ELECTRICAL SYSTEM

SECTION EL

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**

CONTENTS

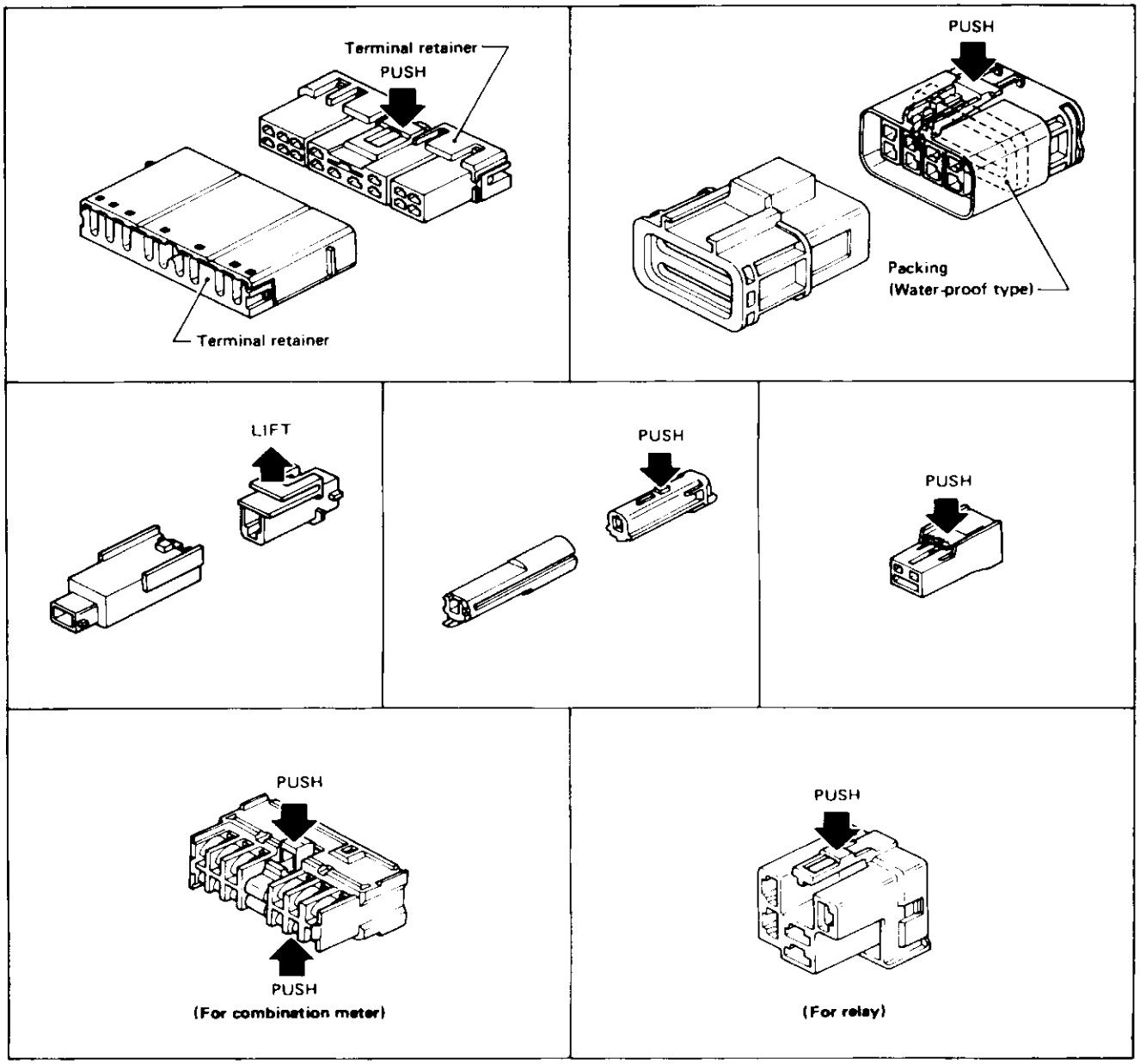
WIRING DIAGRAM REFERENCE CHART

Description

HARNESS CONNECTOR

- All harness connectors have been modified to prevent accidental looseness or disconnection.
- The connector can be disconnected by pushing or lifting the locking section.

CAUTION:
Do not pull the harness when disconnecting the connector.
[Example]

