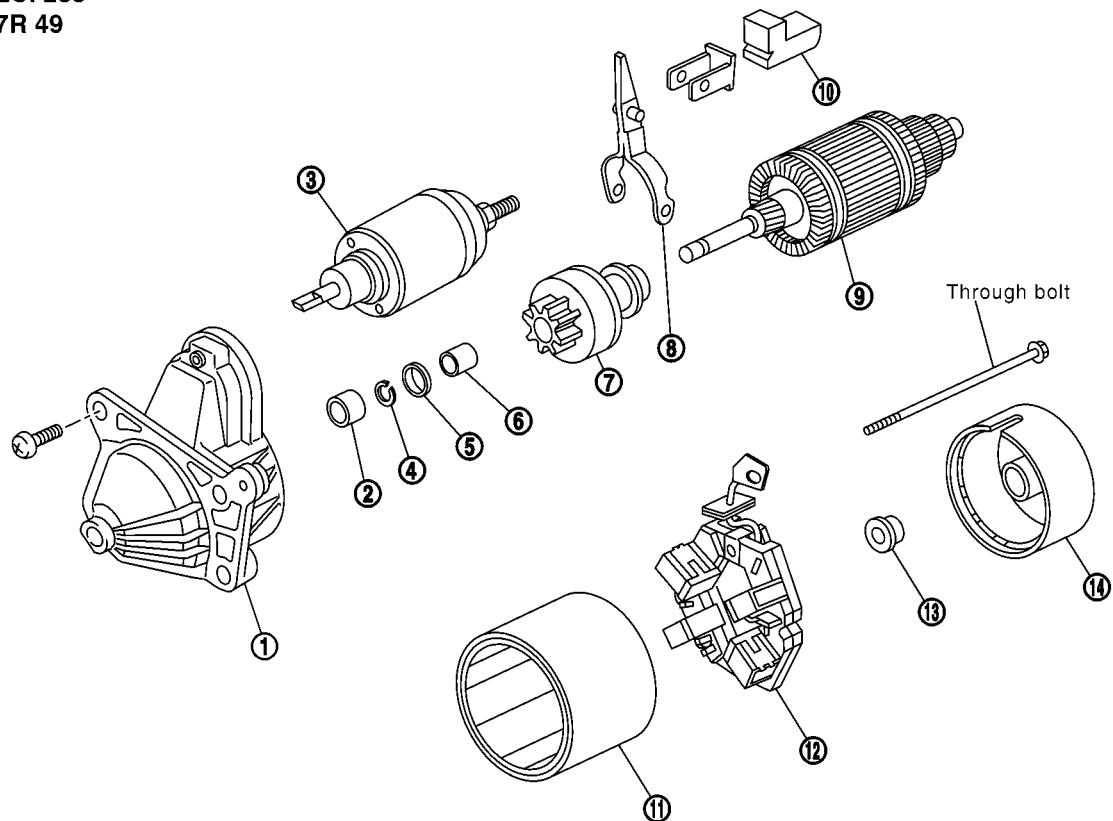
A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
SC  
L  
M



- |                           |                    |                             |
|---------------------------|--------------------|-----------------------------|
| 1. Stopper clip           | 2. Pinion stopper  | 3. Pinion                   |
| 4. Spring                 | 5. Gear case       | 6. Plate                    |
| 7. Packing                | 8. Adjusting plate | 9. Magnetic switch assembly |
| 10. Snap ring             | 11. Retainer ring  | 12. Over running clutch     |
| 13. Internal gear         | 14. Planetary gear | 15. Ball                    |
| 16. Packing               | 17. Cover          | 18. Yoke                    |
| 19. Armature              | 20. Washer         | 21. Rear bearing            |
| 22. Brush holder assembly | 23. Brush spring   | 24. Brush (-)               |
| 25. Rear cover            |                    |                             |

# STARTING SYSTEM

SEC. 233  
D7R 49




MK1A0096E

- |                    |                   |                             |
|--------------------|-------------------|-----------------------------|
| 1. Gear case       | 2. Bushing        | 3. Magnetic switch assembly |
| 4. Stopper clip    | 5. Pinion stopper | 6. Bushing                  |
| 7. Pinion assembly | 8. Shift lever    | 9. Armature                 |
| 10. Packing        | 11. Yoke          | 12. Brush holder            |
| 13. Bushing        | 14. Rear cover    |                             |

**Through-bolt:**

**M8T71471**

 : 5.6 - 10.4 N·m (0.57 - 1.06 kg-m, 49.5 - 92.0 in-lb)

