

STARTING & CHARGING SYSTEM

SECTION SC

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PRECAUTIONS

Supplemental Restraint System (SRS) "AIR BAG"

Supplemental Restraint System (SRS) "AIR BAG"

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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 S15 is as follows:

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), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

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 with yellow harness connector.

Wiring Diagrams and Trouble Diagnosis

NMSC0002

When you read wiring diagrams, refer to the following:

- Refer to GI-11, "HOW TO READ WIRING DIAGRAMS"
- Refer to EL-7, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- Refer to GI-31, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- Refer to GI-20, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

How to Handle Battery

NMSC0003

CAUTION:

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

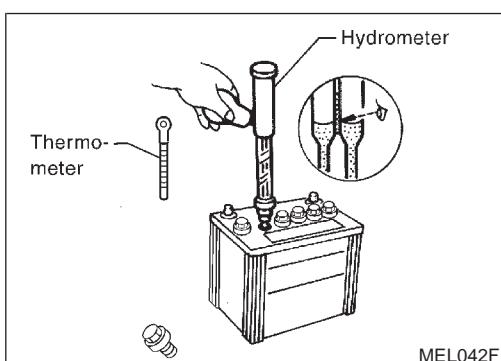
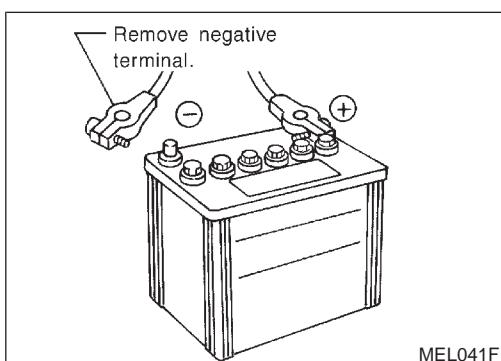
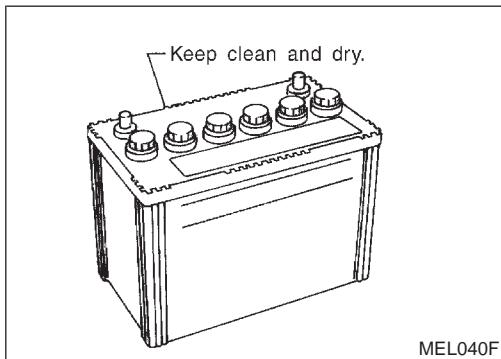
- 1) Use a 12-volt booster battery.
- 2) After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.
- 3) Never add distilled water through the hole used to check specific gravity.

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**METHODS OF PREVENTING OVER-DISCHARGE**

NMSC0003S01

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.

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CHECKING ELECTROLYTE LEVEL

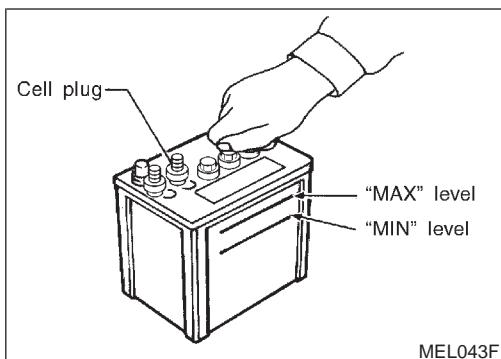
NMSC0003S02

WARNING:

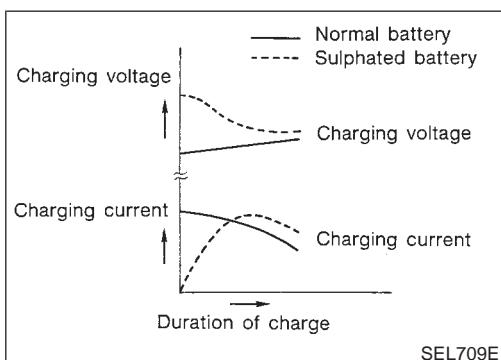
Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

BATTERY

How to Handle Battery (Cont'd)



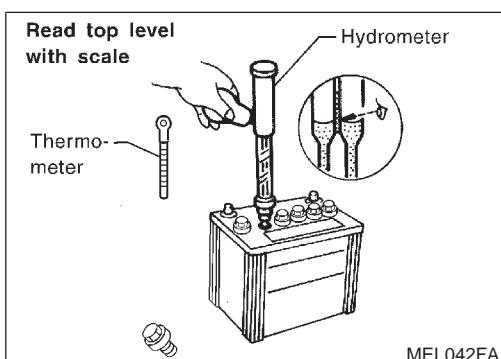
- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.



Sulphation

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

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1. Read hydrometer and thermometer indications at eye level.

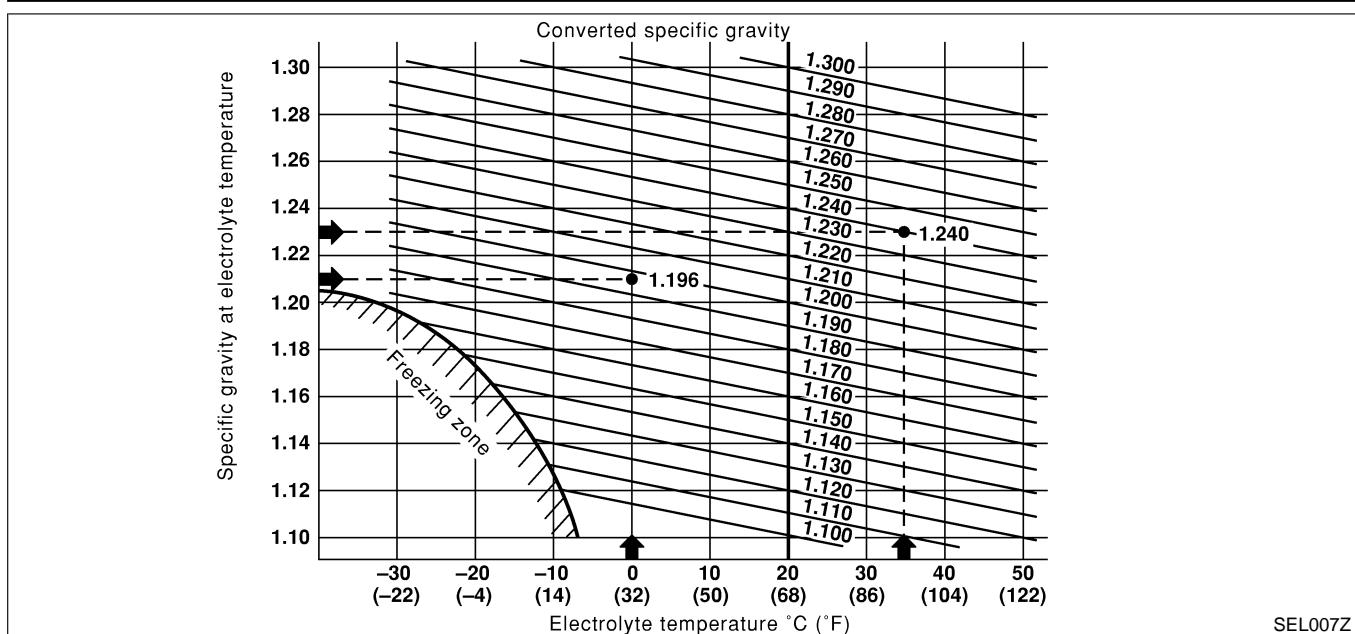
2. Convert into specific gravity at 20°C (68°F).