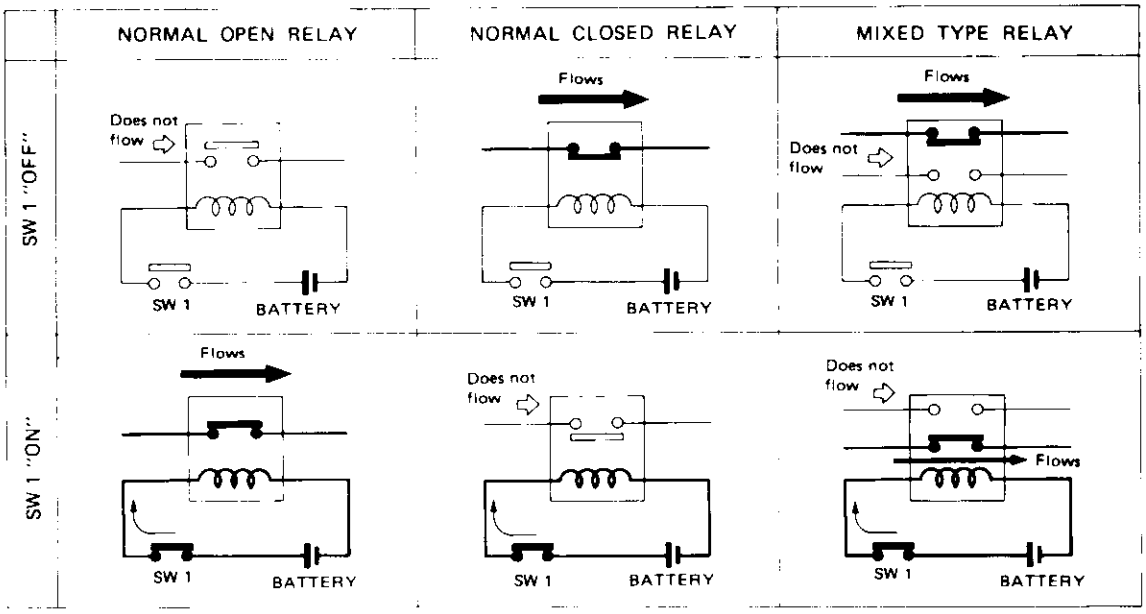


SEL769D

Description

NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

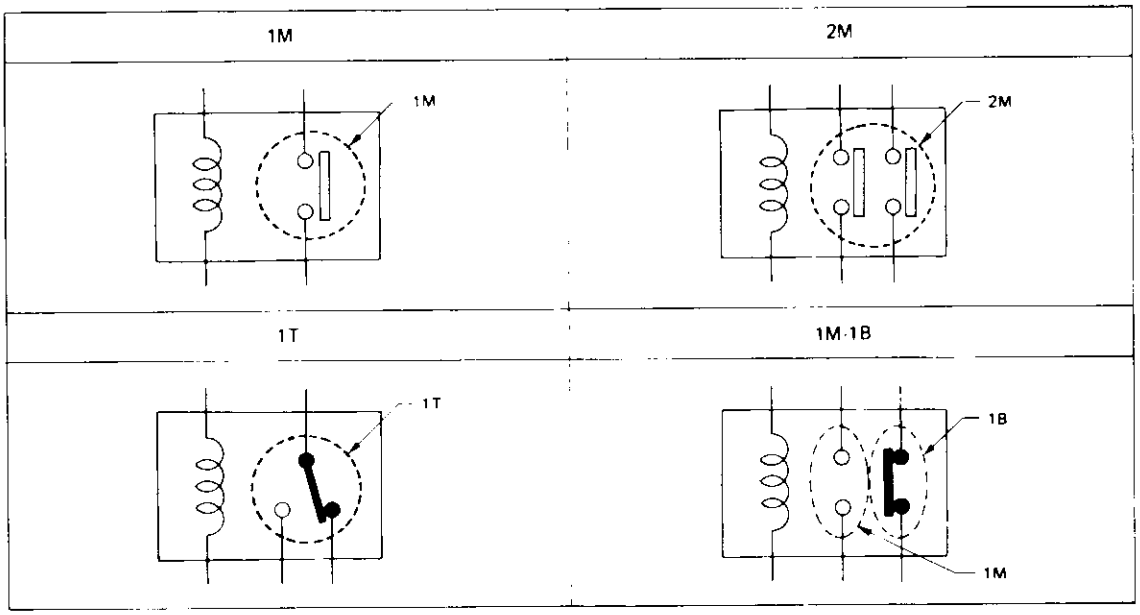
Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.



SEL881H

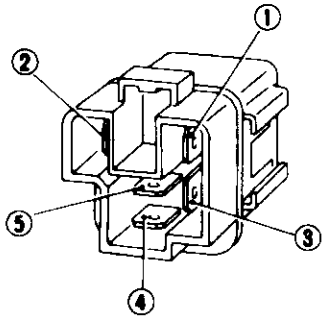
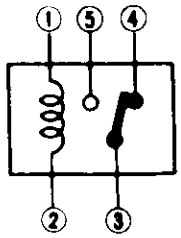
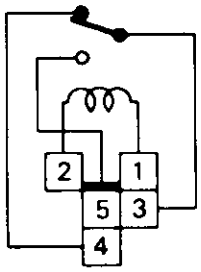
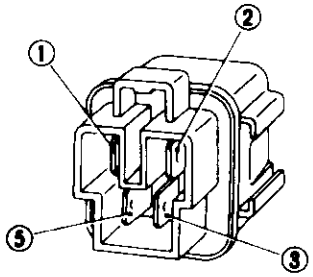
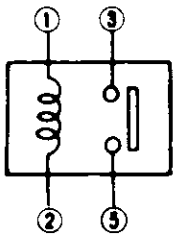
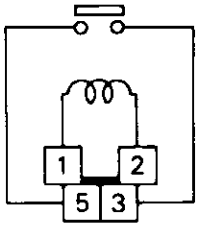
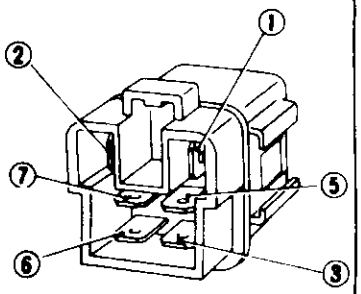
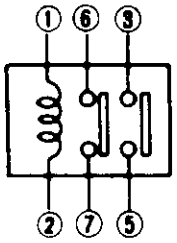
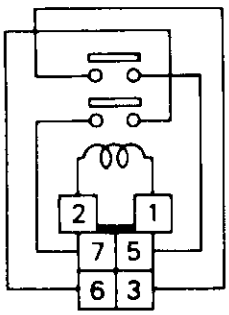
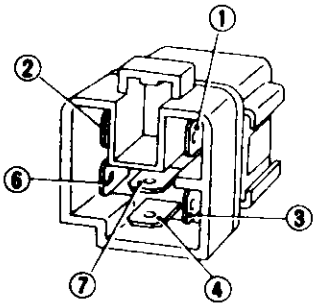
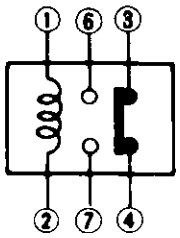
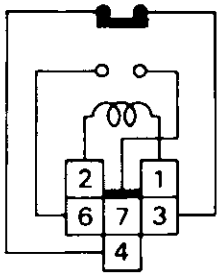
TYPE OF STANDARDIZED RELAYS

1M	..... 1 Make	2M	..... 2 Make
1T	..... 1 Transfer	1M ± 1B	..... 1 Make 1 Break



SEL882H

Description (Cont'd)

