SECTION SC
STARTING & CHARGING SYSTEM

CONTENTS

PRECAUTIONS

PFP:00011

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

EKS007Z9

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 harness connectors.**

Wiring Diagrams and Trouble Diagnosis

EKS007ZA

When you read wiring diagrams, refer to the followings:

- GI-14, "How to Read Wiring Diagrams" in GI section
- PG-4, "POWER SUPPLY ROUTING" for power distribution circuit in PG section

When you perform trouble diagnosis, refer to the followings:

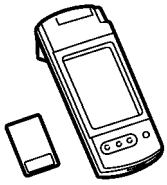
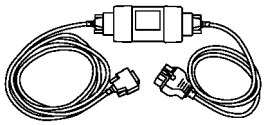
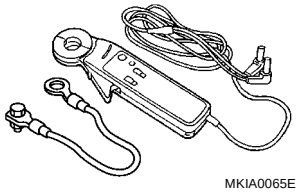
- GI-10, "How to Follow Trouble Diagnoses" in GI section
- GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident" in GI section

PREPARATION

PFP:00002

Special Service Tools

EKS007ZY

Tool name	Description	
CONSULT-II unit, and Program card AED02E	 PBIA3527J	System diagnose and inspection
CONSULT-II CONVERTER	 PBIA3526J	
Current measurement probe for CONSULT-II EG1187 1900	 MKIA0065E	

BATTERY

PFP:00011

How to Handle Battery

EKS007ZB

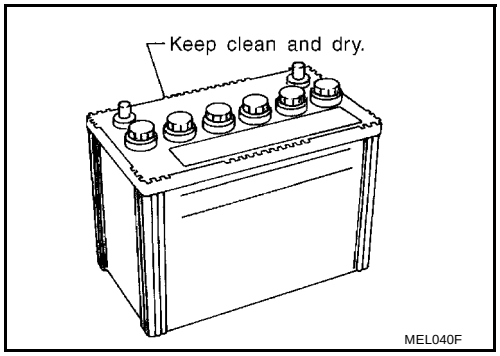
CAUTION:

- **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.**

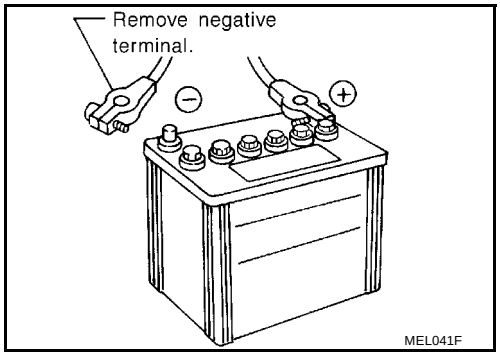
METHODS OF PREVENTING OVER-DISCHARGE

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

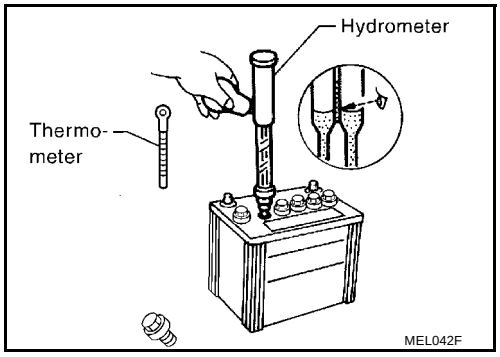
- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level.
  This also applies to batteries designated as “low maintenance” and “maintenance-free”.



- 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.

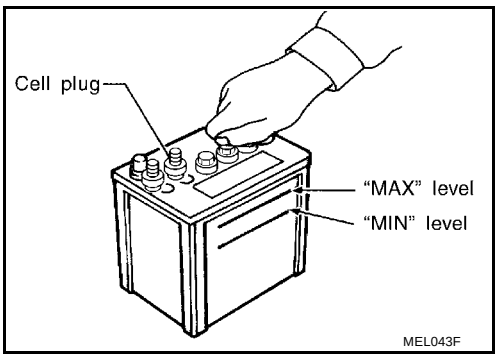


CHECKING ELECTROLYTE LEVEL

WARNING:

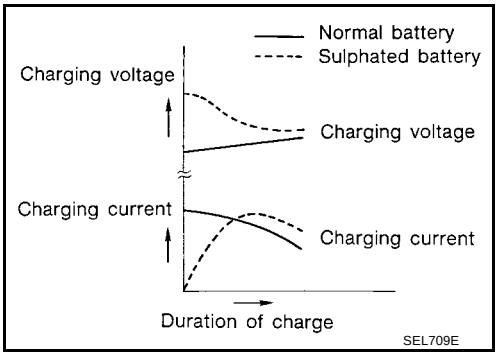
Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

- 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.

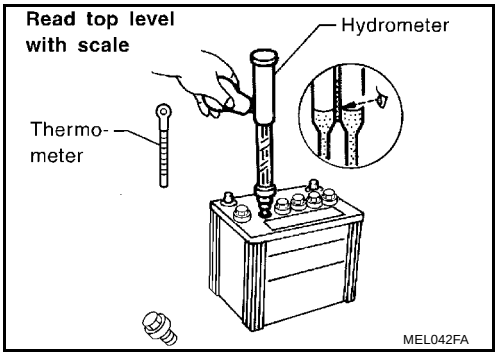


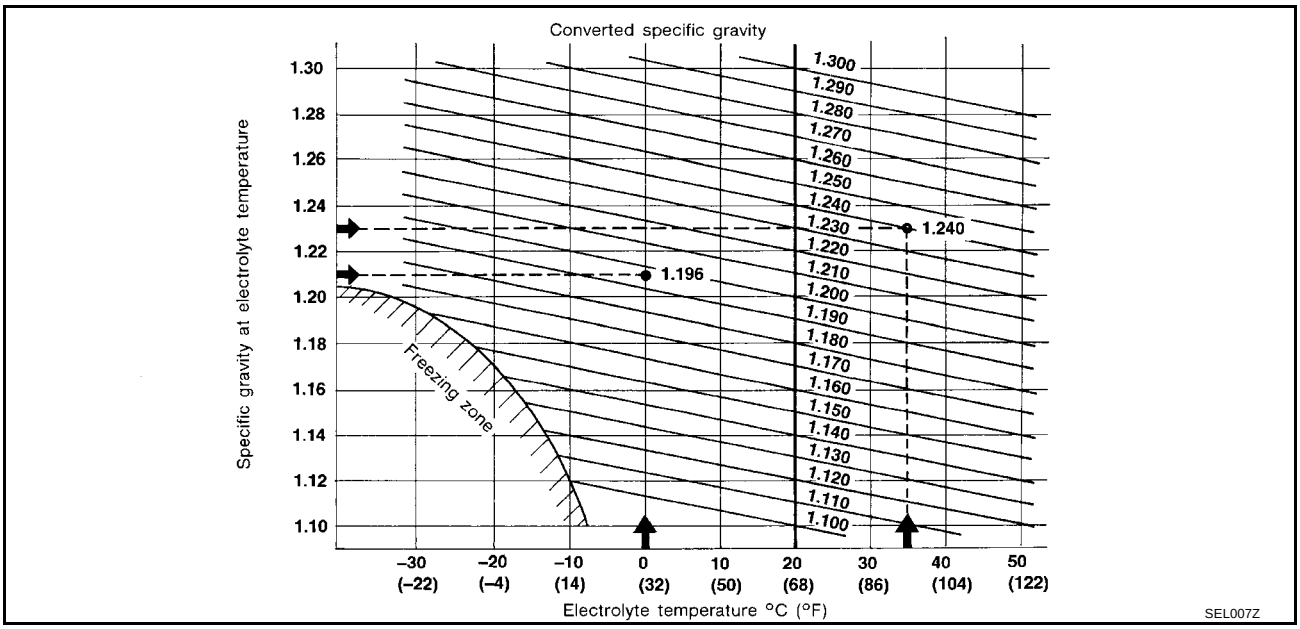
SPECIFIC GRAVITY CHECK

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.