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)



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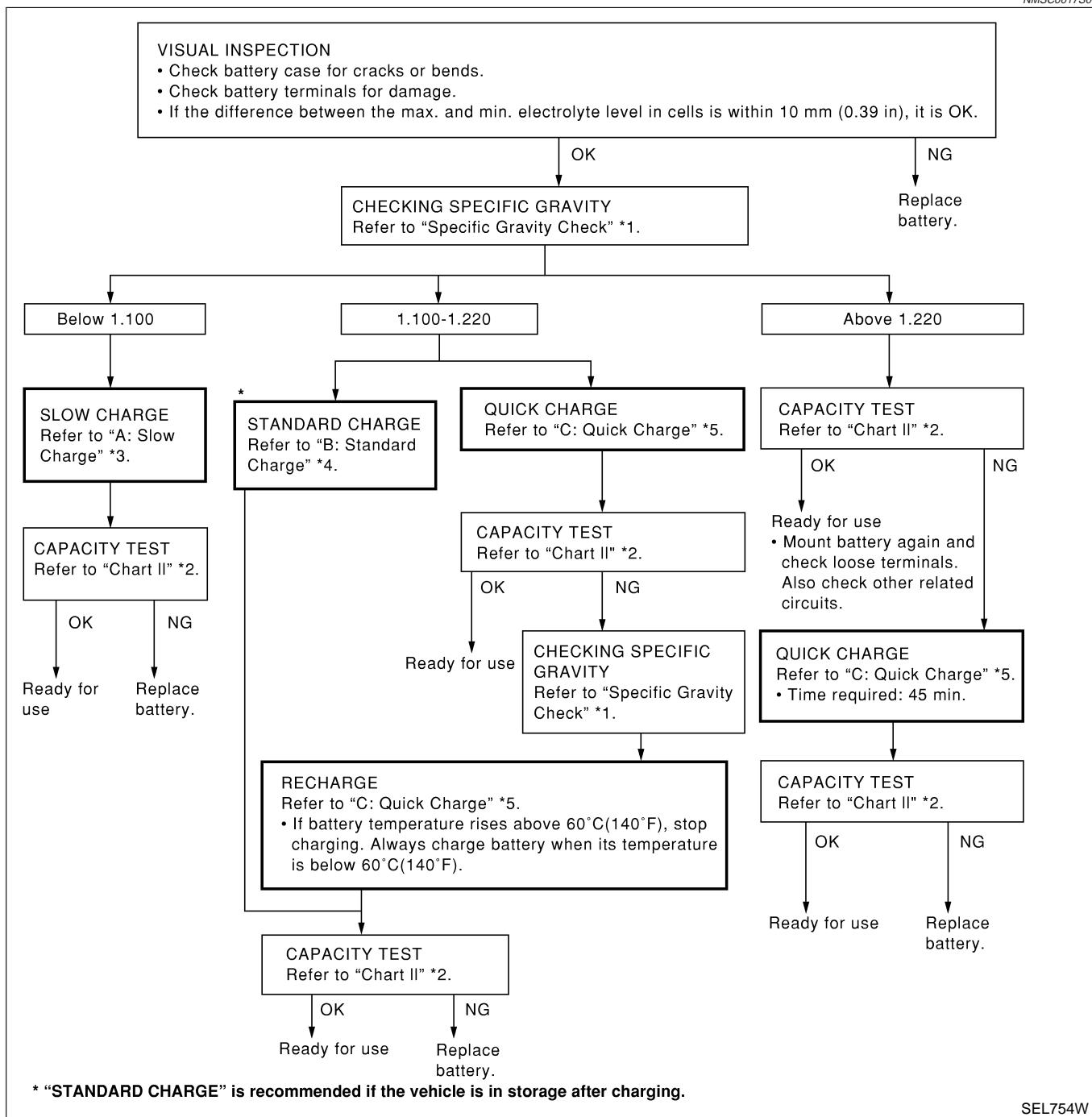
BATTERY

Battery Test and Charging Chart

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NMSC0017S01

CHART I



*1: SC-4

*2: SC-7

*3: SC-8

*4: SC-9

*5: SC-11

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BATTERY

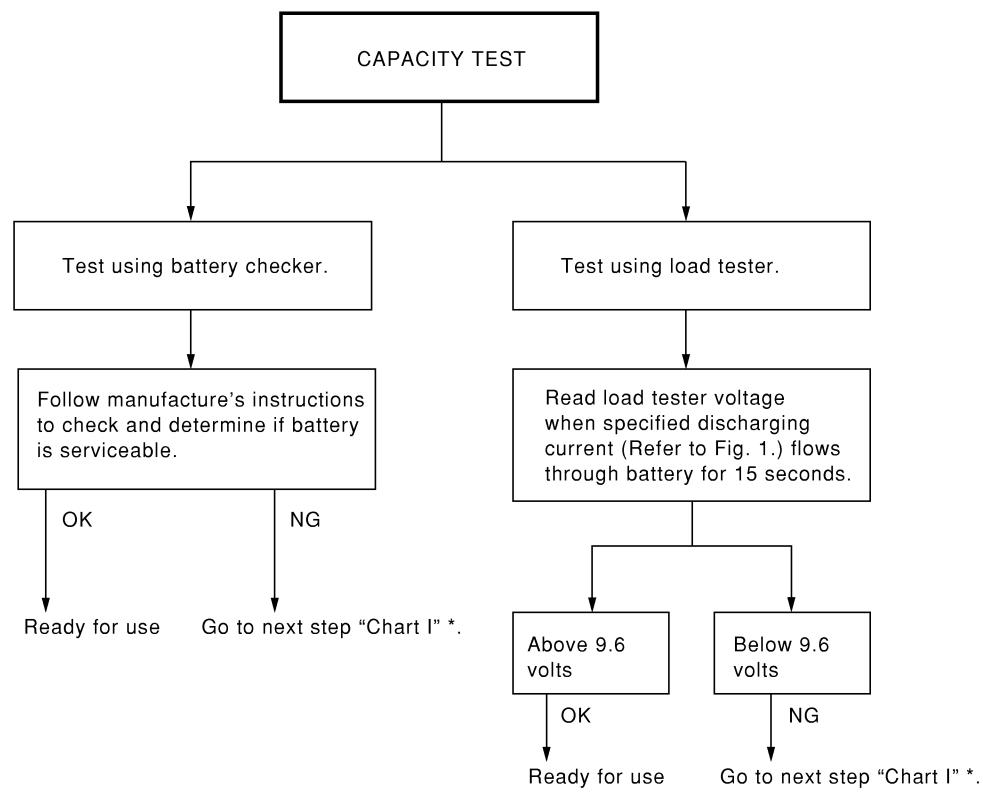
Battery Test and Charging Chart (Cont'd)

CHART II

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*: SC-6

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

Fig. 1 Discharging Current (Load Tester)

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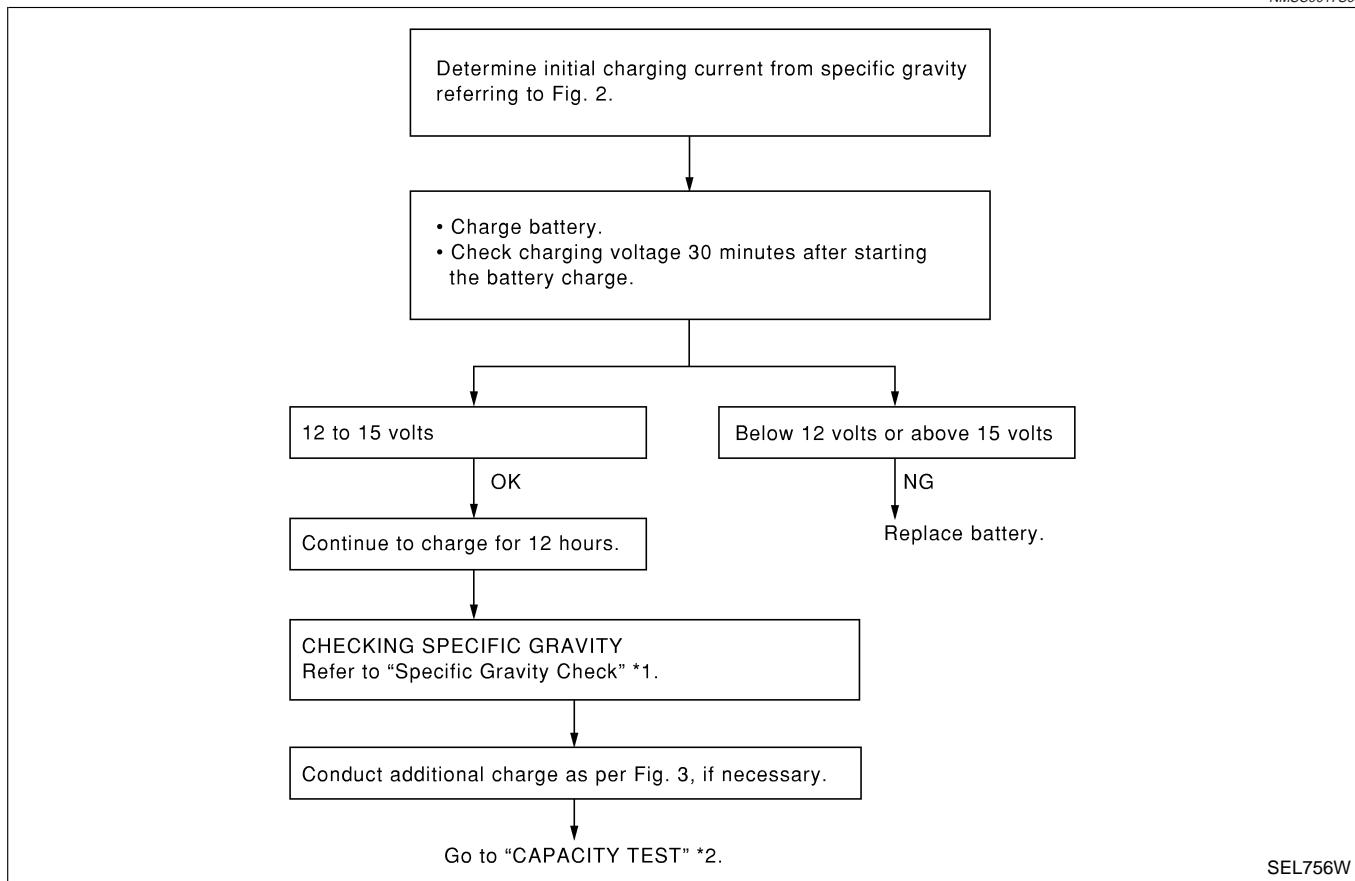
Type	Current (A)
28B19R(L)	90
34B19R(L)	99
46B24R(L)	135
55B24R(L)	135
50D23R(L)	150
55D23R(L)	180
65D26R(L)	195
80D26R(L)	195
75D31R(L)	210
95D31R(L)	240
115D31R(L)	240
95E41R(L)	300
130E41R(L)	330