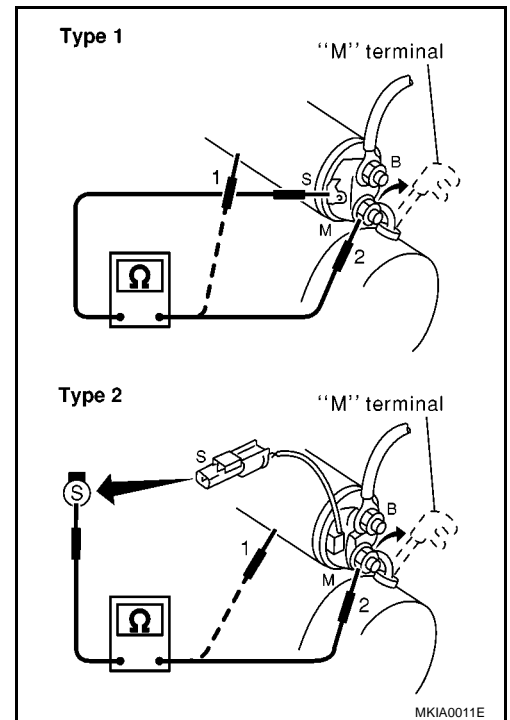
## Inspection MAGNETIC SWITCH CHECK

EKS009LE

- Before starting to check, disconnect battery ground cable.
- Disconnect "M" terminal of starter motor.

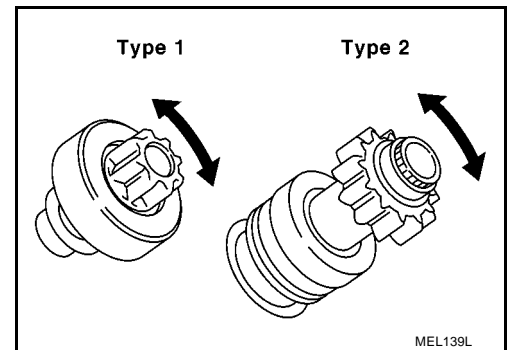
# STARTING SYSTEM

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

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

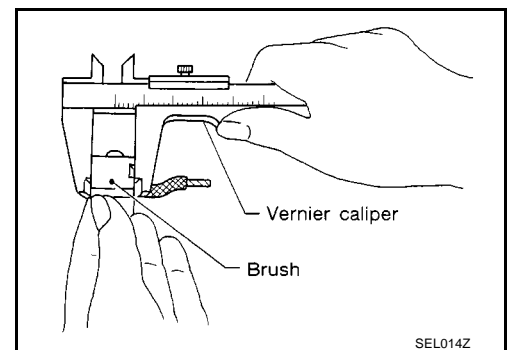
### Brush

Check wear of brush.

**Wear limit length**

**: Refer to SDS. [SC-32](#).  
"Starter".**

- Excessive wear ... Replace.



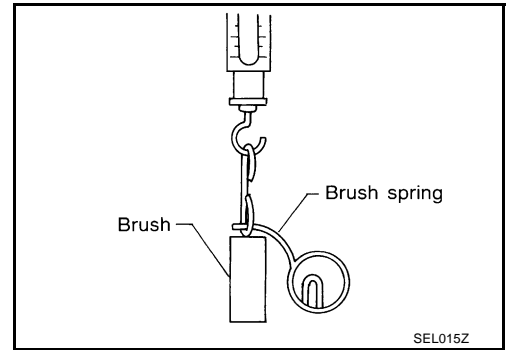
# STARTING SYSTEM

## Brush Spring Check

Check brush spring pressure with brush spring detached from brush.

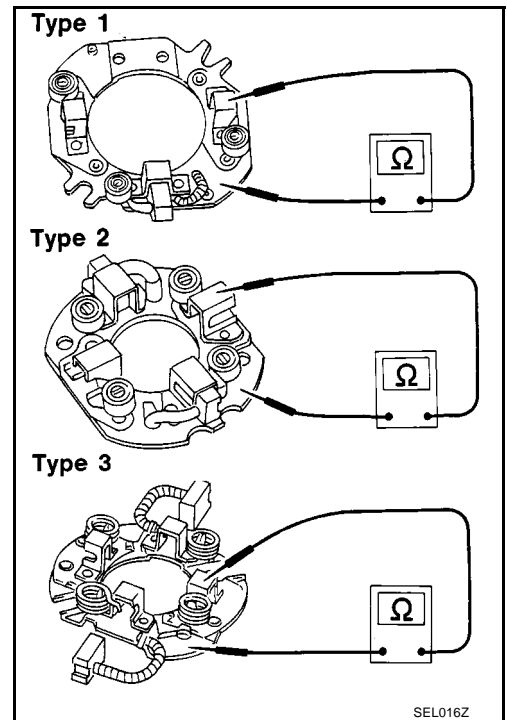
**Spring pressure (with new brush)** : Refer to SDS. [SC-32](#), ["Starter"](#) .