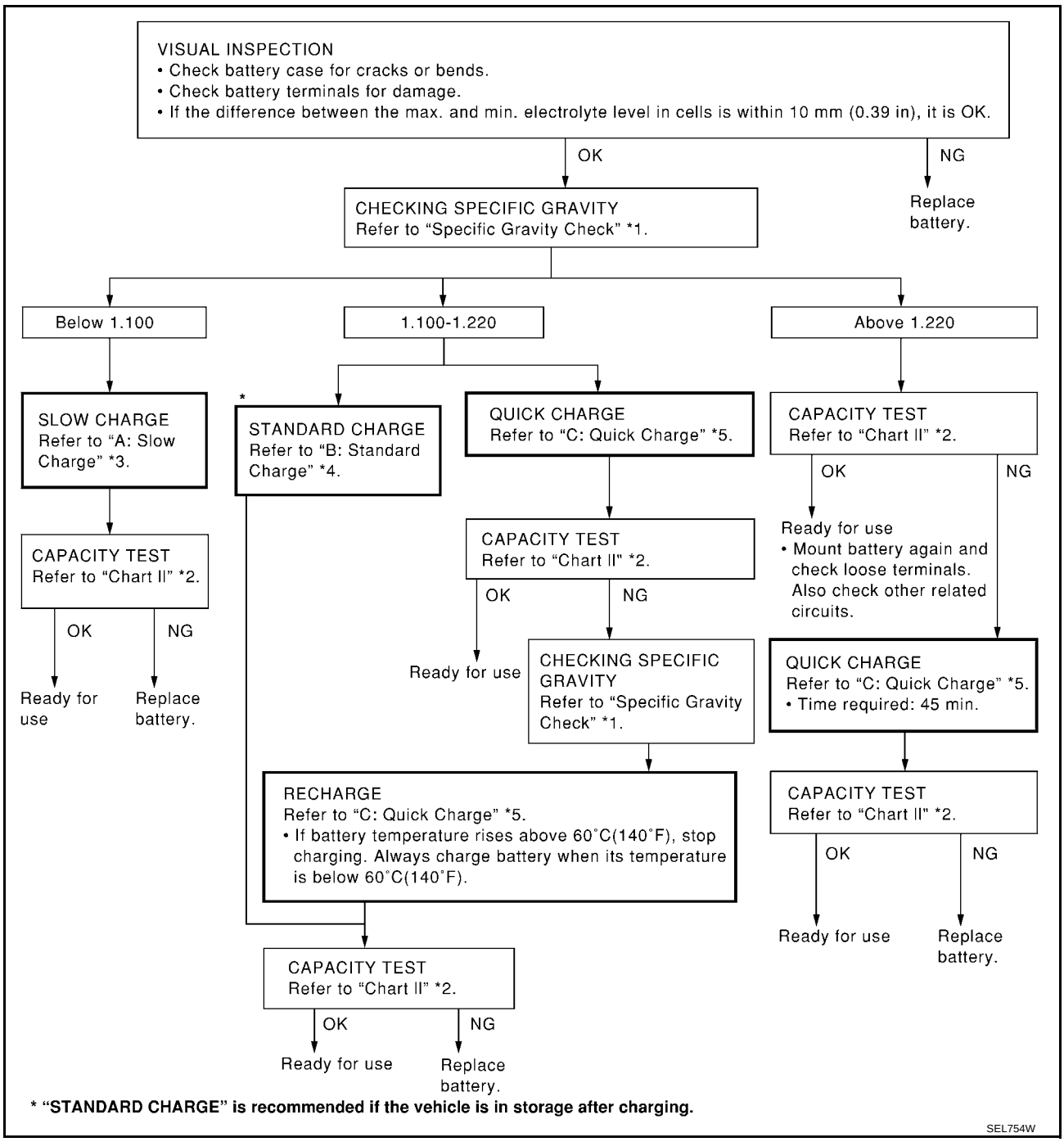




Battery Test and Charging Chart

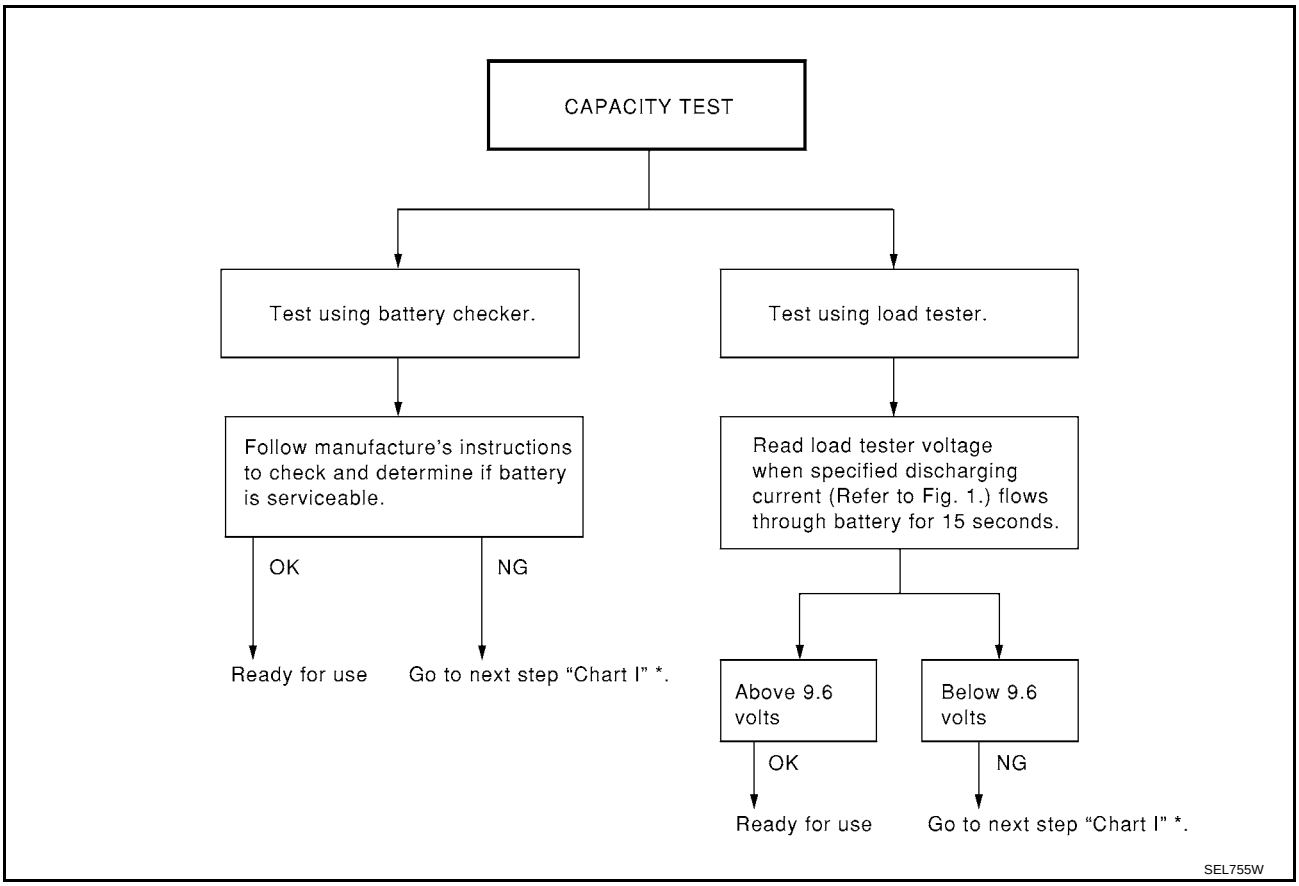
EKS007ZC

CHART I



*1. SC-5, "SPECIFIC GRAVITY CHECK"
*2. SC-7, "CHART II"
*3. SC-8, "A: SLOW CHARGE"
*4. SC-10, "B: STANDARD CHARGE"
*5. SC-11, "C: QUICK CHARGE"

CHART II



*. SC-6, "CHART I"

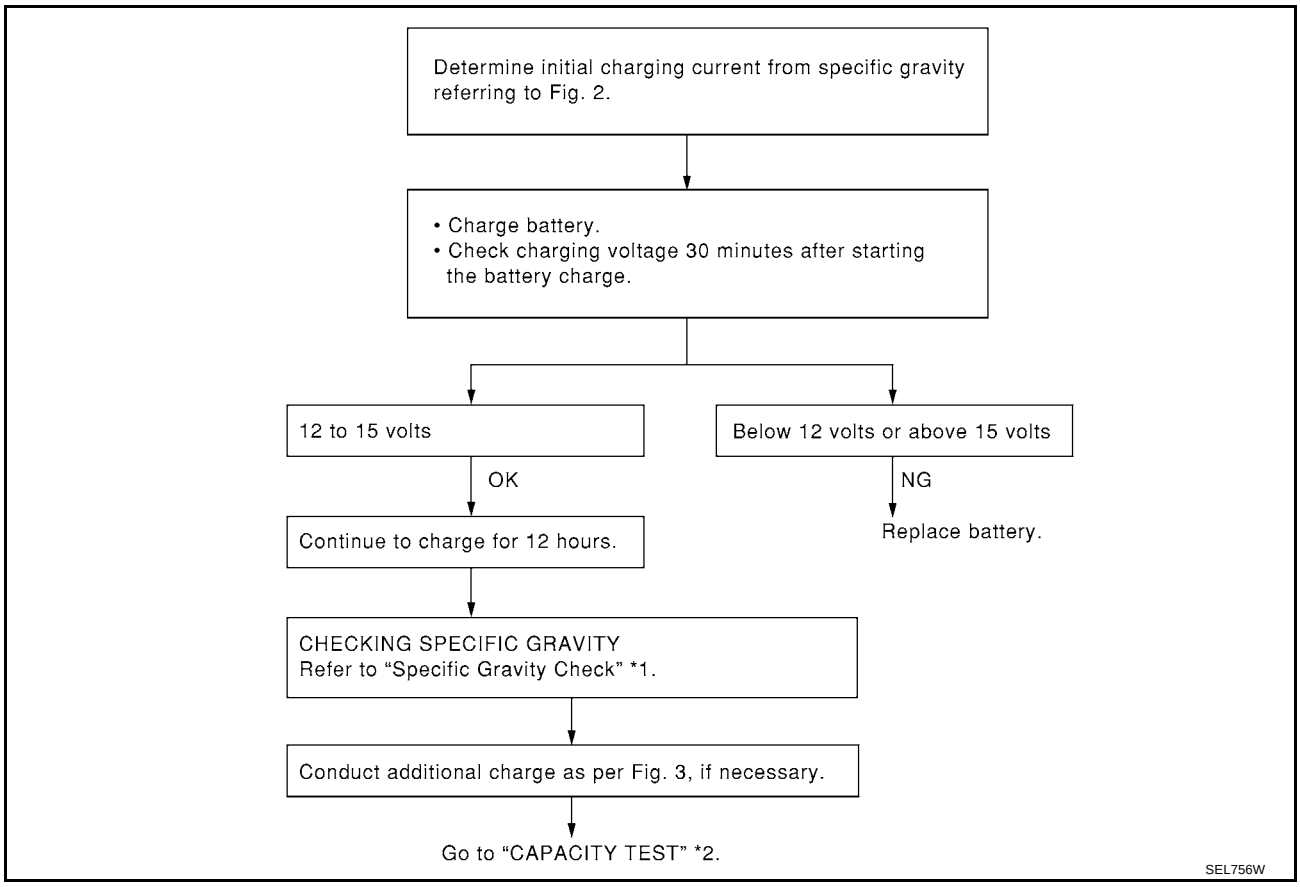
- Check battery type and determine the specified current using the following table.

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

Type	Current (A)
130E41R(L)	330
096 [YUASA type code]	375
096 [YUASA type code]	375
010S [YUASA type code]	360
LB1 FCM 047 620 [FULMAN type code]	420
LB2 FCM 055 622 [FULMAN type code]	510
LB2 FCM 050 622 [FULMAN type code]	600

A: SLOW CHARGE



*1. SC-5, "SPECIFIC GRAVITY CHECK"

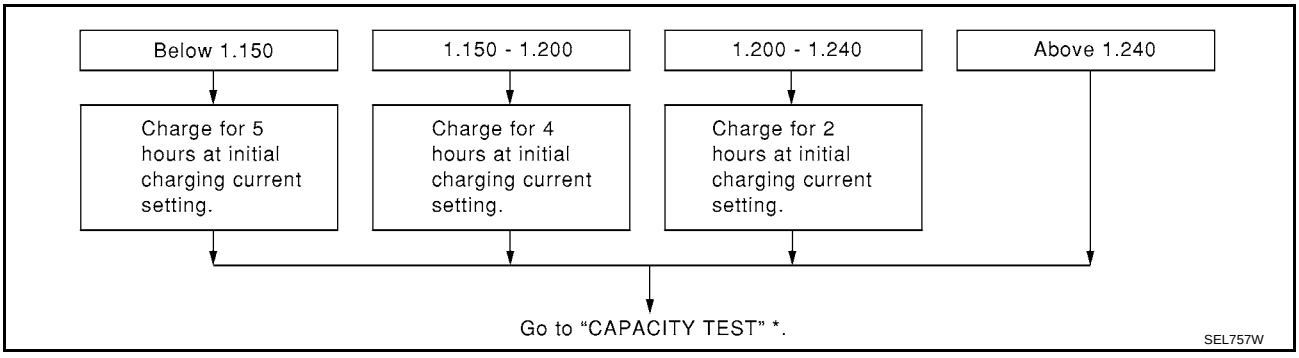
*2. SC-7, "CHART II"

Fig. 2 Initial Charging Current Setting (Slow Charge)

CON-VERTED SPECIFIC GRAVITY	BATTERY TYPE																							
	BL1 FCM 047 620 [FULMEN type code]	LB2 FCM 050 622 [FULMEN type code]	LB2 FCM 055 622 [FULMEN type code]	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	2.55 (A)	2.75 (A)	3.0 (A)	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)

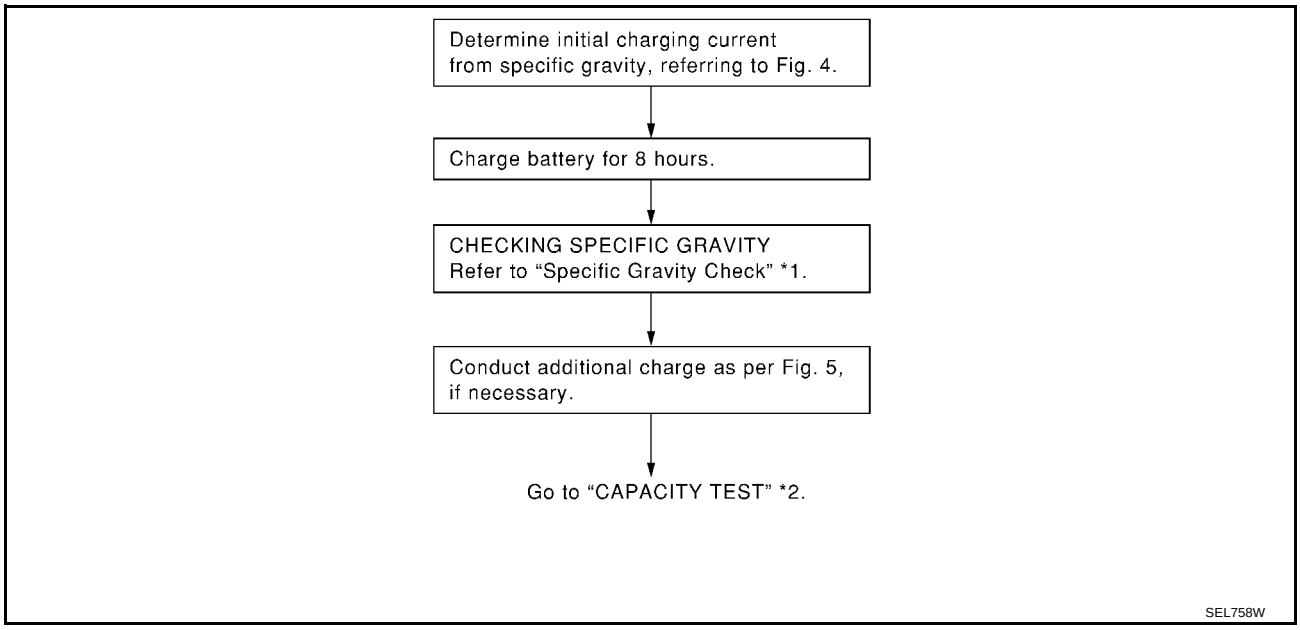


*. SC-7, "CHART II"

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-5, "SPECIFIC GRAVITY CHECK"