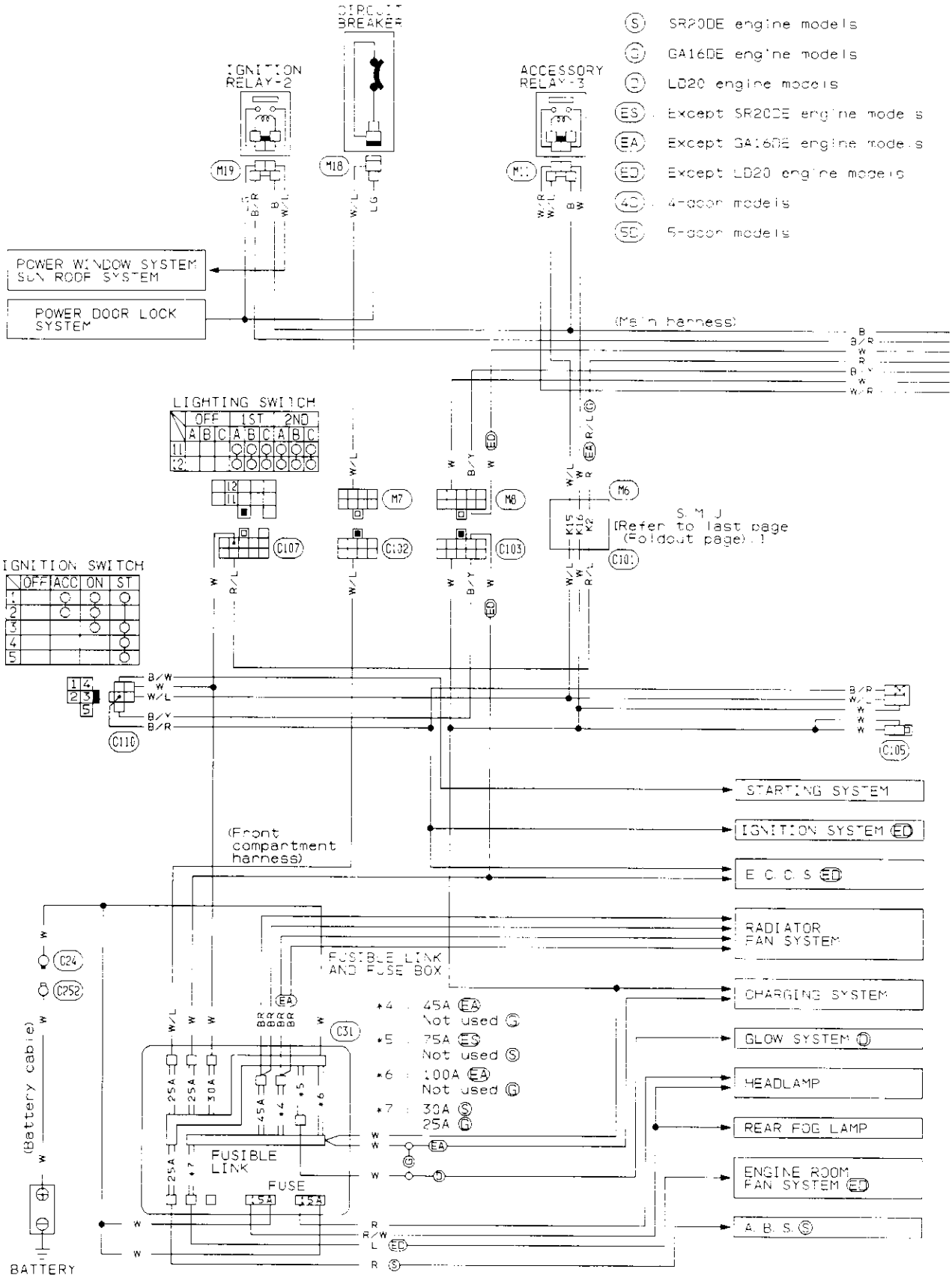
Type	Outer view	Circuit	Connector symbol and connection	Case color
1T				BLACK
1M				BLUE or GREEN
2M				BROWN
1M-1B				GRAY