- Not within the specified values ... Replace.



## Brush Holder

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.

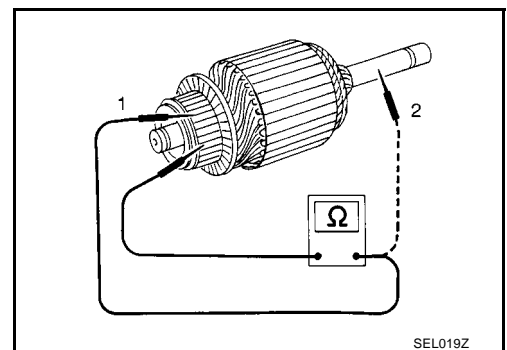


## YOKE CHECK

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.

### CAUTION:

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



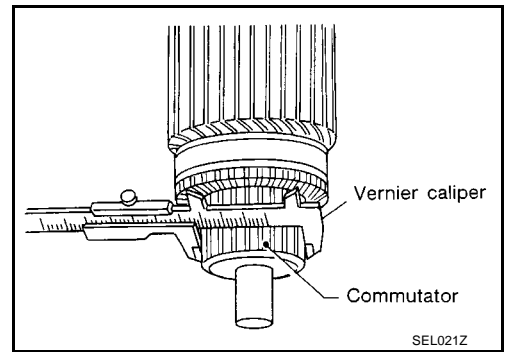
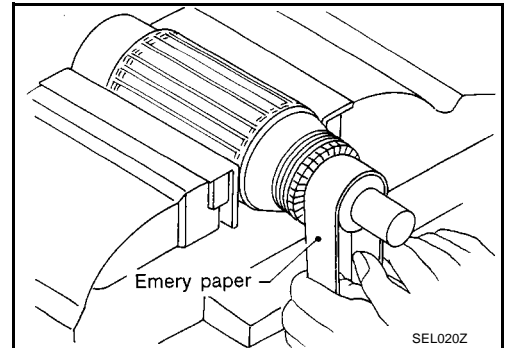
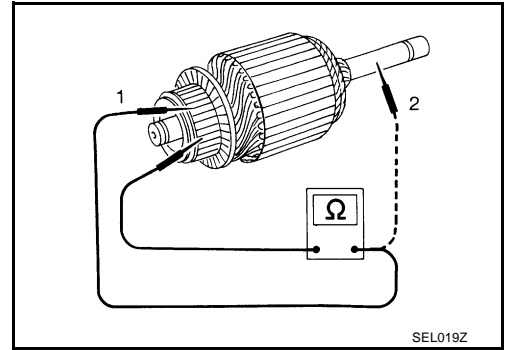
# STARTING SYSTEM

## ARMATURE CHECK

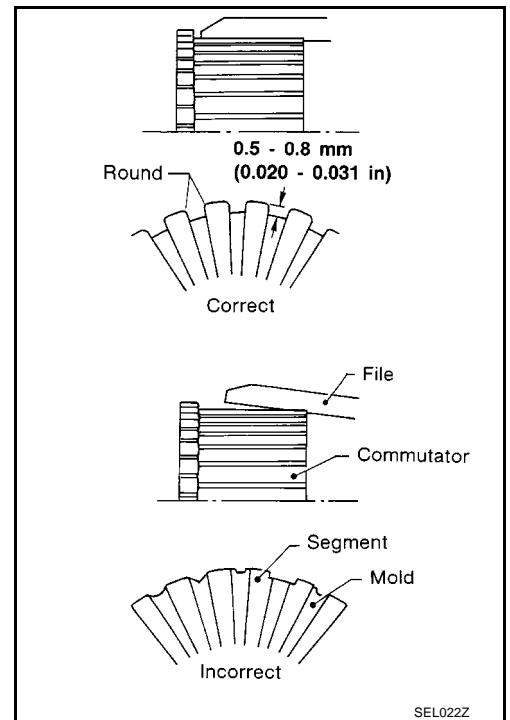
1. Continuity test (between two segments side by side).
  - No continuity ... Replace.
2. Insulation test (between each commutator bar and shaft).
  - Continuity exists. ... Replace.
3. Check commutator surface.
  - Rough ... Sand lightly with No. 500 - 600 emery paper.
4. Check diameter of commutator.

**Commutator minimum diameter : Refer to SDS. SC-32. "Starter".**

  - Less than specified value ... Replace.
5. Check depth of insulating mold from commutator surface.



# STARTING SYSTEM



- Less than 0.2 mm (0.008 in) ... Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in)

## Assembly

EKS009LF

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

Carefully observe the following instructions.