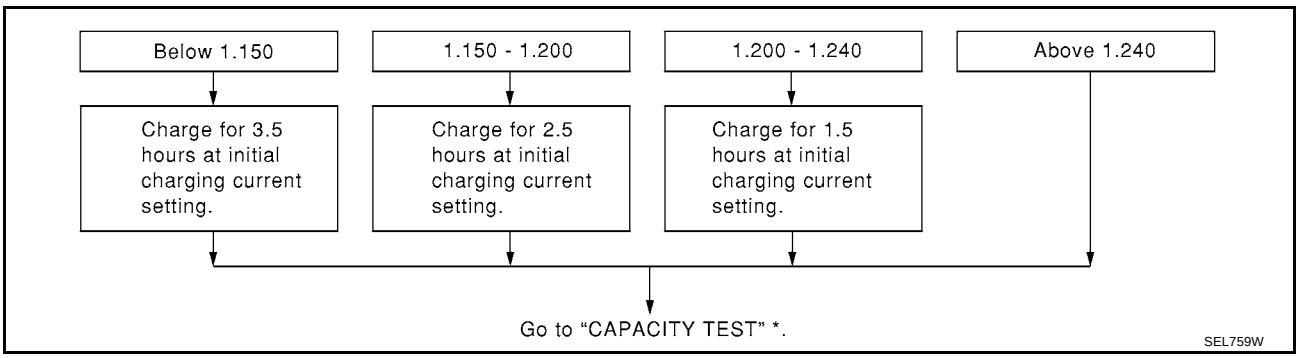
*2. SC-7, "CHART II"

Fig. 4 Initial Charging Current Setting (Standard Charge)

CON-VERTED SPECIFIC GRAVITY	BATTERY TYPE																							
	28B19R(L)	34B19R(L)	LB1 FCM 047 620 [FULMEN type code]	LB2 FCM 050 622 [FULMEN type code]	46B24R(L)	55B24R(L)	LB2 FCM 055 622 [FULMEN type code]	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)		4.1(A)	4.8(A)	5.0 (A)		2.0(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)		3.4(A)	4.0(A)	4.0 (A)		4.2(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)		2.8(A)	3.3(A)	3.0 (A)		3.3(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)		2.1(A)	2.3(A)	2.0 (A)		2.4(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)

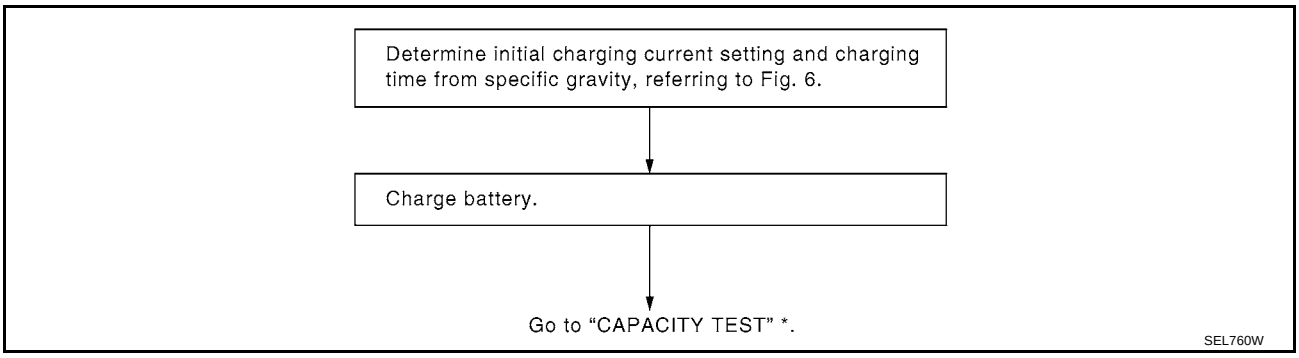


*. SC-7, "CHART II"

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, "CHART II"

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

BATTERY TYPE	CURRENT [A]	CONVERTED SPECIFIC GRAVITY			
		1.100 - 1.130	1.130 - 1.160	1.160 - 1.190	1.190 - 1.220	Above 1.220
28B19R(L)	10 (A)	2.5 hours	2.0 hours	1.5 hours	1.0 hours	0.75 hours (45 min.)
34B19R(L)						
46B24R(L)	15 (A)					
55B24R(L)						
50D23R(L)						
55D23R(L)	20 (A)					
65D26R(L)						
80D26R(L)						
025 [YUASA type code]						
027 [YUASA type code]						
063 [YUASA type code]						
LB1 FCM 047 620 [FULMEN type code]	21(A)					
BL2 FCM 050 622 [FULMEN type code]	23(A)					
LB2 FCM 055 622 [FULMEN type code]	24(A)					
067 [YUASA type code]	25 (A)					
096 [YUASA type code]						
065 [YUASA type code]						
075 [YUASA type code]						
096L [YUASA type code]	30 (A)					
010S [YUASA type code]						
75D31R(L)						
95D31R(L)						
115D31R(L)						
110D26R(L)						
95E41R(L)						
130E41R(L)	40 (A)					

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

CAUTION:

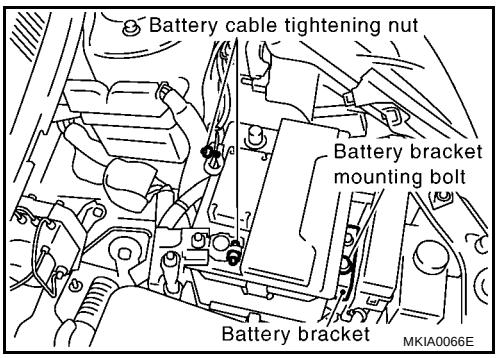
- **Do not use quick charge method on a battery whose specific gravity is less than 1.100.**
- **Set initial charging current to value specified in Fig. 6. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.**
- **Keep battery away 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.**

Removal and Installation

EKS007ZD

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 bracket mounting bolt:

: 12.7 - 15.7 N·m (1.3 - 1.6 kg-m, 10 - 11 ft-lb)

Battery cable tightening nut:

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

CHARGING SYSTEM

PFP:00011

System Description

EKS007ZE

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. 26, located in the fuse block (J/B)].

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 link.
The alternator is grounded to the body.
With the ignition switch in the ON or START position, power is supplied

- 10A fuse [No. 2, located in the fuse block (J/B)]
- to combination meter terminal 28 for the charge warning lamp.

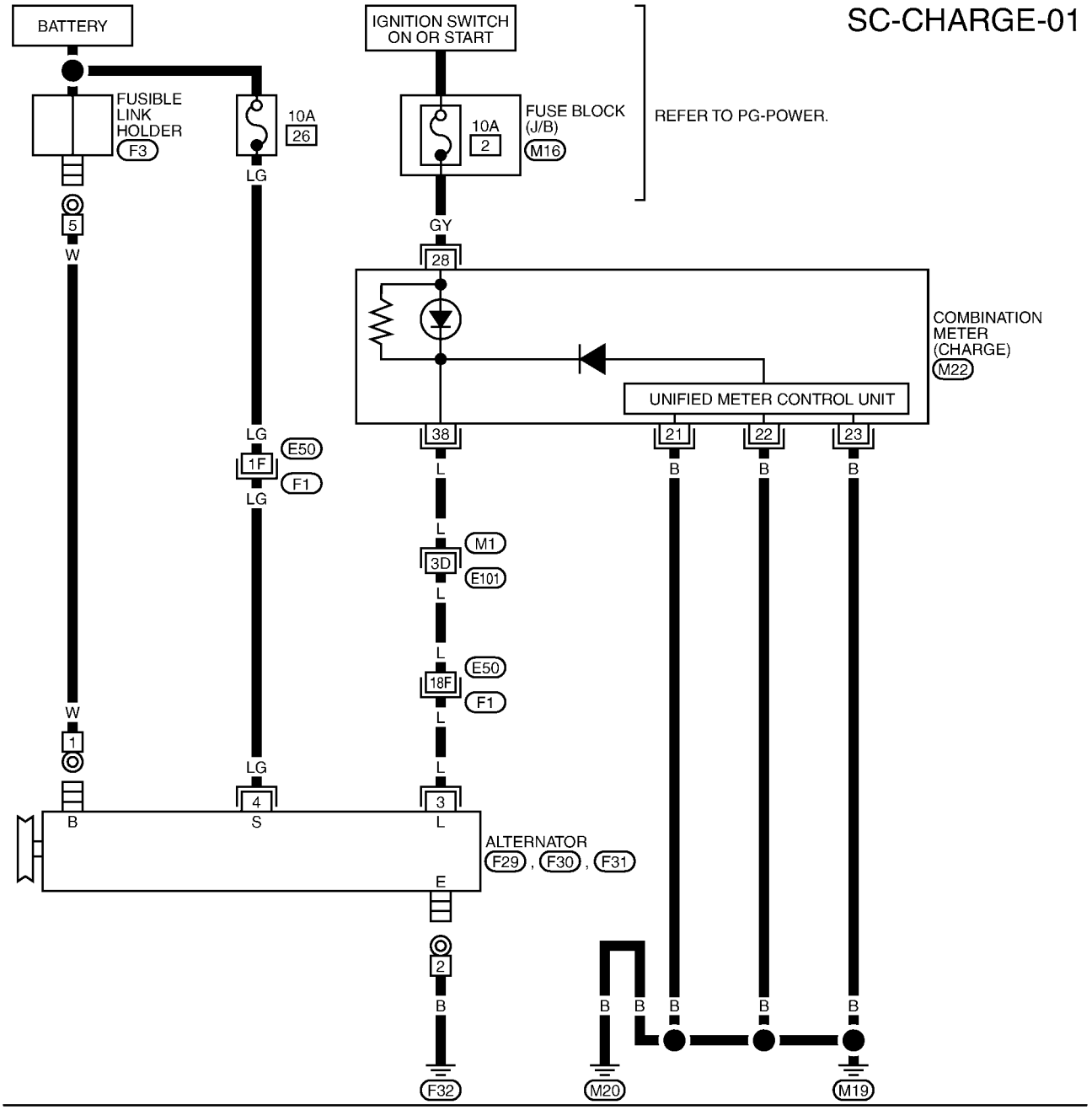
Ground is supplied With power and ground supplied

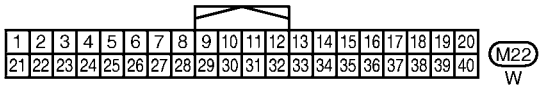
- to terminal 38 of the combination meter
- through terminal 3 (L) of the alternator.

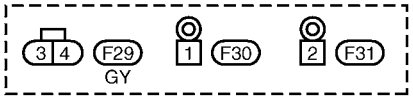
The charge warning lamp will illuminate. When the alternator is providing sufficient voltage with the engine running, the ground is opened and the charge warning lamp will go off.
If the charge warning lamp illuminates with the engine running, a fault is indicated.

Wiring Diagram — CHARGE —

EKS007ZF







REFER TO THE FOLLOWING.
M1 , F1 -SUPER MULTIPLE JUNCTION (SMJ)
M16 -FUSE BLOCK-JUNCTION BOX (J/B)

MKWA0787E

Trouble Diagnoses

EKS007ZG

DIAGNOSIS PROCEDURE

1. Check malfunction symptoms or customer's remarks.
2. Perform pre-diagnosis inspection. Refer to SC-16, "PRE-DIAGNOSIS INSPECTION" .
3. Perform trouble diagnosis for each trouble symptom. Refer to SC-16, "DIAGNOSIS CHART BY SYMPTOM"
4. Repair or replace parts indicated inspection flow based on the charge warning lamp. Refer to SC-16, "INSPECTION FLOW BY CHARGE WARNING LAMP" .
5. End

PRE-DIAGNOSIS INSPECTION

1. Perform alternator belt inspection. Refer to EM-10, "DRIVE BELTS" in EM section.
2. Inspect battery.
3. Check alternator terminal B for loose or improper connection.
4. Check alternator connector S and L terminals for loose connection, disconnection and bend.
5. Check connecting condition of harness for charging system harness (fusible link terminal and battery terminal).
6. After performing 1 to 5 above, go to trouble diagnosis for symptoms. Refer to SC-16, "DIAGNOSIS CHART BY SYMPTOM" .

DIAGNOSIS CHART BY SYMPTOM

Symptom	Reference page
Battery discharge	Refer toSC-16, "INSPECTION FLOW BY CHARGE WARNING LAMP" .
Charge warning lamp illuminates.	Refer to SC-16, "INSPECTION FLOW BY CHARGE WARNING LAMP" .
Other than the above symptoms (splashing out of battery fluid, nasty smell and others)	SC-20, "INSPECTION OF EXCESSIVE ALTERNATOR POWER GENERATION".