BATTERY

Battery Test and Charging Chart (Cont'd)

A: SLOW CHARGE

NMSC0017S03



SEL756W

*1: SC-4

*2: SC-7

Fig. 2 Initial Charging Current Setting (Slow Charge)

NMSC0017S0301

CON-VERTED SPECIFIC GRAVITY	BATTERY TYPE											
	28B19R(L)	34B19R(L)	46B24R(L)	55B24R(L)	50D23R(L)	55D23R(L)	65D26R(L)	80D26R(L)	75D31R(L)	95D31R(L)	115D31R(L)	95E41R(L)
Below 1.100	4.0 (A)	5.0 (A)	7.0 (A)	8.0 (A)	9.0 (A)	10.0 (A)	14.0 (A)					

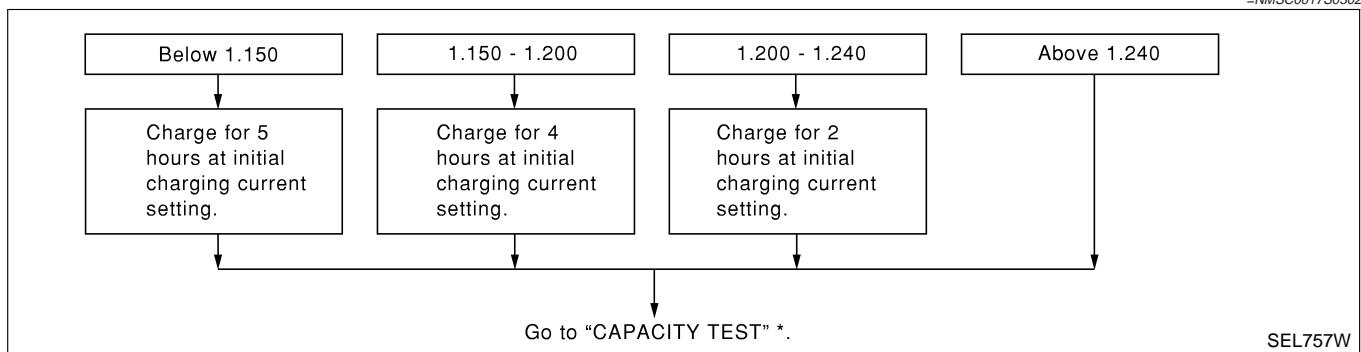
- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

BATTERY

Battery Test and Charging Chart (Cont'd)

Fig. 3 Additional Charge (Slow Charge)

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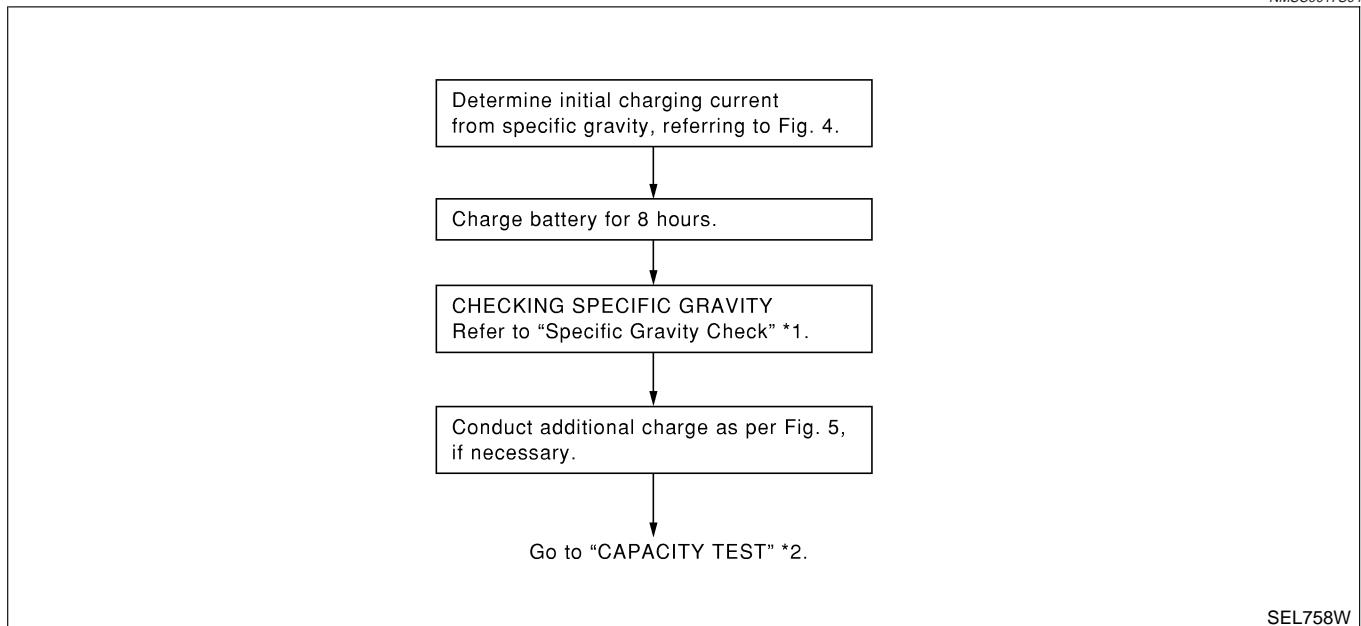
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CAUTION:

- 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

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*1: SC-4

*2: SC-7

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BATTERY

Battery Test and Charging Chart (Cont'd)

Fig. 4 Initial Charging Current Setting (Standard Charge)

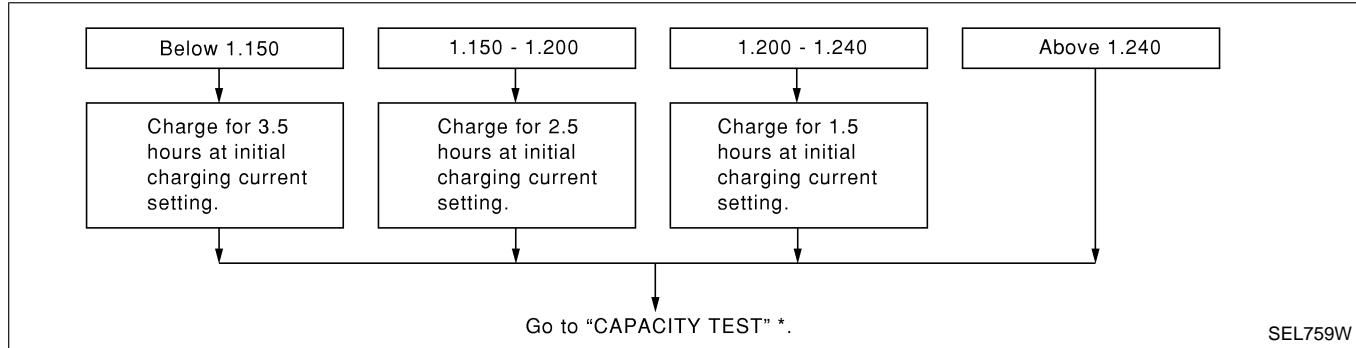
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CON-VERTED SPECIFIC GRAVITY	BATTERY TYPE												
	28B19R(L)	34B19R(L)	46B24R(L)	55B24R(L)	50D23R(L)	55D23R(L)	65D26R(L)	80D26R(L)	75D31R(L)	95D31R(L)	115D31R(L)	95E41R(L)	130E41R(L)
1.100 - 1.130	4.0 (A)		5.0 (A)		6.0 (A)		7.0 (A)		8.0 (A)	9.0 (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.