SEL883H

NOTE

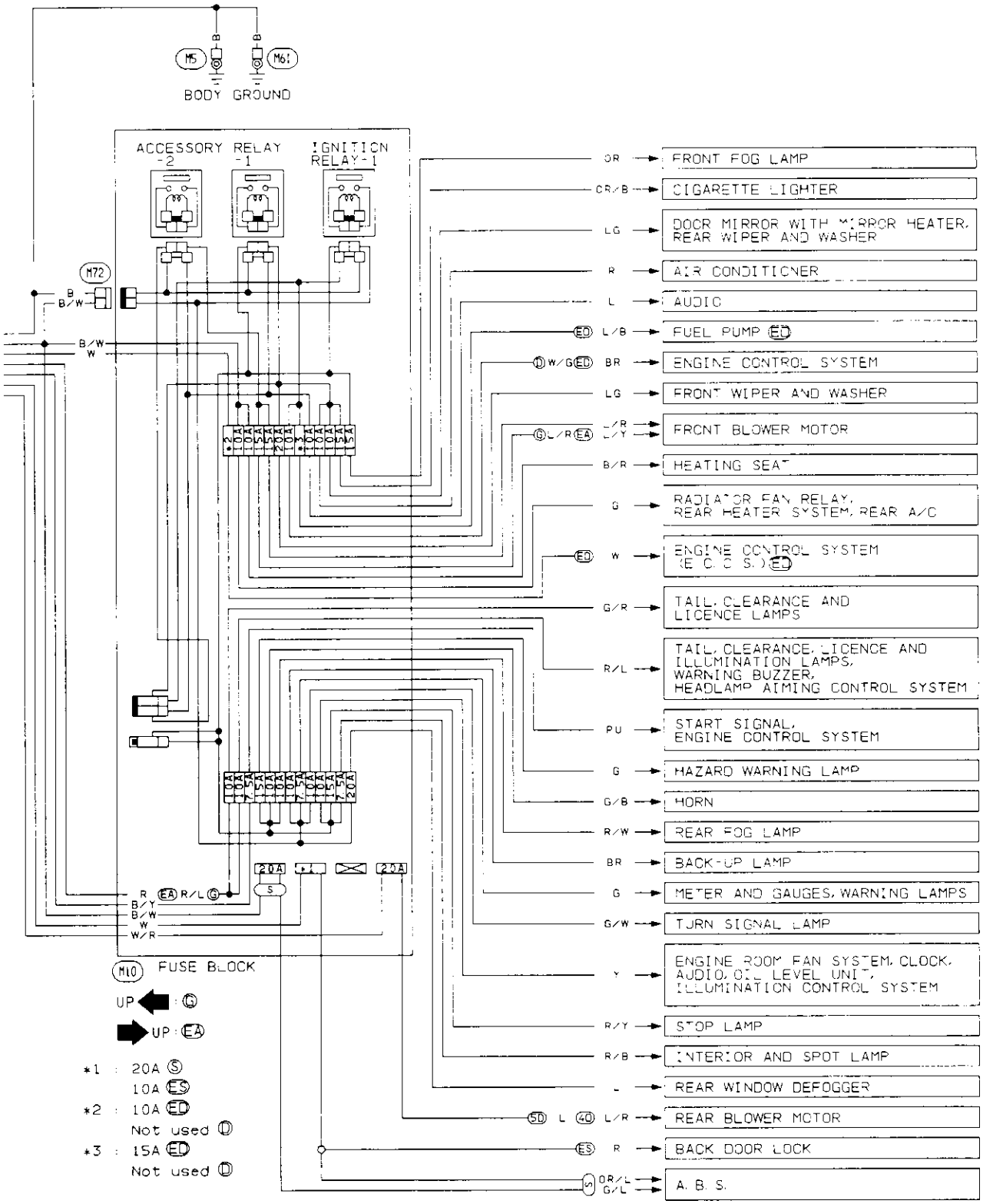
Wiring Diagram

FOR CENTRAL EUROPE



MEL708B1

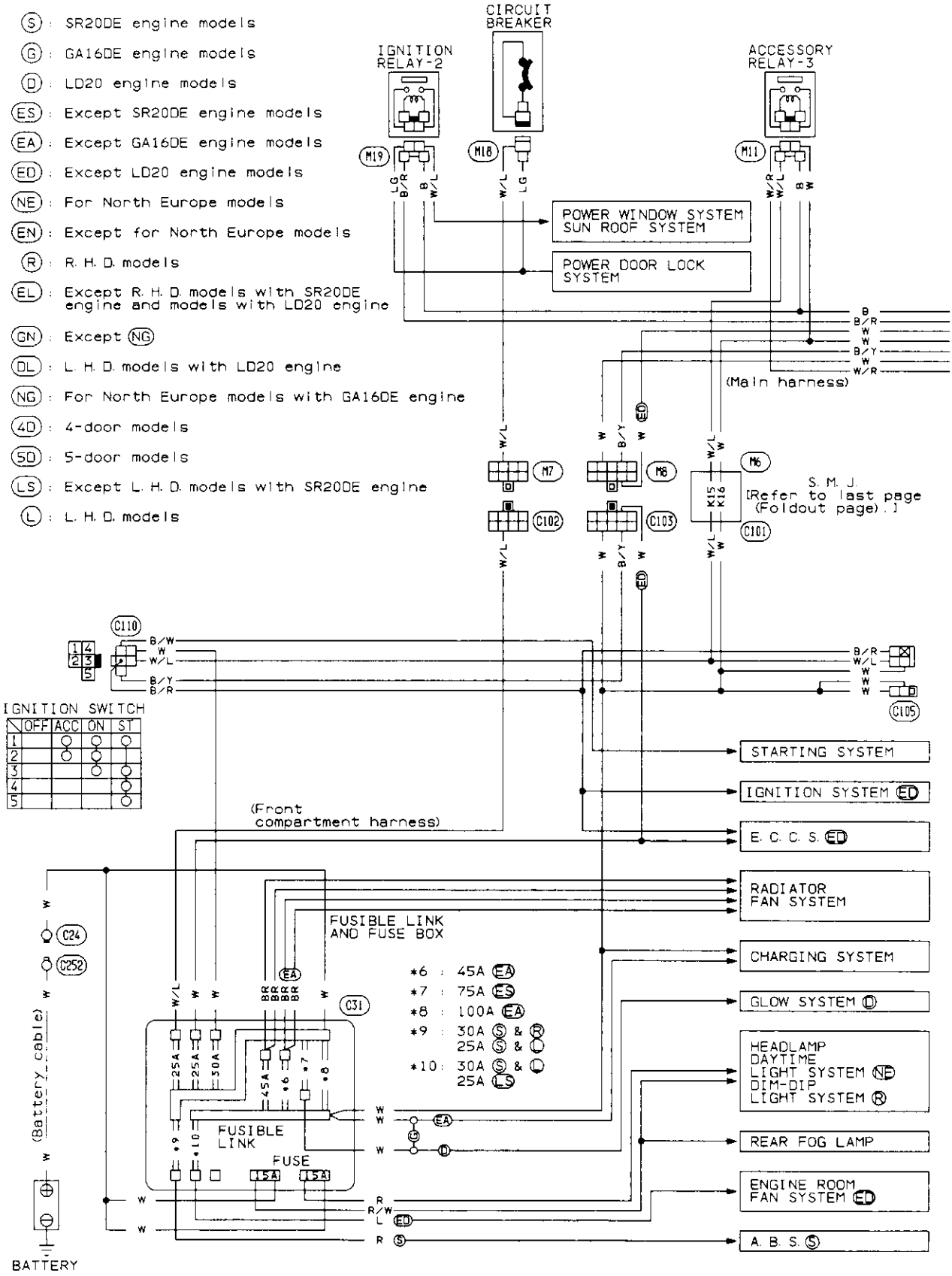
Wiring Diagram (Cont'd)



MEL708B

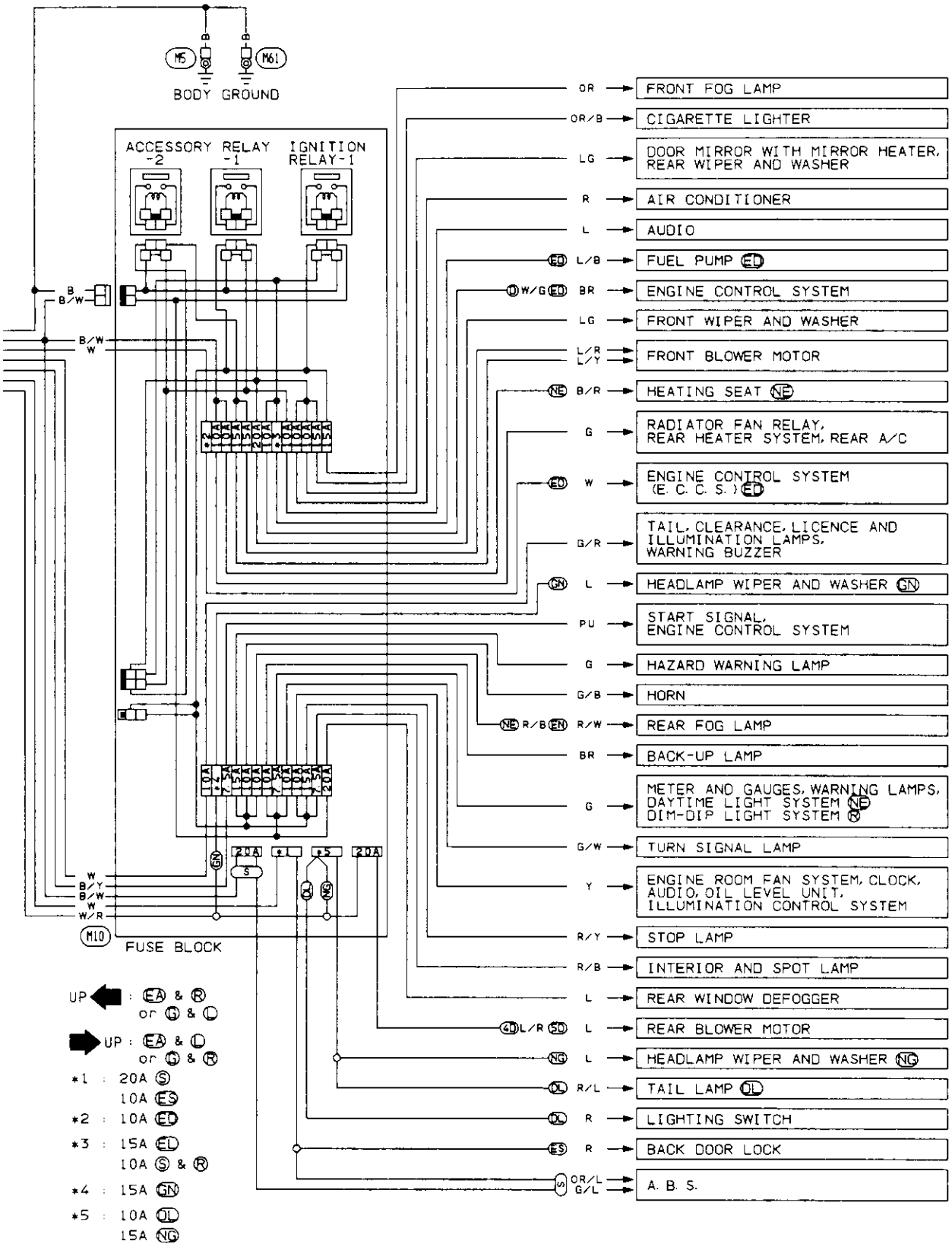
Wiring Diagram (Cont'd)