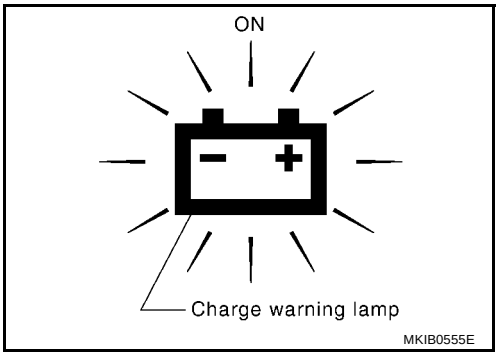
INSPECTION FLOW BY CHARGE WARNING LAMP

1. CHARGE WARNING LAMP INSPECTION

1. Turn ignition switch ON.
2. Check if charge warning lamp illuminates.

Does charge warning lamp illuminate?

YES >> GO TO 2.
NO >> Go to SC-17, "CHARGE WARNING LAMP LINE INSPECTION" .

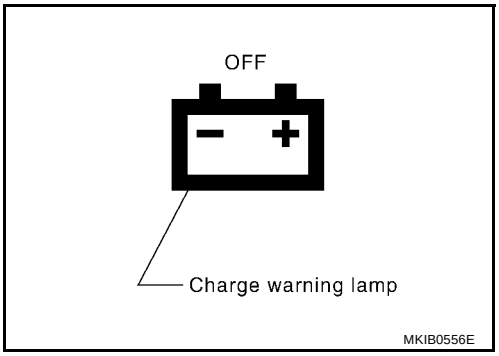


2. CHARGE WARNING LAMP INSPECTION

1. Start engine.
2. Check if charge warning lamp goes off.

Does charge warning lamp goes off?

YES >> GO TO 3.
NO >> Go to SC-18, "VOLTAGE DETECTION LINE AND CHARGE WARNING LAMP INSPECTION" .

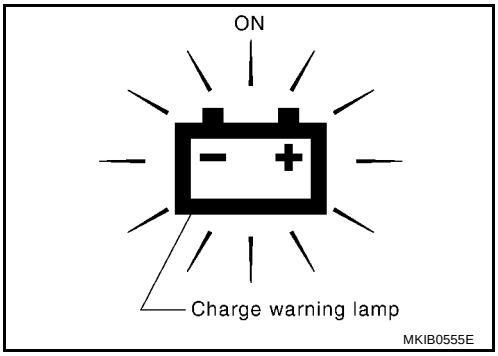


3. CHARGE WARNING LAMP INSPECTION

1. Set engine speed at 2,500 rpm.
2. Check if charge warning lamp illuminates.

Does charge warning lamp illuminate?

YES >> Go to SC-20, "INSPECTION OF EXCESSIVE ALTERNATOR POWER GENERATION" .
NO >> Go to SC-20, "INSPECTION OF INSUFFICIENT ALTERNATOR POWER GENERATION" .



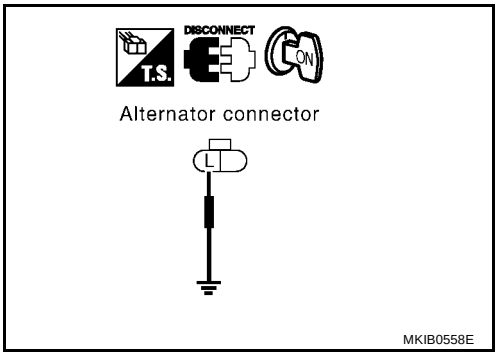
CHARGE WARNING LAMP LINE INSPECTION

CAUTION:
If open circuit is detected in L terminal, alternator cannot start generating.

INSPECTION PROCEDURE

1. CHARGE WARNING LAMP INSPECTION

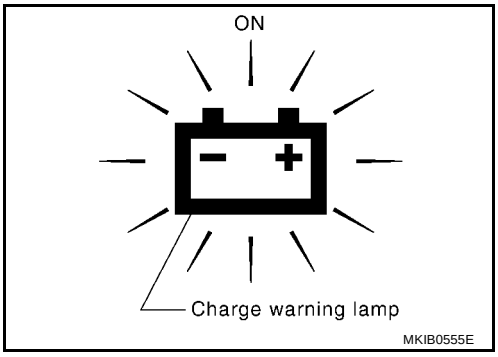
1. Turn ignition switch OFF.
2. Remove alternator connector (S and L terminals)
3. Connect alternator connector L terminal to ground.



4. Turn ignition switch ON.

Does charge warning lamp illuminate?

YES >> GO TO 4.
NO >> GO TO 2.



2. CONNECTOR INSPECTION

1. Turn ignition switch OFF.
2. Check meter and terminals (meter side, and harness side) for damage, deformation or improper connection.

OK or NG

OK >> GO TO 3.
NG >> Repair terminals and connectors.

3. CONTINUITY INSPECTION

1. Disconnect combination meter connector.
2. Check continuity between combination meter connector terminal 38 and alternator connector terminal L.

38 - L : Continuity should exist.

OK or NG

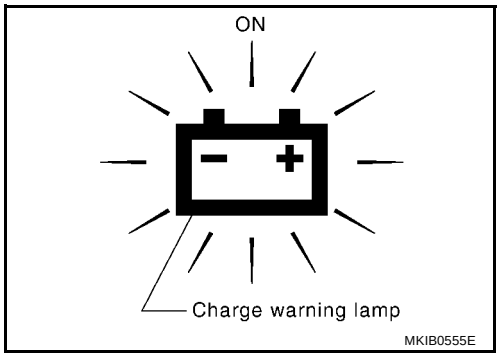
OK >> Replace combination meter. (Do not replace alternator, since it is normal.)
NG >> Repair the harnesses or connectors. (Do not replace alternator, since it is normal.)

4. CHARGE WARNING LAMP INSPECTION

1. Turn ignition switch OFF.
2. Connect alternator connectors (S and L terminals).
3. Turn ignition switch ON.

Does charge warning lamp illuminate?

YES >> Repair alternator connectors (S and L terminals). (Poor connection and intermittent problem) (Do not replace alternator, since it is normal.)
NO >> Replace alternator. (L circuit malfunction in alternator)



VOLTAGE DETECTION LINE AND CHARGE WARNING LAMP INSPECTION

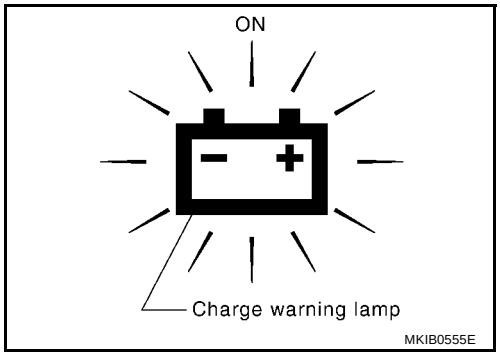
INSPECTION PROCEDURE

1. CHARGE WARNING LAMP INSPECTION

1. Turn ignition switch OFF.
2. Remove alternator connector (S and L terminals)
3. Turn ignition switch ON.

Does charge warning lamp stay ON?

YES >> GO TO 5.
NO >> GO TO 2.



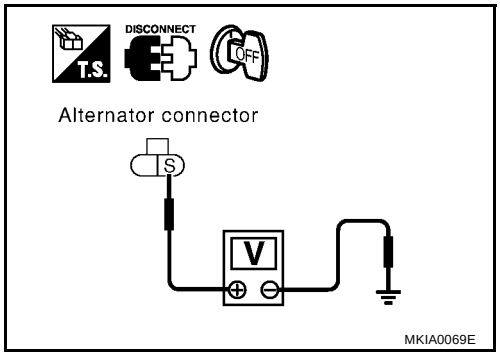
2. VOLTAGE INSPECTION

Check voltage between alternator connector S terminal and ground.

S - Ground : 12V or more

Is the inspection result 12V or more?

YES >> Replace alternator.
NO >> GO TO 3.



3. CONNECTOR INSPECTION

1. Turn ignition switch OFF.
2. Check alternator connector (S and L terminals) and S terminal (alternator side, and harness side) for damage, deformation or improper connection.

OK or NG

OK >> GO TO 4.
NG >> Repair terminals and connectors.

4. CHECK FUSES.

Check if alternator S terminal fuse #26 (10A) is blown.

OK or NG

OK >> Repair harness between fuse #26 (10A) and alternator connector S terminal. (Do not replace alternator, since it is normal.)
NG >> Replace fuse. (Do not replace alternator, since it is normal.)

5. CONTINUITY INSPECTION

1. Turn ignition switch OFF.
2. Disconnect combination meter connector.
3. Check continuity between combination meter connector terminal 38 and ground, and combination meter connector terminal 38 and alternator L terminal.

38 - Ground : Continuity should not exist.
38 - L : Continuity should exist.

OK or NG

OK >> Replace combination meter. (Do not replace alternator, since it is normal.)
NG >> Repair the harnesses or connectors. (Do not replace alternator, since it is normal.)

INSPECTION OF INSUFFICIENT ALTERNATOR POWER GENERATION

CAUTION:

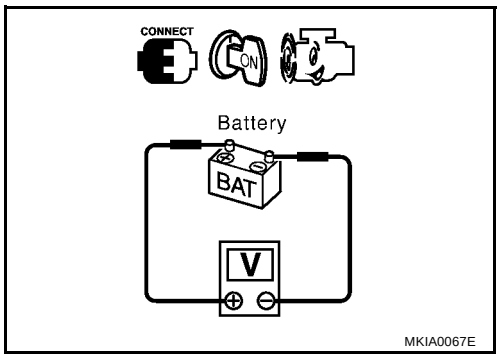
Check them using charged battery performed battery inspection.

1. VOLTAGE INSPECTION

1. Increase engine speed to 2,500 rpm.
2. Turn electrical load to ON. (Headlamp LO turns on, blower fan motor maximum airflow amount)
3. Check battery voltage.

Is the inspection result 12.8V to 15.1V?

YES >> GO TO 2.
NO >> Replace alternator. (Alternator power generation error.)

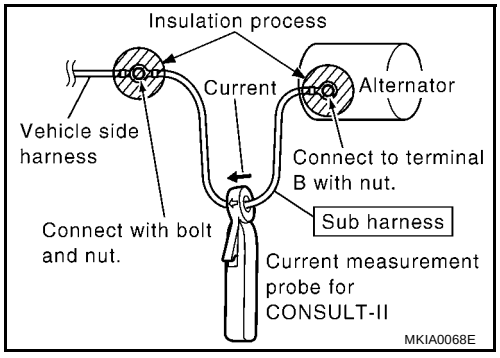


2. CURRENT INSPECTION

1. Turn the ignition switch OFF.
2. Disconnect the battery ground cable.
3. Attach current measurement probe for CONSULT-II to the harness for alternator terminal B. (If the probe can not be attached properly, then connect the sub-harness between alternator terminal B and the vehicle side harness as shown in figure, and attach the probe to sub-harness.)
4. Connect battery ground cable.
5. Increase engine speed to 2,500 rpm.
6. Turn electrical load to ON. (Headlamp LO turns on, blower fan motor maximum airflow amount, rear window defogger)
7. Check alternator terminal B current.

   CAUTION:

   Be careful of rotating parts because the engine is running.



Is the inspection result 30A or more?

YES >> GO TO dark current inspection. Refer to SC-21, "DARK CURRENT INSPECTION" . (Alternator is normal. Do not replace.)
NO >> Replace alternator. (Alternator power generation error.)

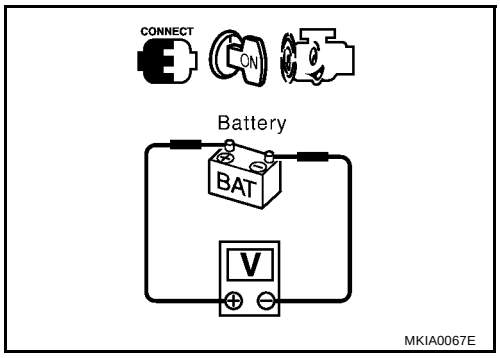
INSPECTION OF EXCESSIVE ALTERNATOR POWER GENERATION

1. ALTERNATOR VOLTAGE INSPECTION

1. Increase engine speed to 2,500 rpm.
2. Check battery voltage.

Is the inspection result 16V or less?

YES >> GO TO 2.
NO >> Replace alternator. (Excessive alternator power generation.)