Fig. 5 Additional Charge (Standard Charge)

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*: SC-7

CAUTION:

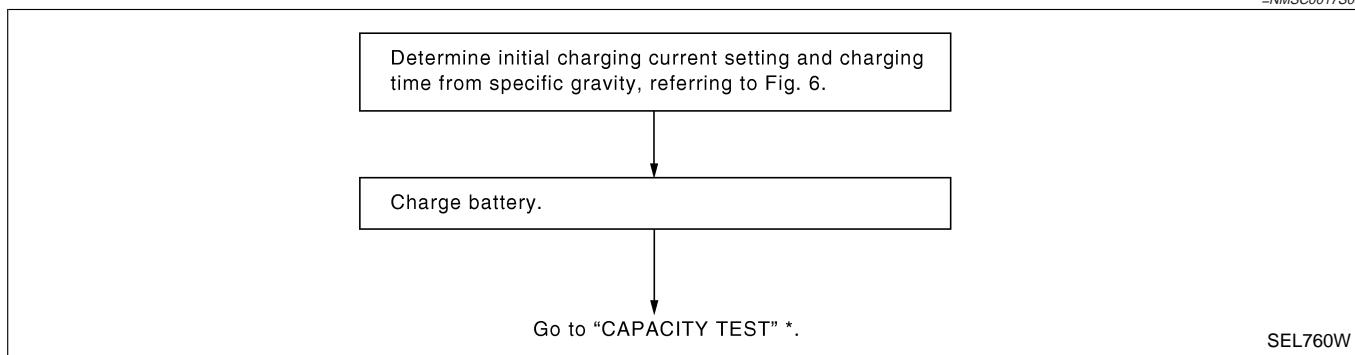
- Do not use standard charge method on a battery whose specific gravity is less than 1.100.
- Set charging current to value specified in Fig. 4. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame 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).

BATTERY

Battery Test and Charging Chart (Cont'd)

C: QUICK CHARGE

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SEL760W

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

NMSC0017S0501

BATTERY TYPE		28B19R(L)	34B19R(L)	46B24R(L)	55B24R(L)	50D23R(L)	55D23R(L)	65D26R(L)	80D26R(L)	75D31R(L)	95D31R(L)	115D31R(L)	95E41R(L)	130E41R(L)
CURRENT [A]		10 (A)		15 (A)			20 (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.

STARTING SYSTEM

System Description

System Description

NMSC0004

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M/T MODELS

Power is supplied at all times

- to ignition switch terminal 1
- through 30A fusible link (letter J, located in the fuse and fusible link box) and

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

- from ignition switch terminal 4
- 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

Power is supplied at all times

NMSC0004S02

- to ignition switch terminal 1
- through 30A fusible link (letter J, located in the fuse and fusible link box).

With the ignition switch in the ON or START position, power is supplied through 10A fuse [No. 12, located in the fuse block (J/B)]

- to starter relay terminal 2.

Also, with the ignition switch in the START position, power is supplied

- from ignition switch terminal 4
- to starter relay terminal 3.

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

- to starter relay terminal 1 through the park/neutral position switch terminals 2 and 1
- from body grounds, E43 and E57.

Then starter relay is energized and power is supplied

- from starter relay 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.