EXCEPT FOR CENTRAL EUROPE

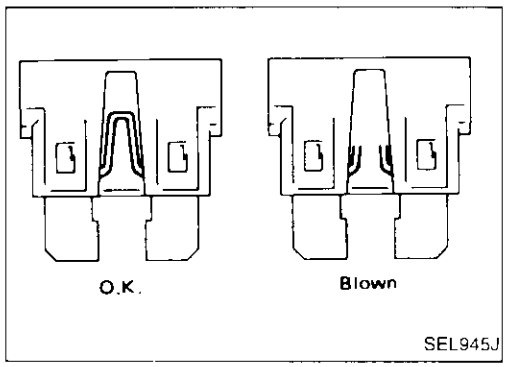


MEL709B1

Wiring Diagram (Cont'd)

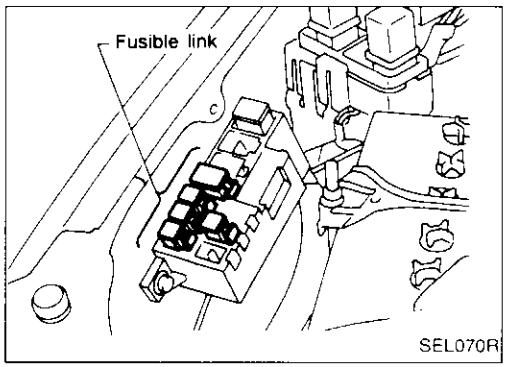


MEL709B



Fuse

a. If fuse is blown, be sure to eliminate cause of problem before installing new fuse.
b. Use fuse of specified rating. Never use fuse of more than specified rating.
c. Do not install fuse in oblique direction; always insert it into fuse holder properly.
d. Remove fuse for clock if vehicle is not used for a long period of time.



Fusible Link

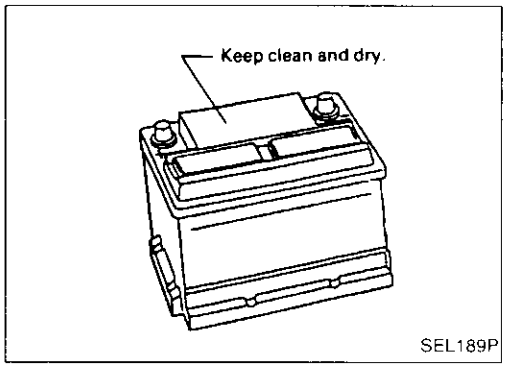
A melted fusible link can be detected by visual inspection. If its condition is questionable, use circuit tester or test lamp.

CAUTION:

a. If fusible link should melt, it is possible that critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check and eliminate cause of problem.
b. Never wrap periphery of fusible link with vinyl tape. Extreme care should be taken with this link to ensure that it does not come into contact with any other wiring harness or vinyl or rubber parts.

CAUTION:

a. **If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.**
b. **After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.**

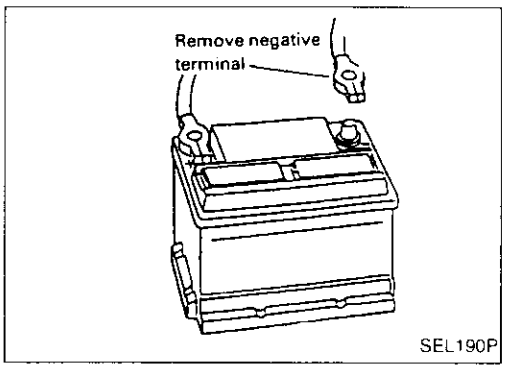


How to Handle Battery

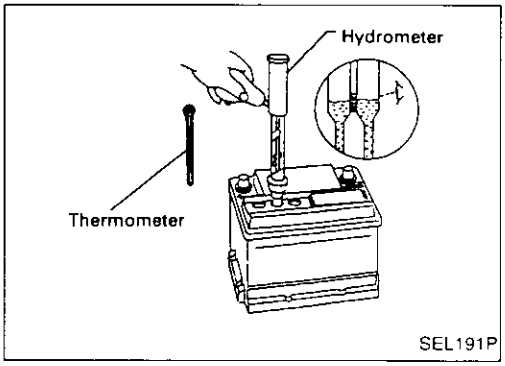
METHODS OF PREVENTING OVER-DISCHARGE

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.
  If the top surface of a battery is wet with electrolyte or water, leakage current will cause the battery to discharge. Always keep the battery clean and dry.



- 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.

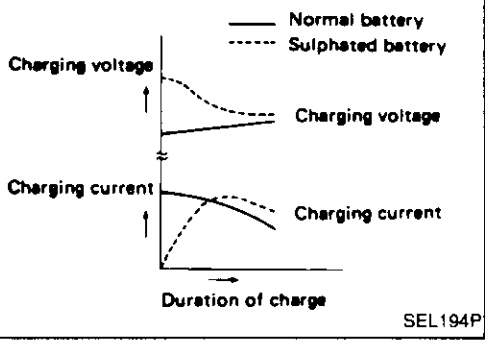
CHECKING ELECTROLYTE LEVEL

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 the acid contacts the eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

Normally the battery does not require additional water. However, when the battery is used under severe conditions, adding distilled water may be necessary during the battery life.