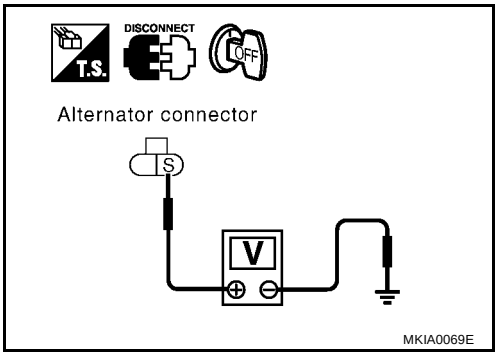
2. BATTERY VOLTAGE INSPECTION

1. Turn the ignition switch OFF.
2. Disconnect alternator connector (terminal S, L).
3. Check voltage between alternator connector terminal S and ground.

S - Ground : 12V or more

Is the inspection result 12V or more?

YES >> Replace alternator. (Alternator power generation error)
NO >> GO TO 3.



3. FUSE CHECK

Check if alternator terminal S fuse #26 (10A) is blown.

OK or NG

OK >> Repair harness between fuse #26 (10A) and alternator harness connector terminal S. (Alternator is normal. Do not replace.)
NG >> Replace fuse. (Alternator is normal. Do not replace.)

DARK CURRENT INSPECTION

Dark Current : Small current while ignition switch “OFF”.

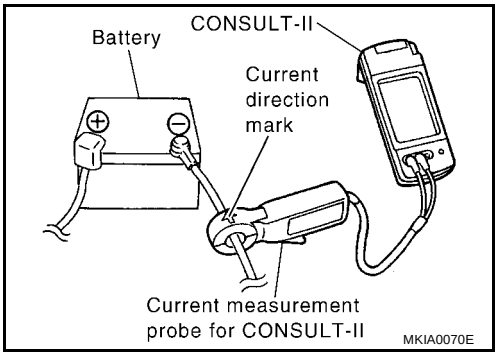
NOTE:

- If battery ground cable is disconnected from battery terminal, a large dark current may not be reproduced. When battery discharge occurs, never disconnect battery terminal while using ammeter.
- Do not connect CONSULT-II CONVERTER to data link connector when measuring dark current. CONSULT-II power should be supplied using AC adapter or internal battery.

1. Attach current measurement probe for CONSULT-II to battery ground cable. Refer to SC-22, "OPERATION PROCEDURE OF CURRENT MEASUREMENT PROBE FOR CONSULT-II" .
2. Check that all electrical equipment is turned OFF.
3. Remove key. Close and lock doors. Check that room lamp turns off.
4. Measure dark current. Is it 50mA or less? Refer to SC-22, "OPERATION PROCEDURE OF CURRENT MEASUREMENT PROBE FOR CONSULT-II" .

   NOTE:
   Dark current stable time is different due to equipment and use of the vehicle. If it is not 50mA or less after leaving for 1 minute, measure dark current again after leaving for 30 minutes or more.
   If YES, GO TO 7. If NO, GO TO 5.
5. Remove and install fuses one by one. Search for the fuse that greatly changes dark current.

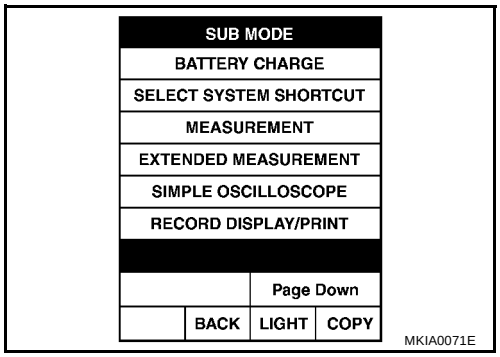
   NOTE:
   If dark current is greatly reduced when removing the fuse, and even if dark current is not greatly increased when installing it again, the fuse circuit may be the cause.
6. Check that dark current changes when moving the suspect circuit harness. If dark current changes, check harness for short. If dark current does not change, electronic unit in the circuit may not be entering the energy-saving mode when it turns OFF. If it does not enter the energy-saving mode, replace electronic unit.
7. No malfunction for alternator and electrical equipment. Electric load may be larger than alternator generating ability. Check the customer's usage.



OPERATION PROCEDURE OF CURRENT MEASUREMENT PROBE FOR CONSULT-II

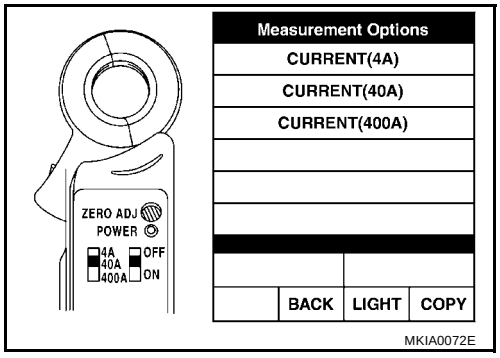
For details, refer to the supplied “CONSULT-II Current Probe Operation Manual”.

1. Turn current probe power supply OFF and connect to CONSULT-II. (Red: CH1, Black: Ground)
2. Touch “SUB MODE”.
3. Touch “Extending Measurement Mode” on “SUB MODE” screen.
4. CAUTION is displayed, touch “OK”.



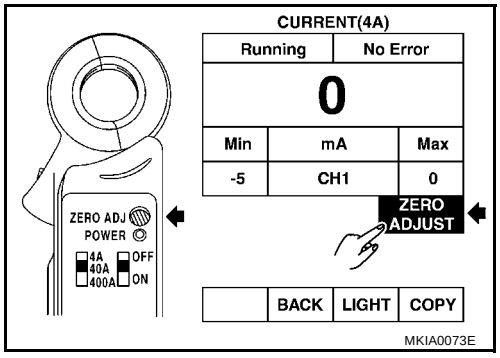
5. Set current probe range switch at the range to measure, turn current probe power supply ON. When measuring dark current, set 4A range. (Check that POWER indicator turns on. Refer to CONSULT-II Current Probe Operation Manual.)
6. Touch the same measuring range at CONSULT-II.

   NOTE:
   If current probe measuring range is different from CONSULT-II measuring range, incorrect value is displayed.



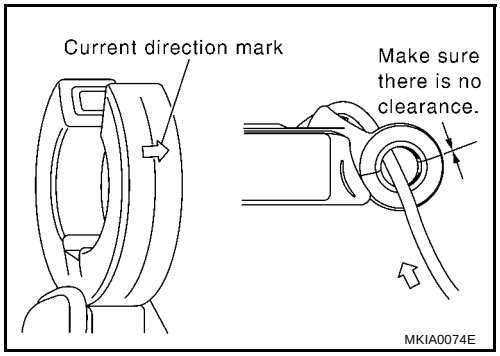
7. Adjust 0 point of current probe or CONSULT-II. (Do not clamp anything to probe.)

   NOTE:
   If 0 point is dislocated greatly, adjust at current probe side generally.



8. Align current direction mark, clamp harness, and measure current. If current direction is incorrect, it is displayed negative value.

   NOTE:
   - When current is measured, close probe joint securely.
   - If multiple harnesses are clamped, measurement cannot be performed. Always clamp only one.

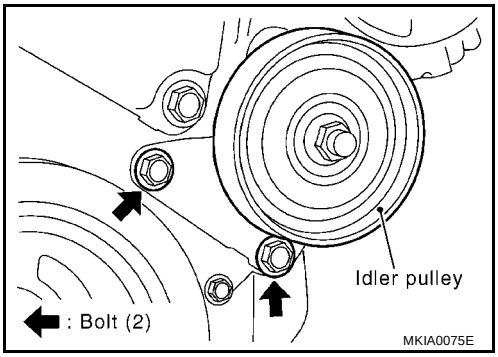


Removal and Installation

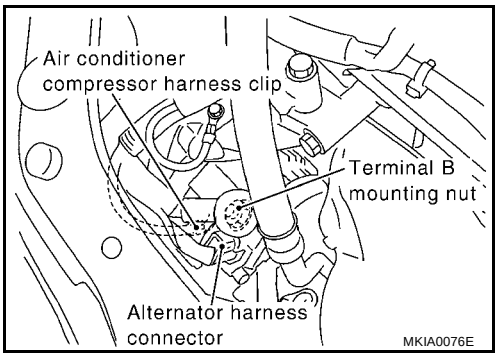
EKS007ZH

REMOVAL

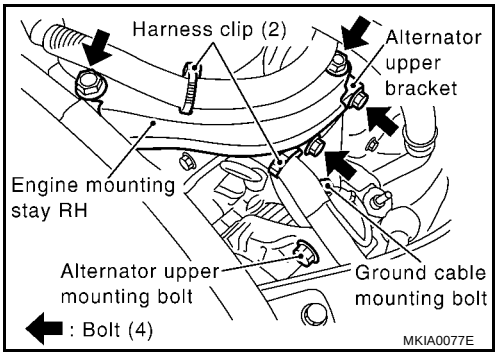
1. Disconnect battery ground cable.
2. Remove fender protector from RH side.
3. Remove alternator drive belt. Refer to EM-12, "Removal and Installation" .
4. Remove idler pulley bracket mounting bolt, and remove idler pulley assembly.



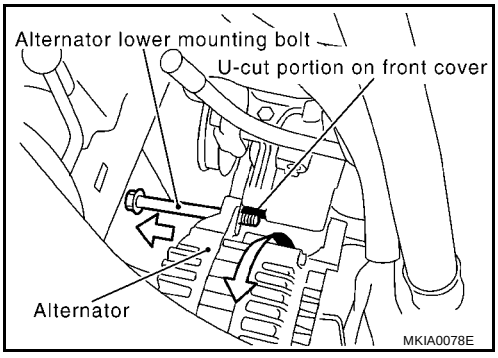
5. Disconnect alternator harness connector.
   B terminal mounting nut, ground wire mounting nut, and remove harness clips.



6. Remove engine mounting stay from RH side.
7. Remove alternator upper bracket mounting bolt, and alternator mounting bolt from upper side.



8. Loosen lower side alternator mounting bolt, and pull out from U-cut portion on front cover.
9. Remove alternator assembly from engine.



INSTALLATION

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

- Install alternator, and check tension of belt. Refer to EM-10, "Tension Adjustment" in “ENGINE MECHANICAL (EM)” section.

CAUTION:

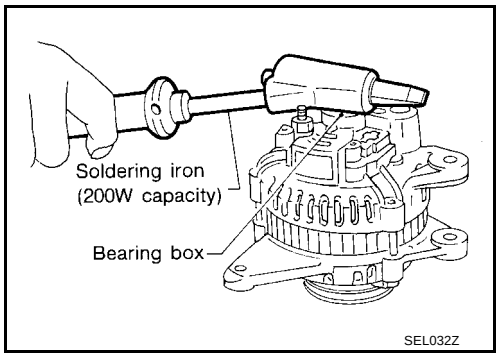
Be sure to tighten B terminal mounting nut carefully.

B terminal nut:	**: 9.32 - 10.8 N·m (0.95 - 1.1 kg-m, 82 - 95 in-lb)**
Ground bolt:	**: 2.94 - 4.9 N·m (0.30 - 0.49 kg-m, 26 - 43 in-lb)**
Alternator mounting bolt:	**: 33.3 - 46.1 N·m (3.4 - 4.7 kg-m, 24 - 34 ft-lb)**
Alternator upper bracket bolt:	**: 33.3 - 46.1 N·m (3.4 - 4.7 kg-m, 24 - 34 ft-lb)**
Engine mounting stay bolt:	**: 40.0 - 50.0 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)**
Idler pulley bracket bolt:	**: 16.6 - 23.5 N·m (1.7 - 2.4 kg-m, 12 - 17 ft-lb)**
Idler pulley nut:	**: 25.5 - 33.3 N·m (2.6 - 3.3 kg-m, 19 - 24 ft-lb)**

Disassembly

REAR COVER

EKS007ZJ



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

CAUTION:

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

Inspection

EKS007ZK

ROTOR CHECK

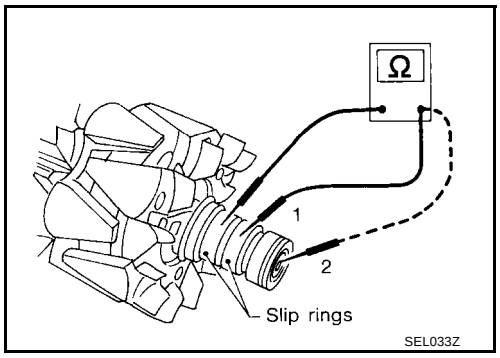
1. Resistance test

Resistance	**: Refer to SDS. SC-37, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

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

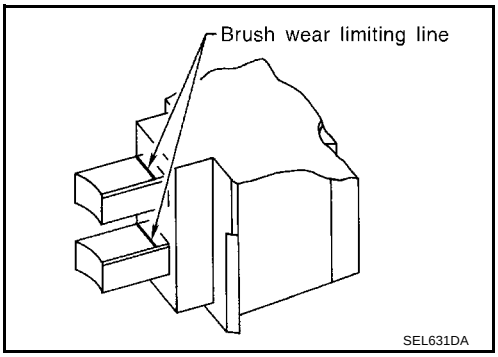
Slip ring minimum outer diameter	**: Refer to SDS. SC-37, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

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



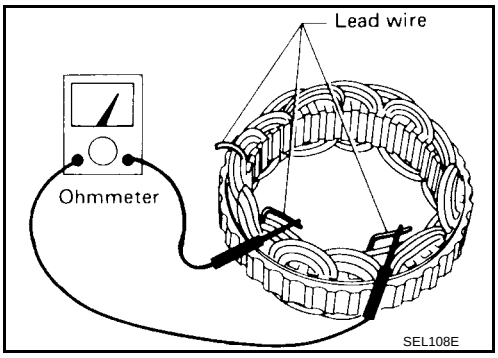
BRUSH CHECK

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.