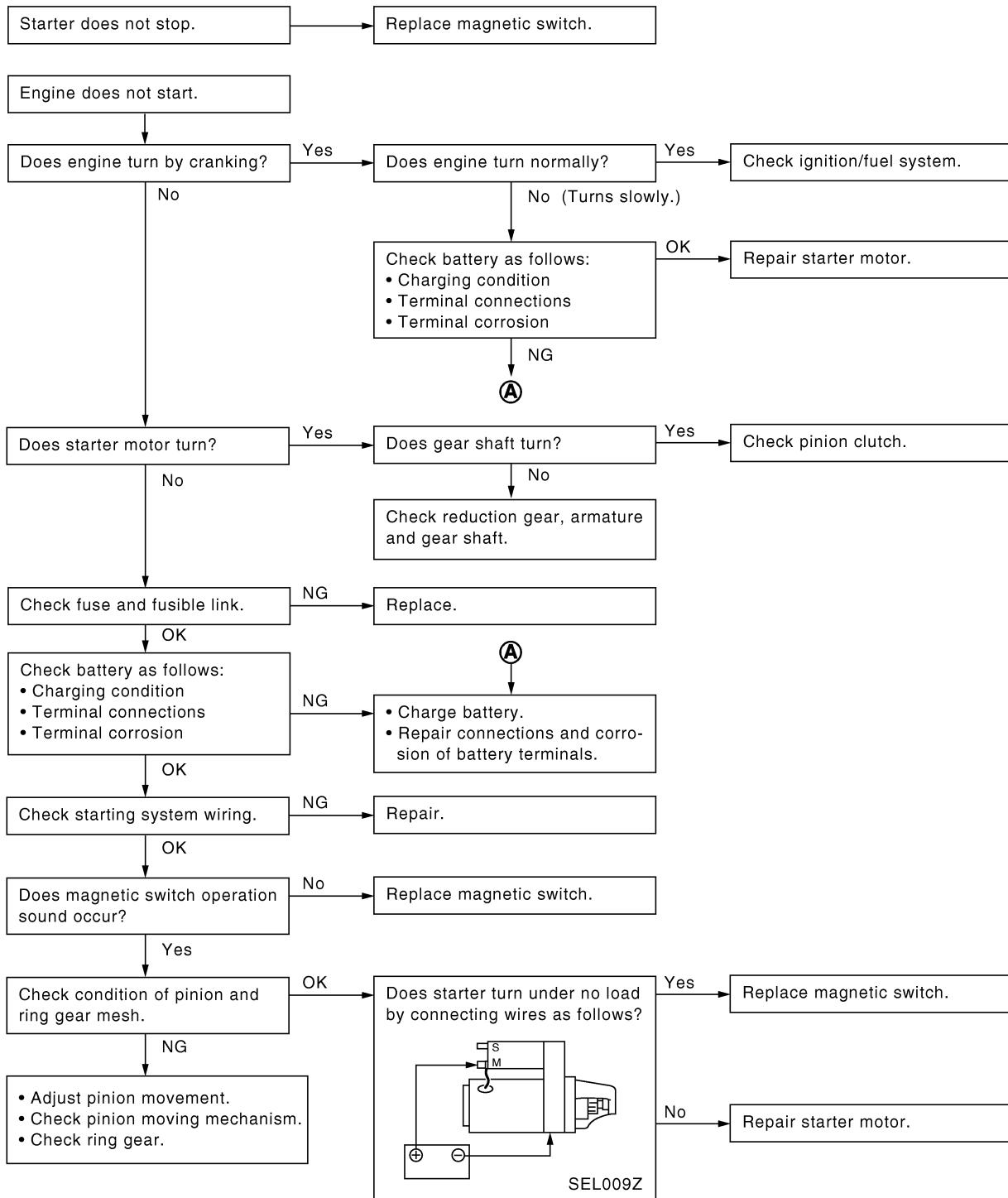
STARTING SYSTEM

Trouble Diagnoses

Trouble Diagnoses

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



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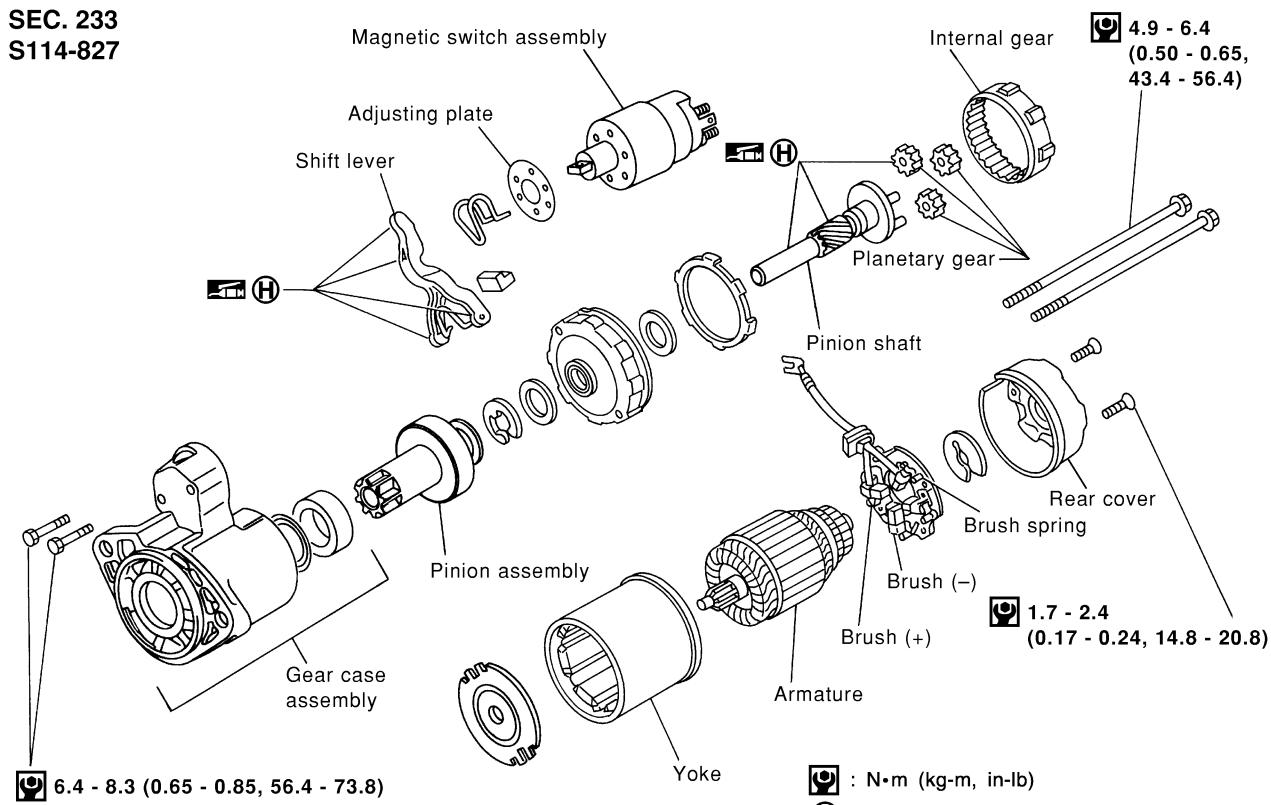
STARTING SYSTEM

Construction

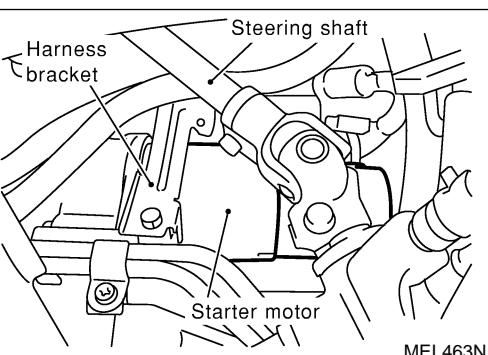
Construction

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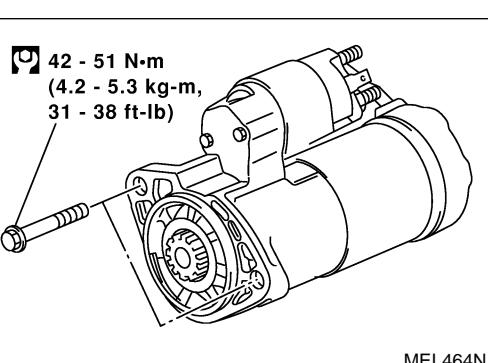


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NMSC0007S02

Removal and Installation

REMOVAL

1. Remove harness bracket from transmission harness.
2. Disconnect starter harness.
3. Remove starter bolts (two).
4. Remove starter.

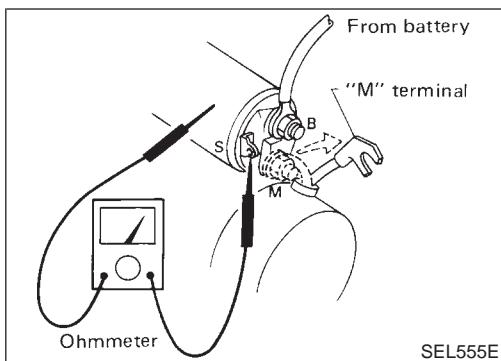
INSTALLATION

To install, reverse the removal procedure.

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STARTING SYSTEM

Inspection

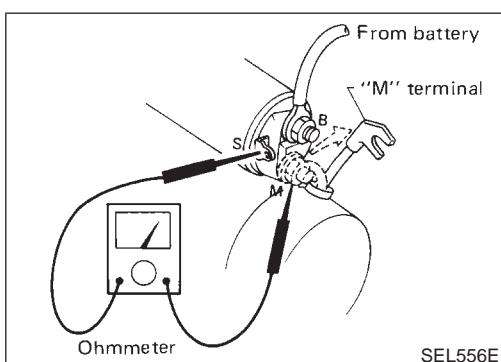


Inspection

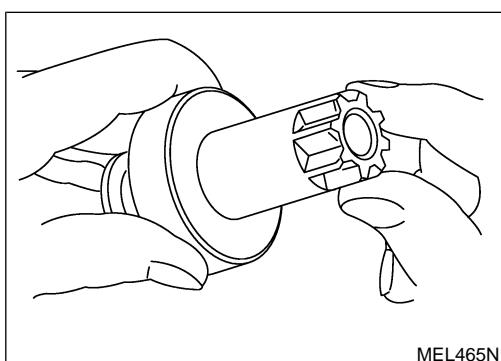
MAGNETIC SWITCH CHECK

NMSC0019

- 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

NMSC0019S02

- 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

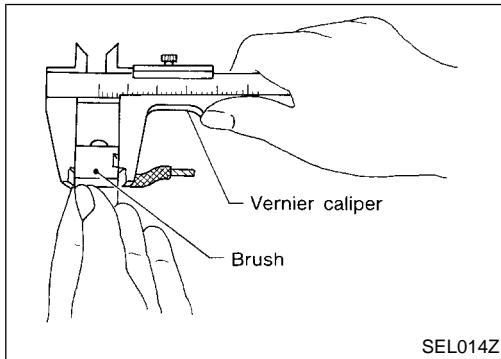
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Check wear of brush.

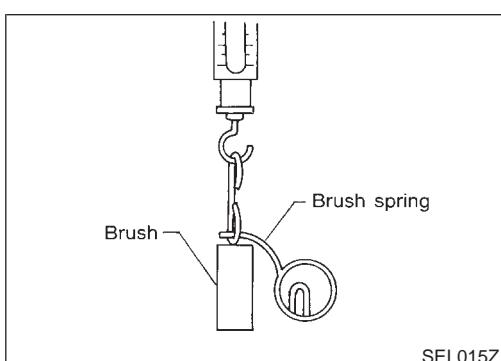
Wear limit length:

Refer to SDS (SC-25).

- Excessive wear ... Replace.



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Brush Spring Check

Check brush spring pressure with brush spring detached from brush.

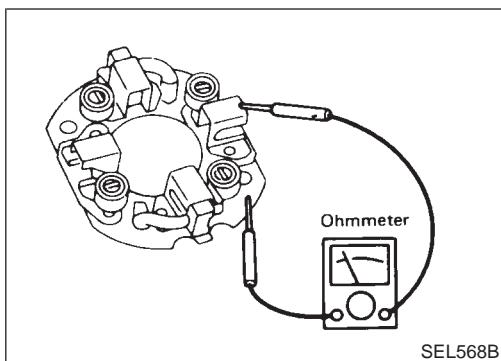
Spring pressure (with new brush):

Refer to SDS (SC-25).

- Not within the specified values ... Replace.

STARTING SYSTEM

Inspection (Cont'd)



Brush Holder

- NMSC0019S0303
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.

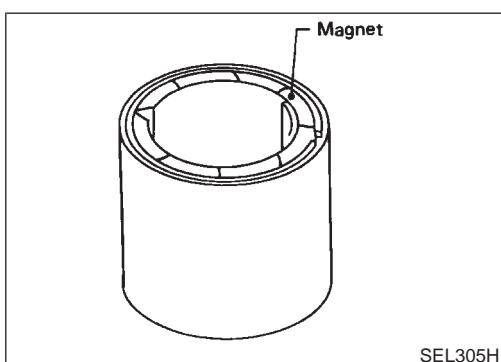
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YOKE CHECK

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.