How to Handle Battery (Cont'd)



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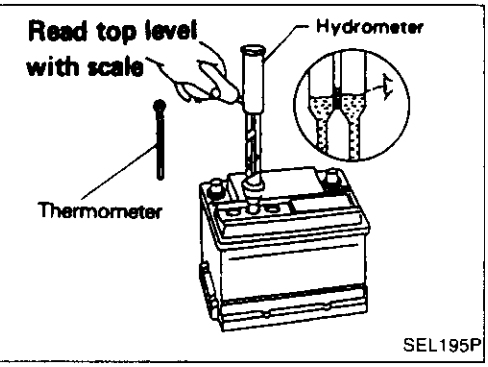
SULPHATION

When a battery has been left unattended for a long period of time and has a specific gravity of less than 1.100, it will be completely discharged, resulting in sulphation on the cell plates.

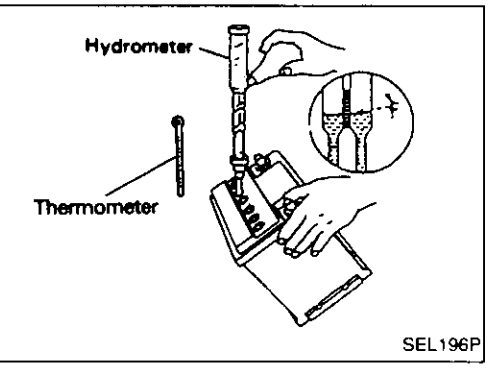
Compared with a battery discharged under normal conditions, the current flow in a "sulphated" battery is not as smooth although its voltage is high during the initial stage of charging, as shown in the figure at the left.



SEL195P

SPECIFIC GRAVITY CHECK

1. Read hydrometer and thermometer indications at eye level.
   - When electrolyte level is too low, tilt battery case to raise it for easy measurement.

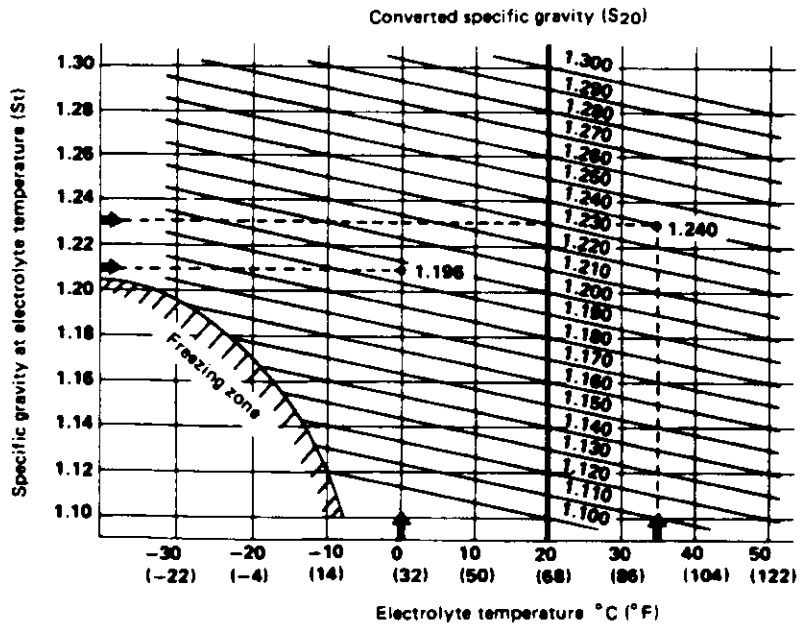


SEL196P

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

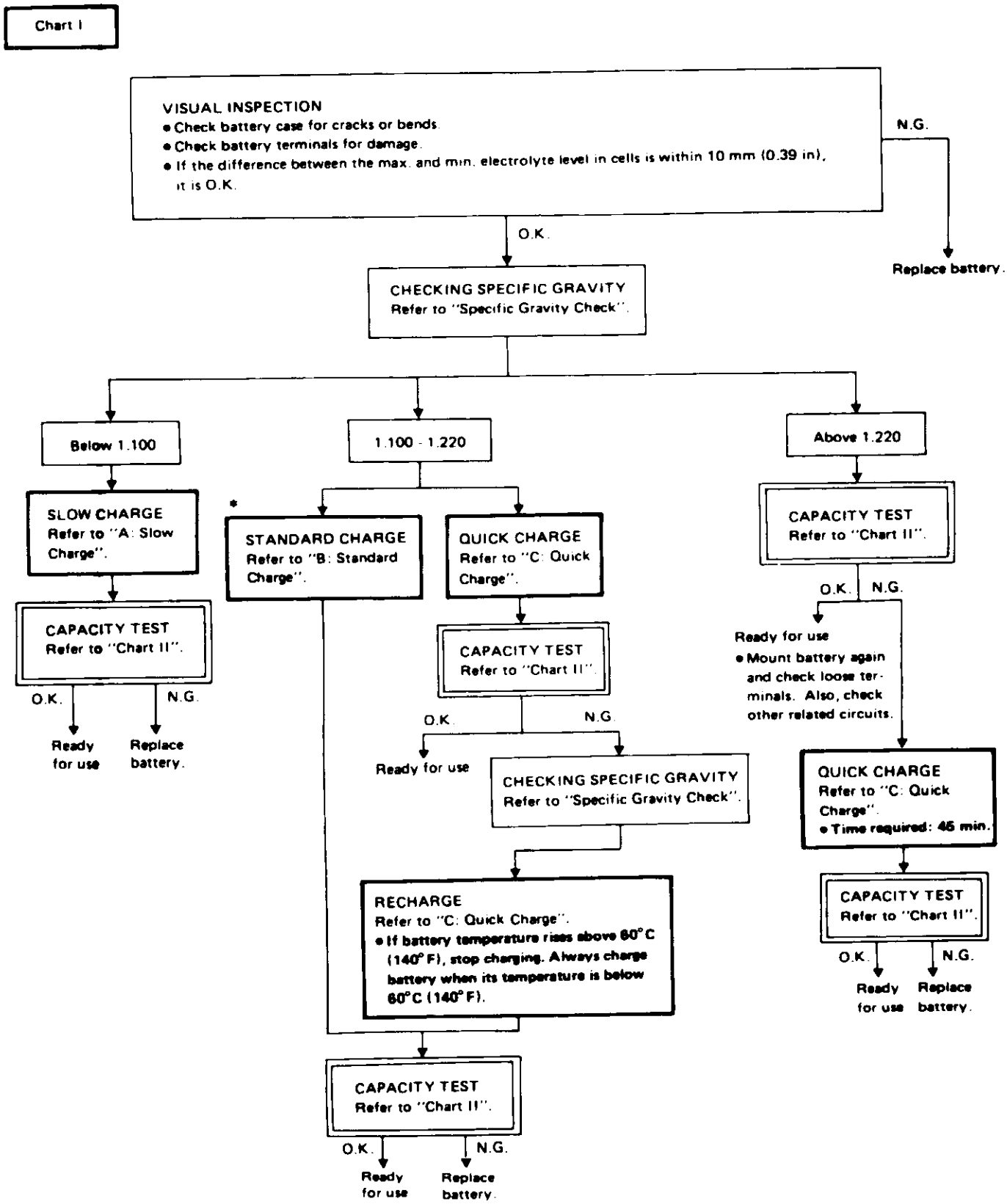
Example:

- 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.