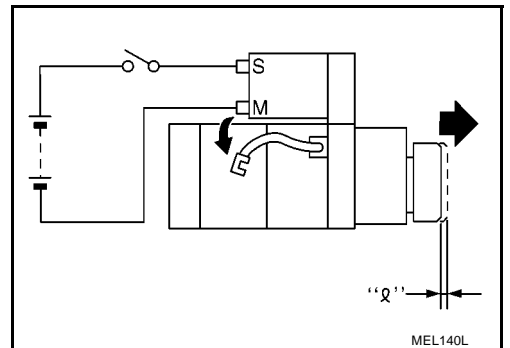
## PINION PROTRUSION LENGTH ADJUSTMENT

### Movement (YD Engine Models)

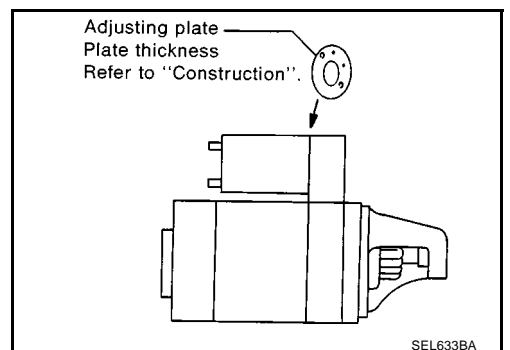
Compare movement “ℓ” in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper.

**Movement “ℓ”**

**: Refer to SDS. [SC-32](#).  
["Starter"](#) .**



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



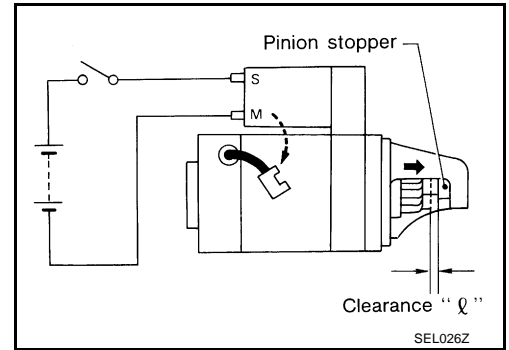
# STARTING SYSTEM

## Clearance (F9Q Engine Models)

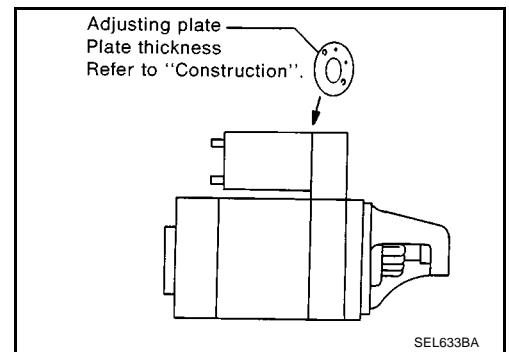
With pinion driven out by magnetic switch, push pinion back to remove slack and measure clearance "ℓ" between the front edge of the pinion and the pinion stopper.

Clearance "ℓ"

: Refer to SDS. [SC-32.](#)  
["Starter"](#) .



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



# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### Battery

EKS009LG

Applied model	YD engine	F9Q engine
Type	LB3 (010S)	
Capacity V-AH	12-56	

### Starter

EKS009LH

Type	M8T71471	D7R 49
	MITSUBISHI	Valeo
	Reduction	Non-reduction
Applied model	YD engine	F9Q engine
System voltage V	12	
No-load	Terminal voltage V	11.0
	Current A	Less than 145
	Revolution rpm	More than 3,300
Minimum diameter of commutator mm (in)	31.4 (1.236)	11,500
Minimum length of brush mm (in)	11.0 (0.433)	
Brush spring tension N (kg, lb)	26.7 - 36.1 (2.7 - 3.7, 6.0 - 8.2)	
Clearance between bearing metal and armature shaft mm (in)	—	
Clearance “ℓ” between pinion front edge and pinion stopper mm (in)	—	
Movement “ℓ” in height of pinion assembly mm (in)	0.5 - 2.0 (0.020 - 0.079)	

### Alternator

EKS009LI

Type	A3TA6581A	
	MITSUBISHI	Valeo
Applied model	YD engine	F9Q engine
Nominal rating V-A	12-110	
Ground polarity	Negative	
Minimum revolutions under no-load (When 13.5V is applied) rpm	Less than 1,300	
Hot output current (When 13.5V is applied) A/rpm	More than 29/1,300 More than 78/2,500 More than 102/5,000	
Regulated output voltage V	14.1 - 14.7	
Minimum length of brush mm (in)	More than 5.0 (0.197)	
Brush spring pressure N (g, oz)	4.8 - 6.0 (490 - 610, 17.28 - 21.51)	
Slip ring minimum diameter mm (in)	More than 22.1 (0.870)	
Rotor coil resistance at 20°C (68°F) Ω	1.8 - 2.1	