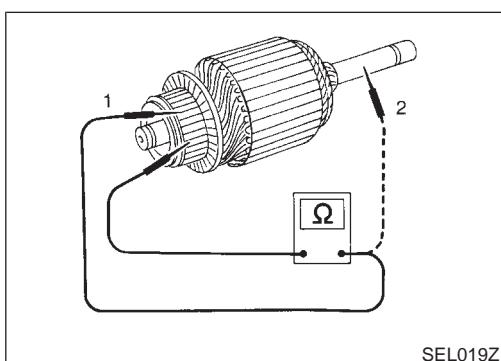
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ARMATURE CHECK

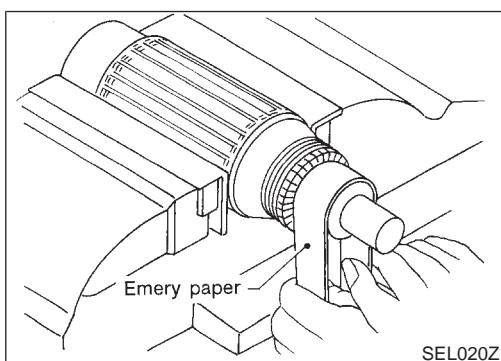
1. Continuity test (between two segments side by side).
- No continuity ... Replace.
2. Insulation test (between each commutator bar and shaft).
- Continuity exists. ... Replace.

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

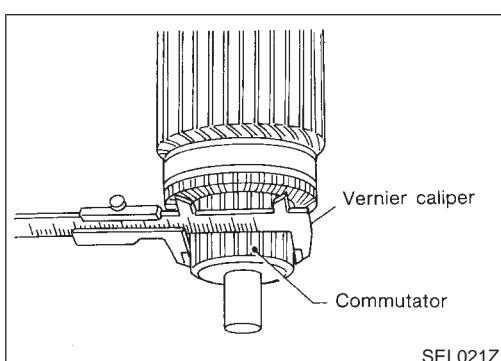
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4. Check diameter of commutator.

**Commutator minimum diameter:
Refer to SDS (SC-25).**

- Less than specified value ... Replace.

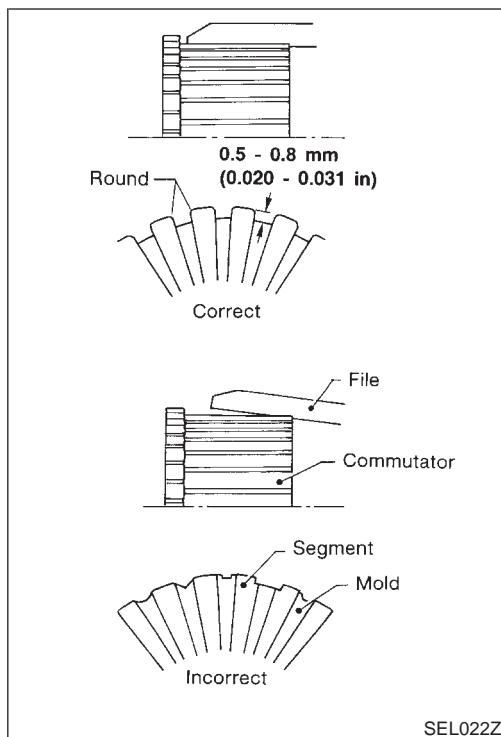
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STARTING SYSTEM

Inspection (Cont'd)



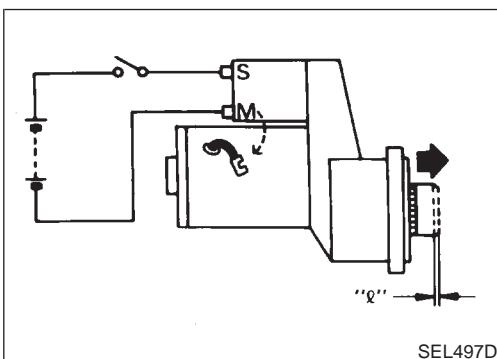
SEL022Z

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.

NMSC0020



PINION PROTRUSION LENGTH ADJUSTMENT

NMSC0020S01

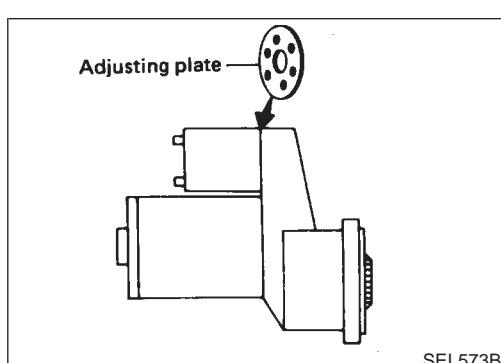
Reduction Gear Type

NMSC0020S0101

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.



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

CHARGING SYSTEM

System Description

System Description

NMSC0009

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:

- 100A fusible link (letter A, located in the fuse and fusible link box), and
- 10A fuse (No. 40, 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 100A 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. 11, located in the fuse block (J/B)]
- to combination meter terminal 12 for the charge warning lamp.

Ground is supplied to terminal 61 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.

GI

MA

EM

LC

EC

FE

CL

MT

AT

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

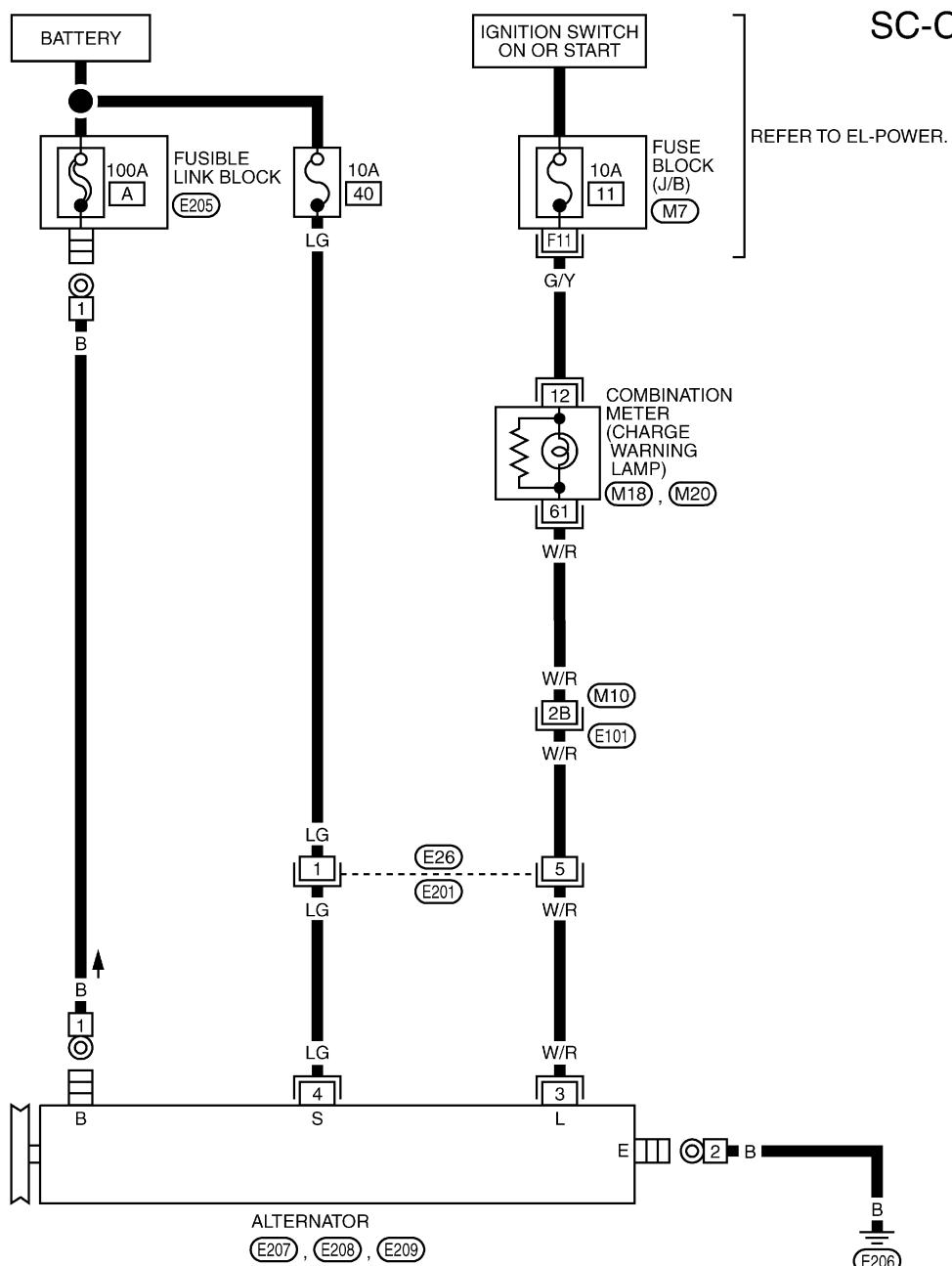
IDX

CHARGING SYSTEM

Wiring Diagram — CHARGE —

Wiring Diagram — CHARGE —

NMSC0010



SC-CHARGE-01

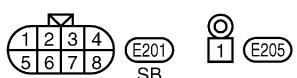
REFER TO EL-POWER.