SEL197P

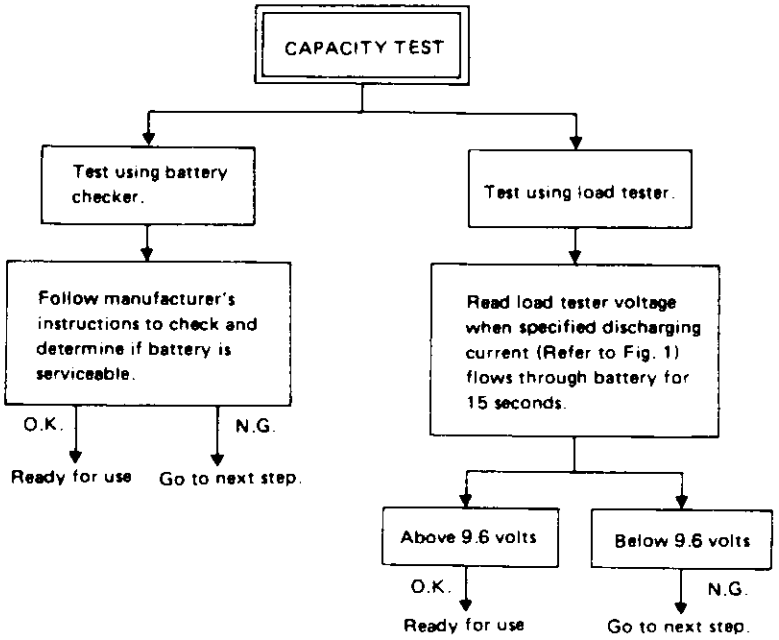
Battery Test and Charging Chart



* "STANDARD CHARGE" is recommended if the vehicle is in storage after charging.

Battery Test and Charging Chart (Cont'd)

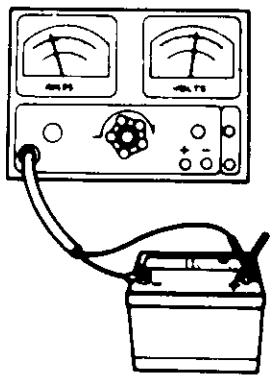
Chart II



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

Fig. 1 DISCHARGING CURRENT (Load tester)

Type	Current (A)
28B19R	90
46B24R	135
55D23R	180
80D26R	195
95D31R	240
115D31R	240



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Battery Test and Charging Chart (Cont'd)

A: SLOW CHARGE

Determine initial charging current from specific gravity referring to Fig. 2.

- Charge battery.
- Check charging voltage 30 minutes after starting the battery charge.

12 to 15 volts — O.K. → Continue to charge for 12 hours.

Below 12 volts or above 15 volts — N.G. → Replace battery.

CHECKING SPECIFIC GRAVITY
Refer to "Specific Gravity Check".

Conduct additional charge as per Fig 3, if necessary.

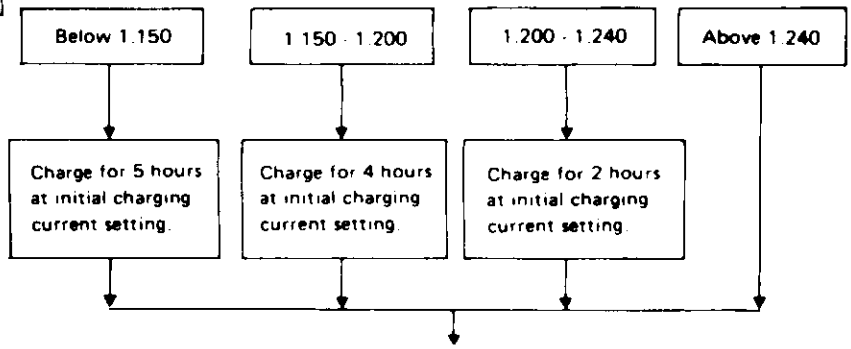
Go to "CAPACITY TEST".

Fig. 2 INITIAL CHARGING CURRENT SETTING (Slow charge)

BATTERY TYPE / CONVERTED SPECIFIC GRAVITY	28B19R	46B24R	55D23R	80D26R	95D31R	130E41R(L)
Below 1.100	4.0 (A)	5.0 (A)	7.0 (A)	8.0 (A)	10.0 (A)	14.0 (A)

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

Fig. 3 ADDITIONAL CHARGE (Slow charge)



CAUTION:

a. 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.
b. Keep battery away from open flame while it is being charged.
c. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
d. If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

Battery Test and Charging Chart (Cont'd)

B. STANDARD CHARGE

Determine initial charging current from specific gravity, referring to Fig. 4.

↓

Charge battery for 8 hours

↓

CHECKING SPECIFIC GRAVITY
Refer to "Specific Gravity Check".

↓

Conduct additional charge as per Fig. 5, if necessary.

↓

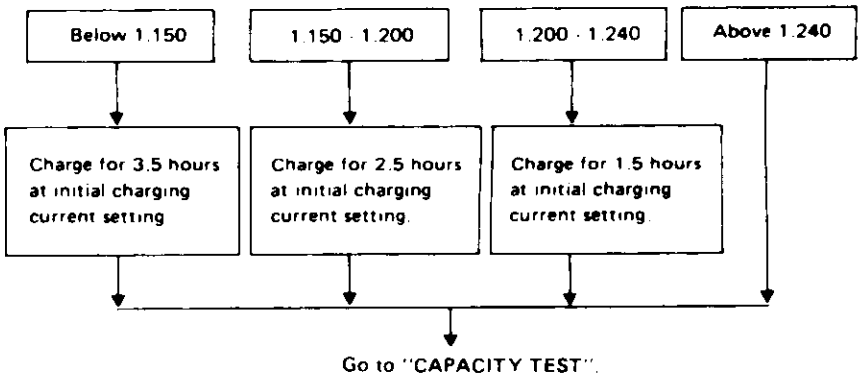
Go to "CAPACITY TEST".