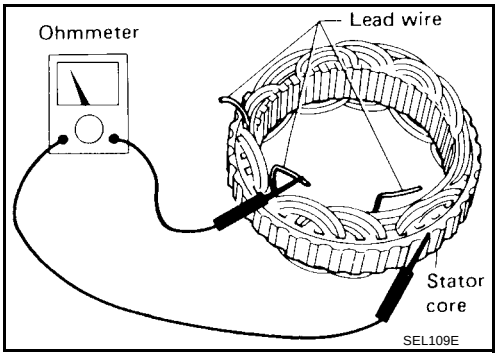


STATOR CHECK

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



2. Ground test
   - Continuity exists... Replace stator.



EKS007ZL

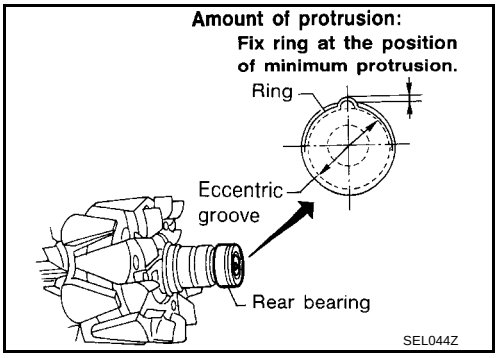
Assembly

RING FITTING IN REAR BEARING

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

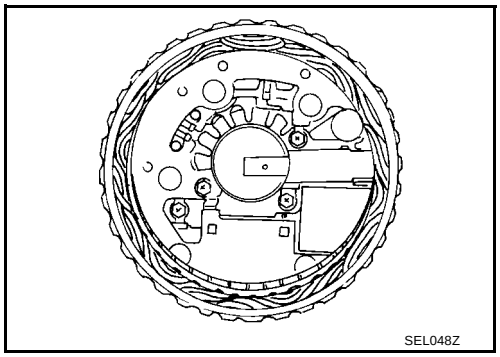
CAUTION:

Do not reuse rear bearing after removal.

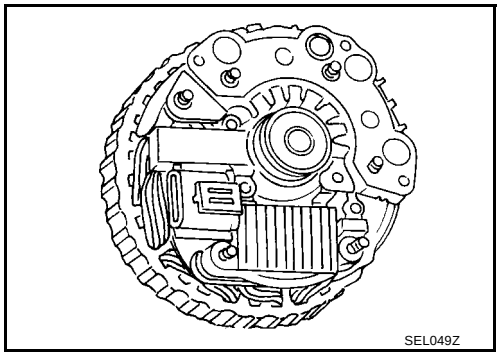


REAR COVER INSTALLATION

1. Fit brush assembly, diode assembly, regulator assembly and stator.


SEL048Z

2. Push brushes up with fingers and install them to rotor.
Take care not to damage slip ring sliding surface.


SEL049Z

STARTING SYSTEM

PFP:00011

System Description

EKS007ZM

M/T MODELS

Power is supplied at all times

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

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

- through 10A fuse [No.4 located in the intelligent power distribution module.

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

- to intelligent power distribution module terminal 36
- from ignition switch terminal 5
- to intelligent power distribution module terminal 9
- from intelligent power distribution module terminal 11
- 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

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

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

- through 10A fuse [No. 50 located in the intelligent power distribution module]

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

- to intelligent power distribution module terminal 36
- from ignition switch terminal 5
- to intelligent power distribution module terminal 9
- through the park neutral position switch terminals 1 and 2, and
- through body grounds, E26.

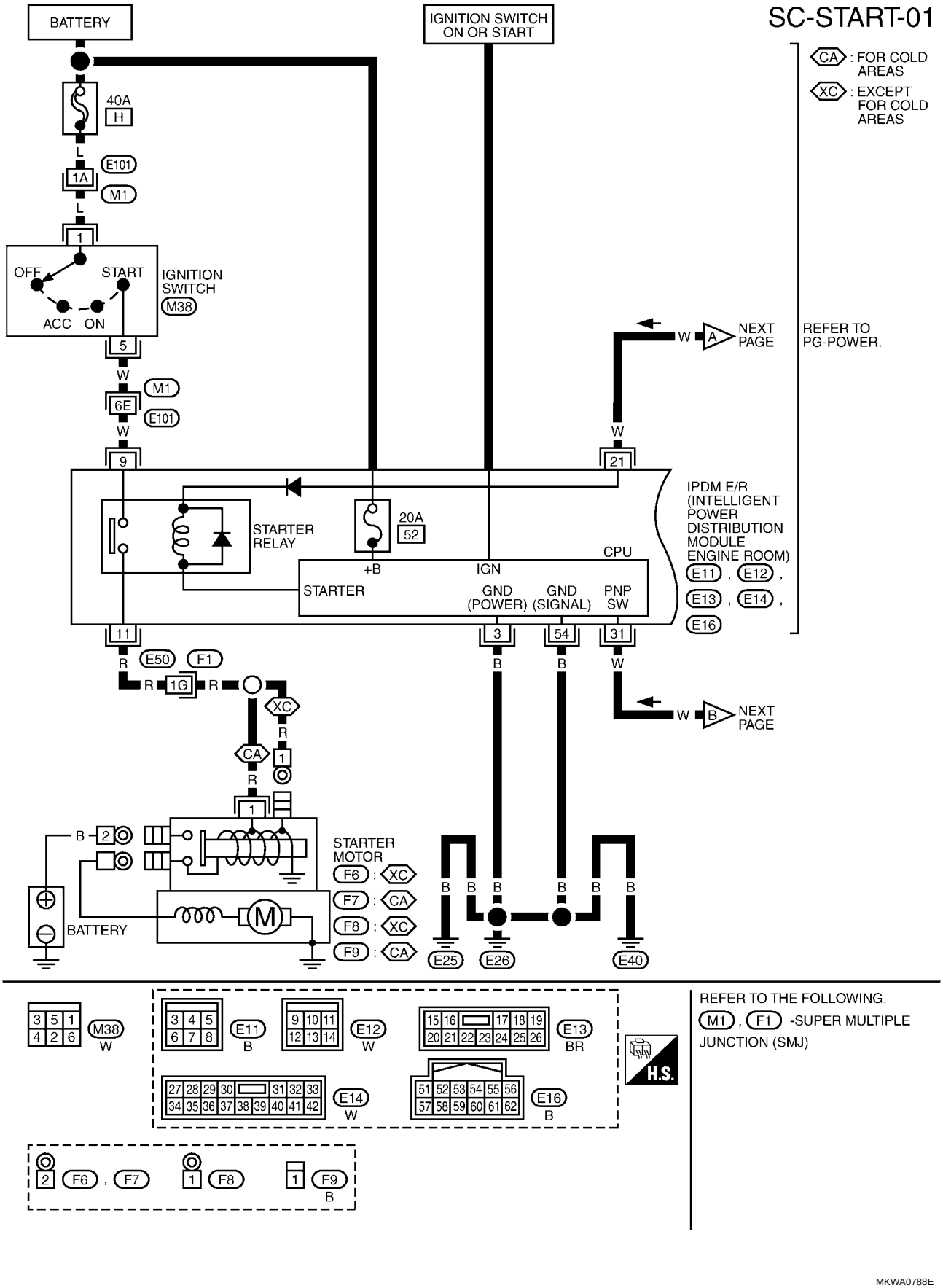
Then starter relay is energized and power is supplied

- from intelligent power distribution module terminal 11
- 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.

Wiring Diagram — START

EKS007ZN



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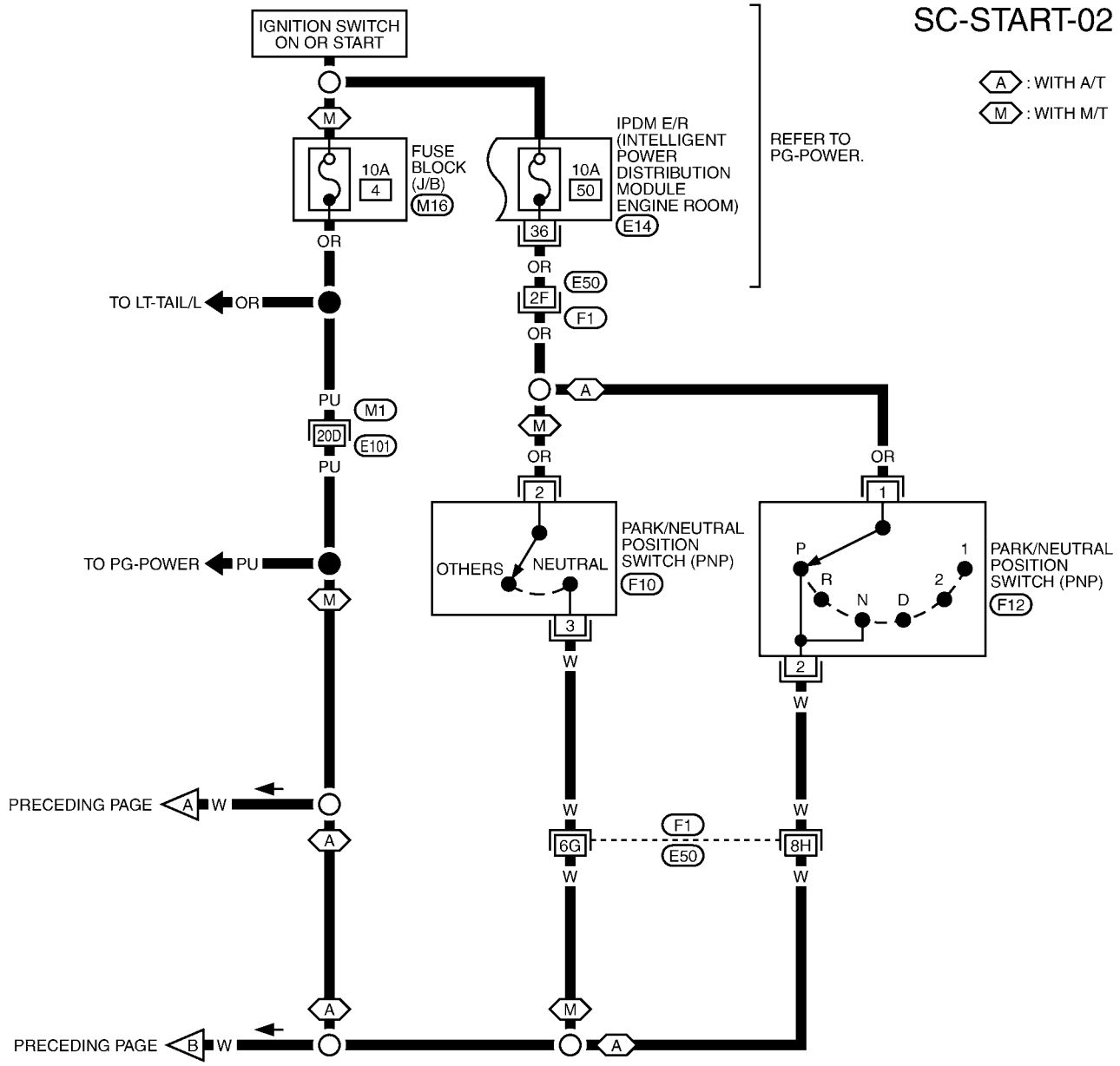
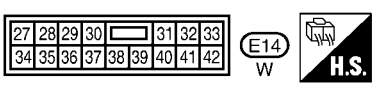
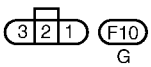
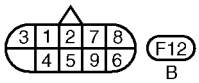