1	2	3	4	5	6	7	8	9	(M18)
10	11	12	13	14	15	16	17	18	19 20

W (E207, E208, E209)

41	42	43	44	45	46	47	48	49	50	51	(M20)
52	53	54	55	56	57	58	59	60	61	62	63 64

BR (E207, E208, E209)



REFER TO THE FOLLOWING.

(E101) -SUPER MULTIPLE JUNCTION (SMJ)

(M7) -FUSE BLOCK-JUNCTION BOX (J/B)

TSC008

CHARGING SYSTEM

Trouble Diagnoses

Trouble Diagnoses

NMSC0011

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

NMSC0011S01

GI

MA

EM

LC

EC

FE

CL

MT

AT

PD

AX

SU

SEL338V

BR

ST

RS

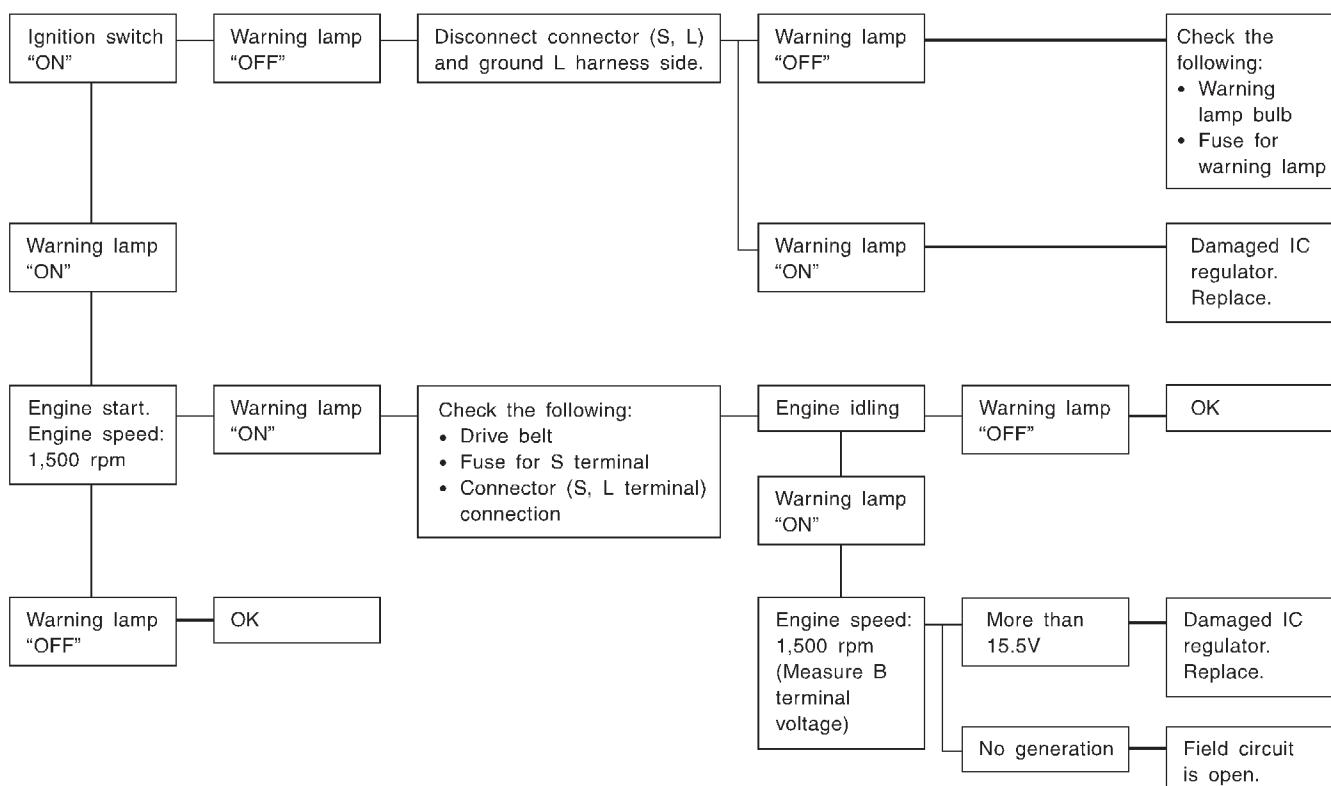
BT

HA

SC

EL

IDX



Warning lamp: "CHARGE" warning lamp in combination meter

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.

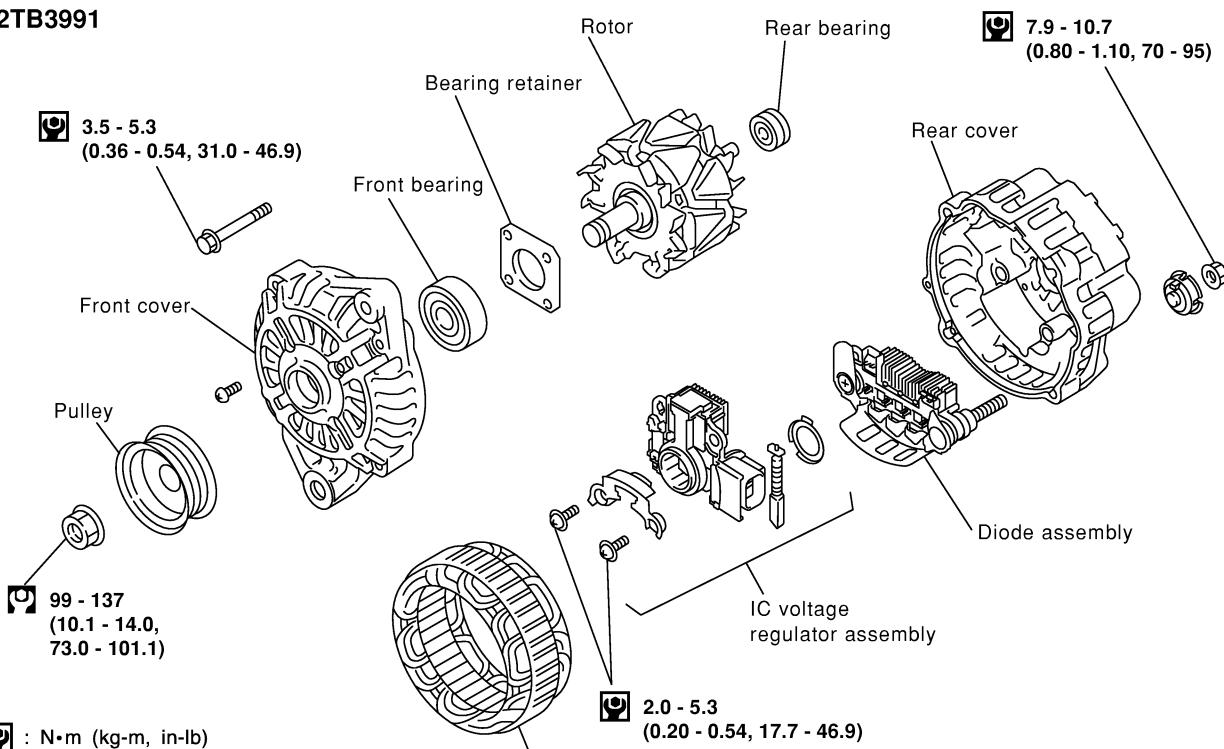
CHARGING SYSTEM

Construction

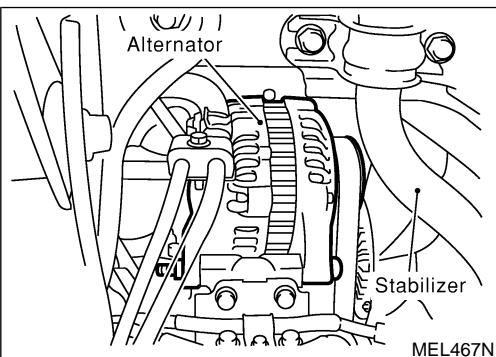
Construction

NMSC0012

SEC. 231
A2TB3991



MEL466N



Removal and Installation

NMSC0013

REMOVAL

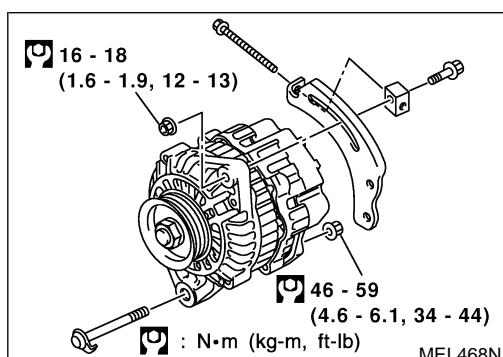
1. Remove alternator harness.
2. Loosen alternator upper nut and lower nut.
3. Loosen drive belt.
4. Remove alternator upper nut and lower bolt.
5. Remove alternator.