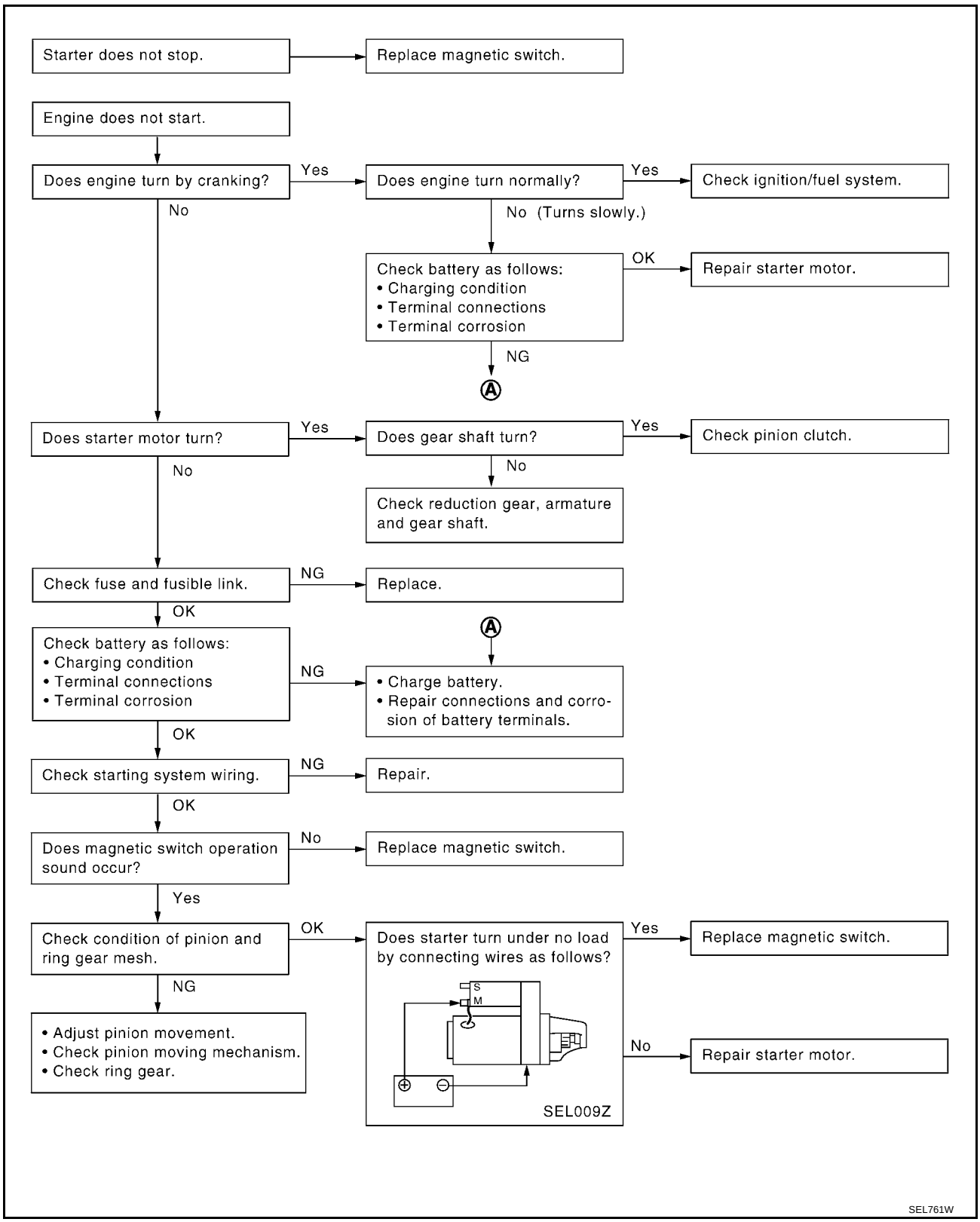
REFER TO THE FOLLOWING.
M1 , F1 -SUPER MULTIPLE JUNCTION (SMJ)
M16 -FUSE BLOCK-JUNCTION BOX (J/B)

MKWA0789E

Trouble Diagnoses

EKS007ZQ

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

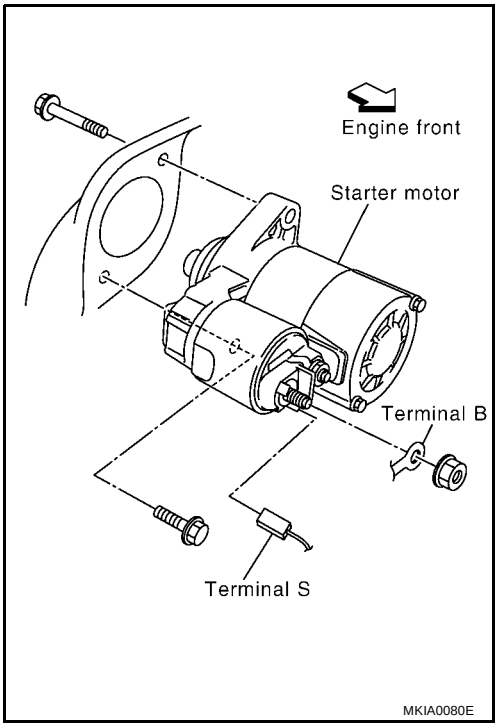


Removal and Installation

EKS007ZR

REMOVAL

1. Disconnect negative battery cable.
2. Remove starter motor mounting bolt from upper side.
3. Disconnect S terminal and B terminal from starter motor.
4. Remove starter motor mounting bolt from lower side.
5. Remove starter motor from lower side the vehicle.

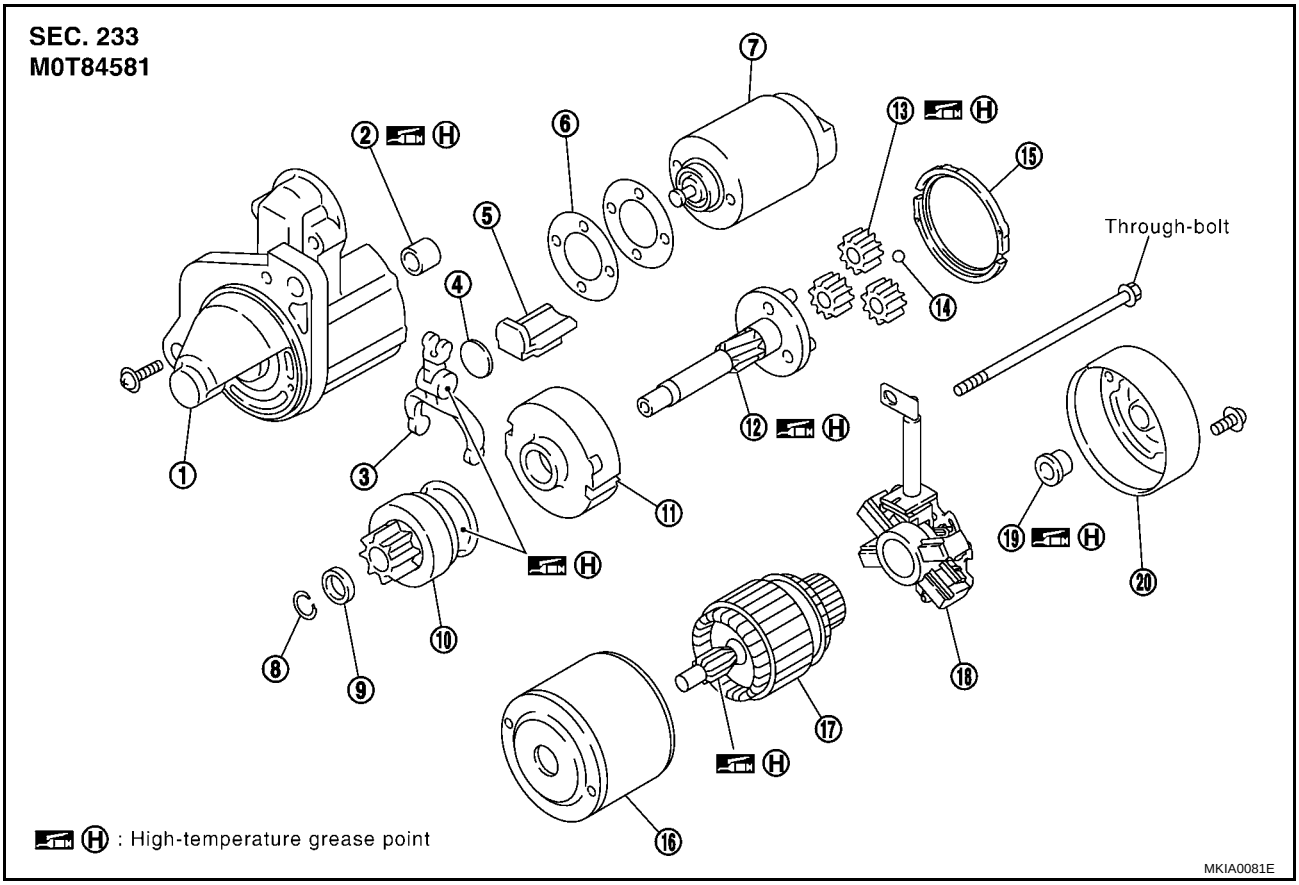


INSTALLATION

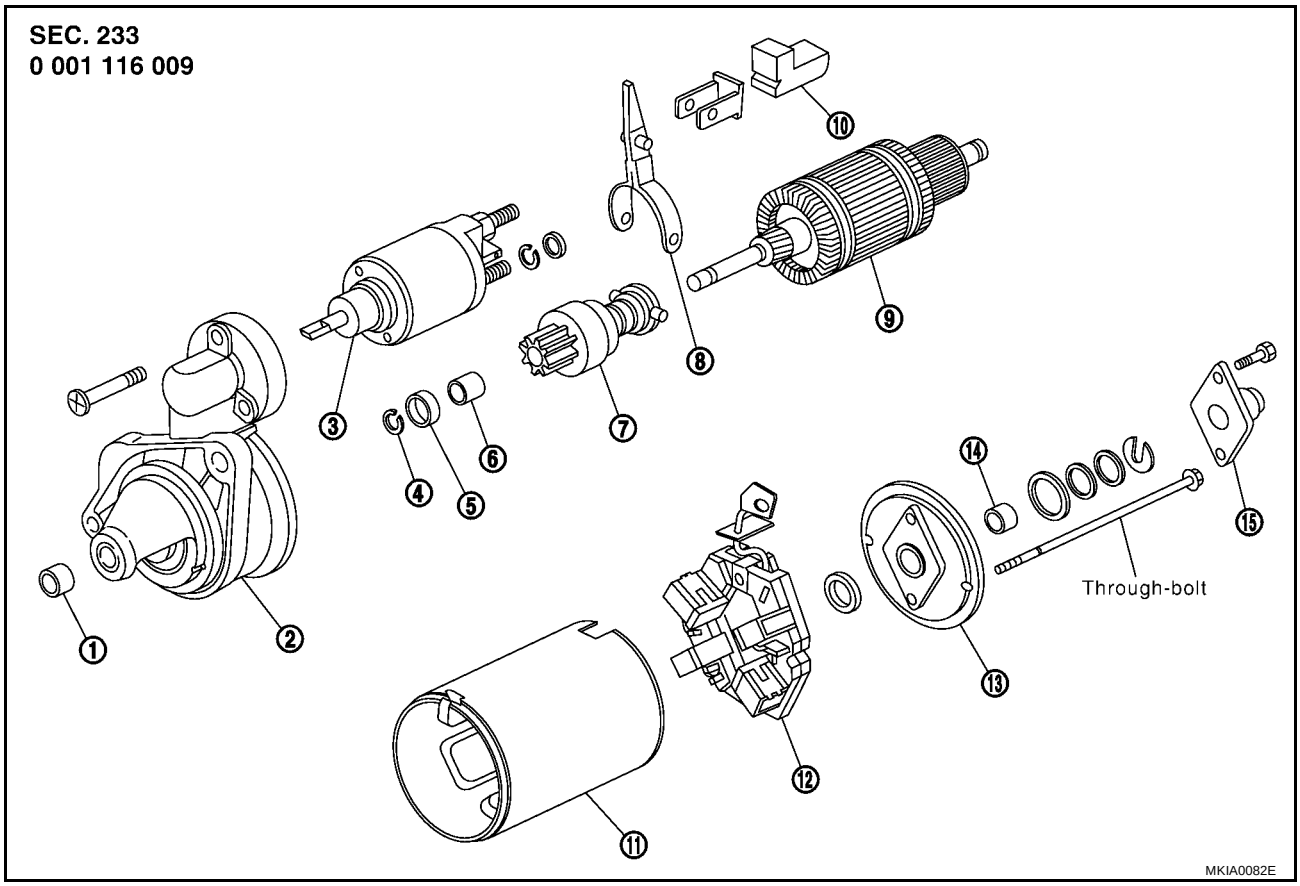
Install in the reverse order of removal.