NMSC0013S01

INSTALLATION

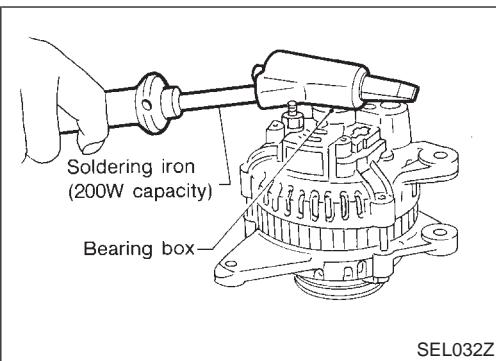
NMSC0013S02

To install, reverse the removal procedure.



CHARGING SYSTEM

Disassembly



Disassembly

REAR COVER

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.

NMSC0021

NMSC0021S01

GI

MA

EM

LC

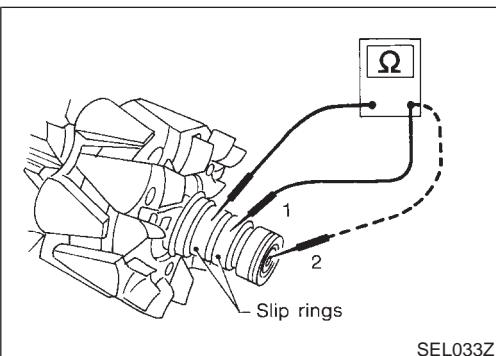
NMSC0021S02

EC

FE

CL

MT



Inspection

ROTOR CHECK

1. Resistance test

Resistance: Refer to SDS (SC-25).

- 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-25).**

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

NMSC0022

NMSC0022S01

AT

PD

AX

SU

BR

ST

RS

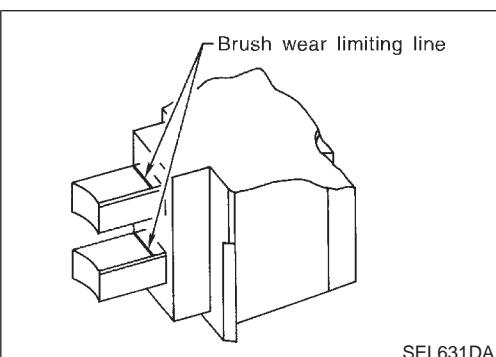
BT

HA

SC

EL

IDX



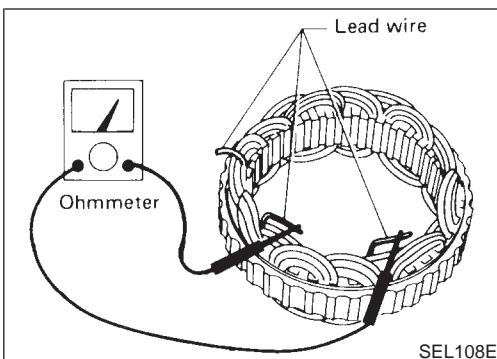
BRUSH CHECK

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.

NMSC0022S02

CHARGING SYSTEM

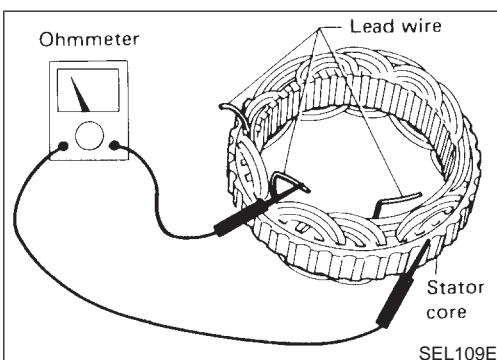
Inspection (Cont'd)



STATOR CHECK

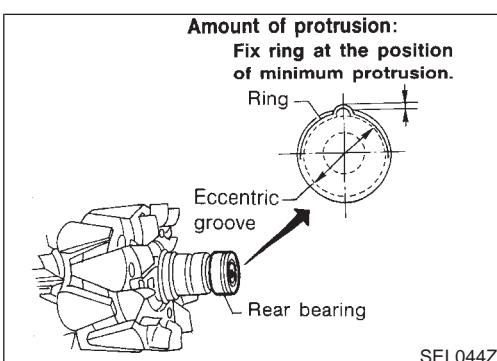
1. Continuity test
- No continuity ... Replace stator.

NMSC0022S03



2. Ground test

- Continuity exists ... Replace stator.



Assembly

RING FITTING IN REAR BEARING

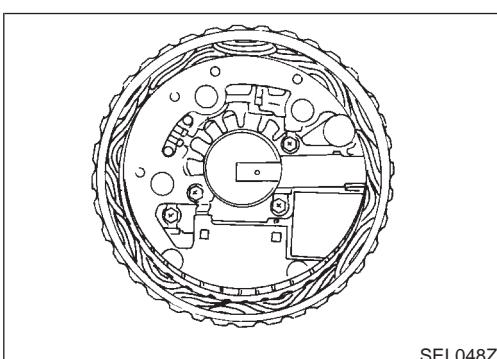
NMSC0023

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

CAUTION:

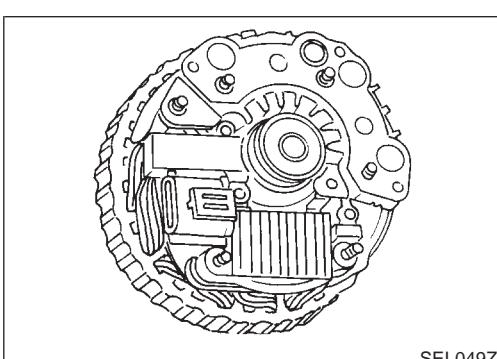
Do not reuse rear bearing after removal.

NMSC0023S01



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.



SERVICE DATA AND SPECIFICATIONS (SDS)

Battery

Battery

NMSC0014

Applied model	For Australia	GI
	Standard	
Type	46B24R	MA
Capacity V-AH	12-48	

Starter

NMSC0015

Type	S114-827	EM
	HITACHI make	LC
	Reduction gear type	EC
System voltage	12V	
No-load	Terminal voltage	FE
	Current	Less than 90A
	Revolution	More than 2,700 rpm
Minimum diameter of commutator	28.0 mm (1.102 in)	
Minimum length of brush	10.5 mm (0.413 in)	MT
Brush spring tension	16.2 N (1.65 kg, 3.64 lb)	
Clearance between bearing metal and armature shaft	0.2 mm (0.008 in)	AT
Movement "ℓ" in height of pinion assembly	0.3 - 2.5 mm (0.012 - 0.098 in)	

Alternator

NMSC0016

Type	A2TB3991	PD
	MITSUBISHI make	AX
Nominal rating	12V-80A	SU
Ground polarity	Negative	
Minimum revolution under no-load (When 13.5V is applied)	Less than 950 rpm	BR
Hot output current (When 13.5V is applied)	More than 23A/1,300 rpm More than 64A/2,500 rpm More than 82A/5,000 rpm	ST
Regulated output voltage	14.1 - 14.7V	
Minimum length of brush	More than 5.0 mm (0.197 in)	RS
Brush spring pressure	4.8 - 6.0 N (490 - 610 g, 17.28 - 21.51 oz)	
Slip ring minimum outer diameter	More than 22.1 mm (0.870 in)	BT
Rotor (Field coil) resistance	2.2 - 2.6Ω	

SC

EL

IDX

NOTES