Disassembly and Assembly

EKS007ZS



1. Gear case
2. Sleeve bearing
3. Shift lever
4. Plate
5. Packing
6. Adjusting plate
7. Magnetic switch assembly
8. Stopper clip
9. Pinion stopper
10. Pinion assembly
11. Internal gear
12. Pinion shaft
13. Planetary gear
14. Ball
15. Packing
16. Yoke
17. Armature
18. Brush holder assembly
19. Rear bearing
20. Rear cover



1. Bushing
2. Gear case
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. Rear cover
14. Bushing
15. Cap

Through-bolt:
M0T84581

: 4.1 - 7.1 N·m (0.45 - 0.72 kg-m, 39.1 - 62.5 in-lb)

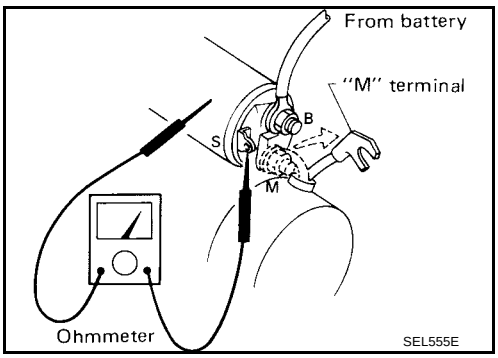
Inspection

EKS007ZT

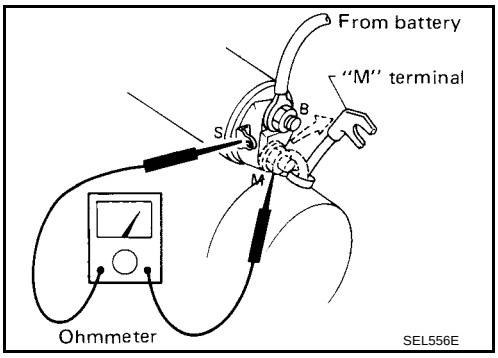
MAGNETIC SWITCH CHECK

- 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.

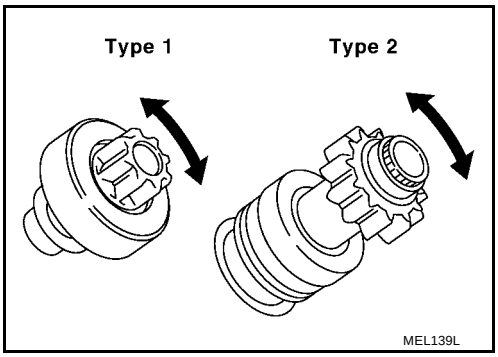


2. Continuity test (between “S” terminal and “M” terminal).
   - No continuity ... Replace.



PINION/CLUTCH CHECK

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.



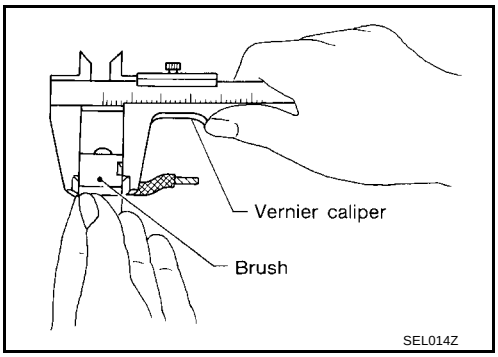
BRUSH CHECK

Brush

Check wear of brush.

Wear limit length **: Refer to SDS.** **SC-37, "SERVICE DATA AND SPECIFICATIONS (SDS)"** **.**

- Excessive wear ... Replace.

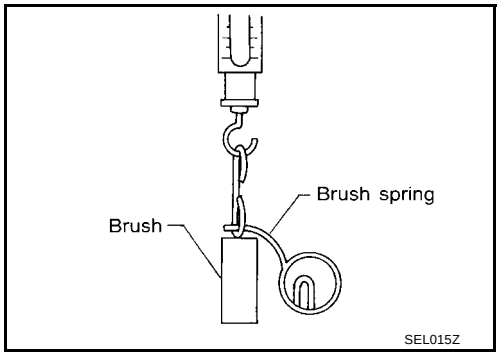


Brush Spring Check

Check brush spring pressure with brush spring detached from brush.

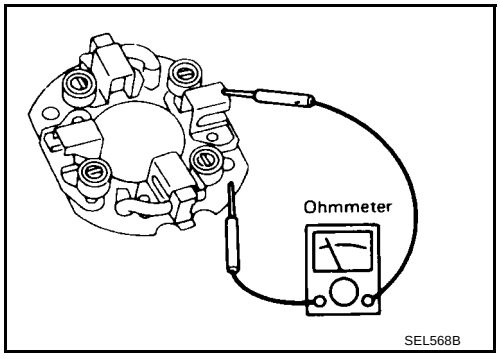
Spring pressure (with new brush) : **Refer to SDS.** **SC-37, "SERVICE DATA AND SPECIFICATIONS (SDS)"** **.**

- 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.

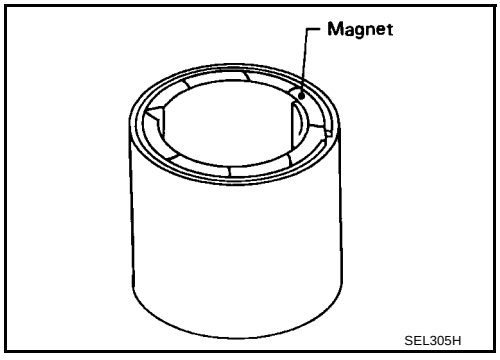


YOKE CHECK

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.

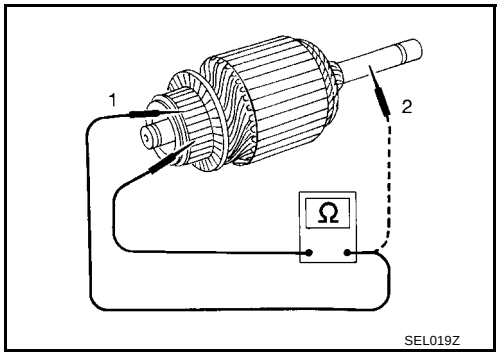
CAUTION:

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

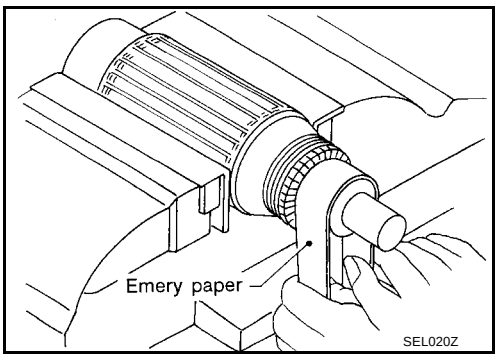


ARMATURE CHECK

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.

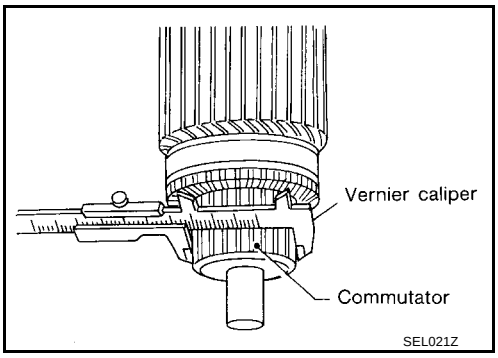


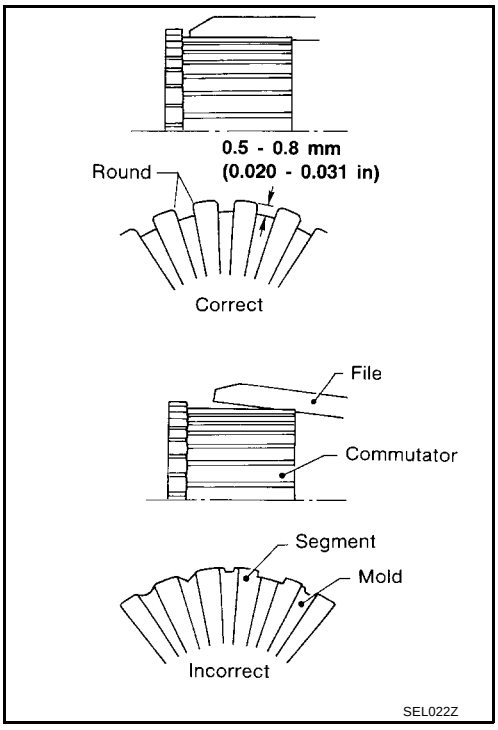
4. Check diameter of commutator.

   Commutator minimum diameter : **Refer to SDS.** **SC-37, "SERVICE DATA AND SPECIFICATIONS (SDS)"** .

   - Less than specified value ... Replace.

5. Check depth of insulating mold from commutator surface.





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

Assembly

EKS007ZU

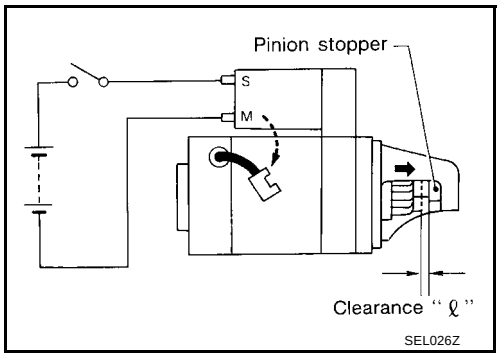
Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter.
Carefully observe the following instructions.

PINION PROTRUSION LENGTH ADJUSTMENT

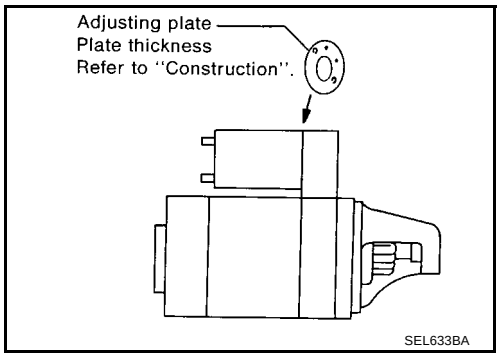
Clearance

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-37, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**



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



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Battery

EKS007ZV

Applied model	CR10, CR12, CR14		
Type	FULMEN type code		
	LB1 (FCM 047 620)	LB2 (FCM 055 622)	LB2 (FCM 050 622)
Capacity V-AH	12-47	12-55	12-50

Starter

EKS007ZW

Type		M0T84581	0 001 116 009
		MITSUBISHI make Reduction gear type	BOSCH make Non reduction
Applied model		CR12, CR14	CR10, CR12, CR14
System voltage V		12	
No-load	Terminal voltage V	11.0	11.5
	Current A	Less than 90	Less than 48
	Revolution rpm	More than 2,800	More than 5,800
Minimum diameter of commutator mm (in)			33.5 (1.319)
Minimum length of brush mm (in)			3.5 (0.138)
Brush spring tension N (kg, lb)			
Clearance between bearing metal and armature shaft mm (in)		Less than 0.2 (0.008)	—
Clearance "ℓ" between pinion front edge and pinion stopper mm (in)		0.3 - 2.5 (0.012 - 0.098)	0.0 - 3.9 (0 - 0.154)

Alternator

EKS007ZX

Type	252694
	VALEO Make
Applied model	CR10, CR12, CR14
Nominal rating V-A	12-77
Ground polarity	Negative
Minimum revolutions under no-load (When 13.5V is applied) rpm	
Hot output current (When 13.5V is applied) A/rpm	More than 39/1,800 More than 60/2,500 More than 76/5,000 More than 77/6,000
Regulated output voltage V	14.4
Minimum length of brush mm (in)	
Brush spring pressure N (g, oz)	
Slip ring minimum diameter mm (in)	
Rotor coil resistance at 20° (68°F) Ω	