Fig. 4 INITIAL CHARGING CURRENT SETTING
(Standard charge)

BATTERY TYPE / CONVERTED SPECIFIC GRAVITY	28B19R	46B24R	50D23R	80D26R	95D31R 115D31R	130E41R(L)
1.100 - 1.130	4.0 (A)	5.0 (A)	6.0 (A)	7.0 (A)	9.0 (A)	13.0 (A)
1.130 - 1.160	3.0 (A)	4.0 (A)	5.0 (A)	6.0 (A)	8.0 (A)	11.0 (A)
1.160 - 1.190	2.0 (A)	3.0 (A)	4.0 (A)	5.0 (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)	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)



CAUTION:

a. Do not use standard charge method on a battery whose specific gravity is less than 1.100.
b. 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.
c. Keep battery away from open flame while it is being charged.
d. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
e. If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

Battery Test and Charging Chart (Cont'd)

C: QUICK CHARGE

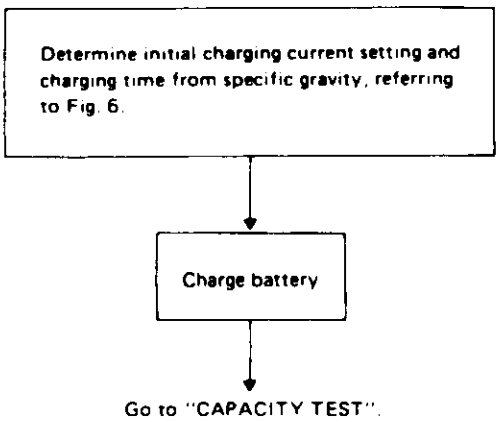


Fig. 6 INITIAL CHARGING CURRENT SETTING AND CHARGING TIME (Quick charge)

BATTERY TYPE / CURRENT (A) / CONVERTED SPECIFIC GRAVITY	28B19R	46B24R	55D23R 80D26R	95D31R 115D31R	130E41R (L)
	10 (A)	15 (A)	20 (A)	30 (A)	40 (A)
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.

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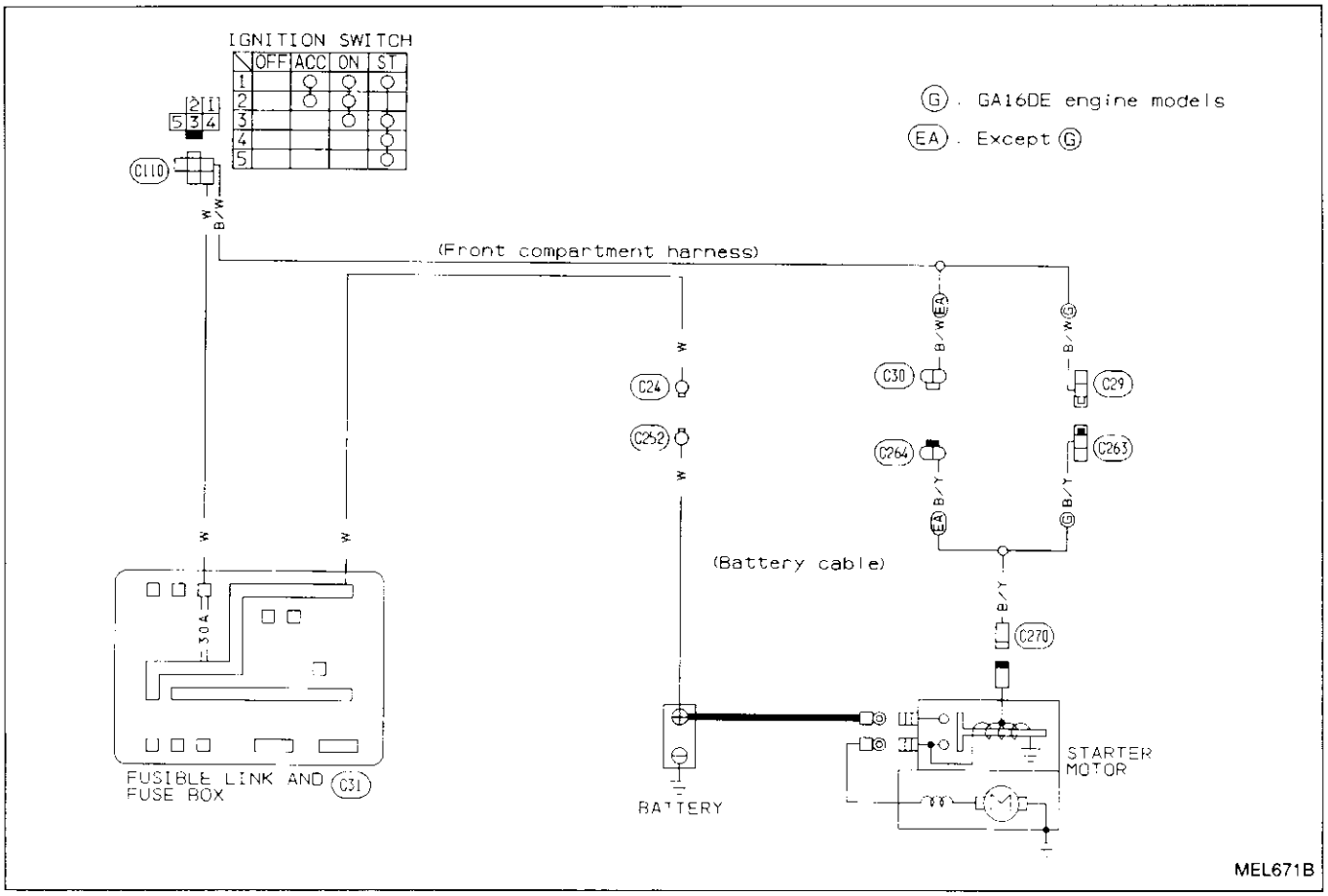
CAUTION:

a. **Do not use quick charge method on a battery whose specific gravity is less than 1.100.**
b. **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.**
c. **Keep battery away from open flame while it is being charged.**
d. **When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.**
e. **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).
f. **Do not exceed the charging time specified in Fig. 6, because charging battery over the charging time can cause deterioration of the battery.**

Service Data and Specifications (S.D.S.)

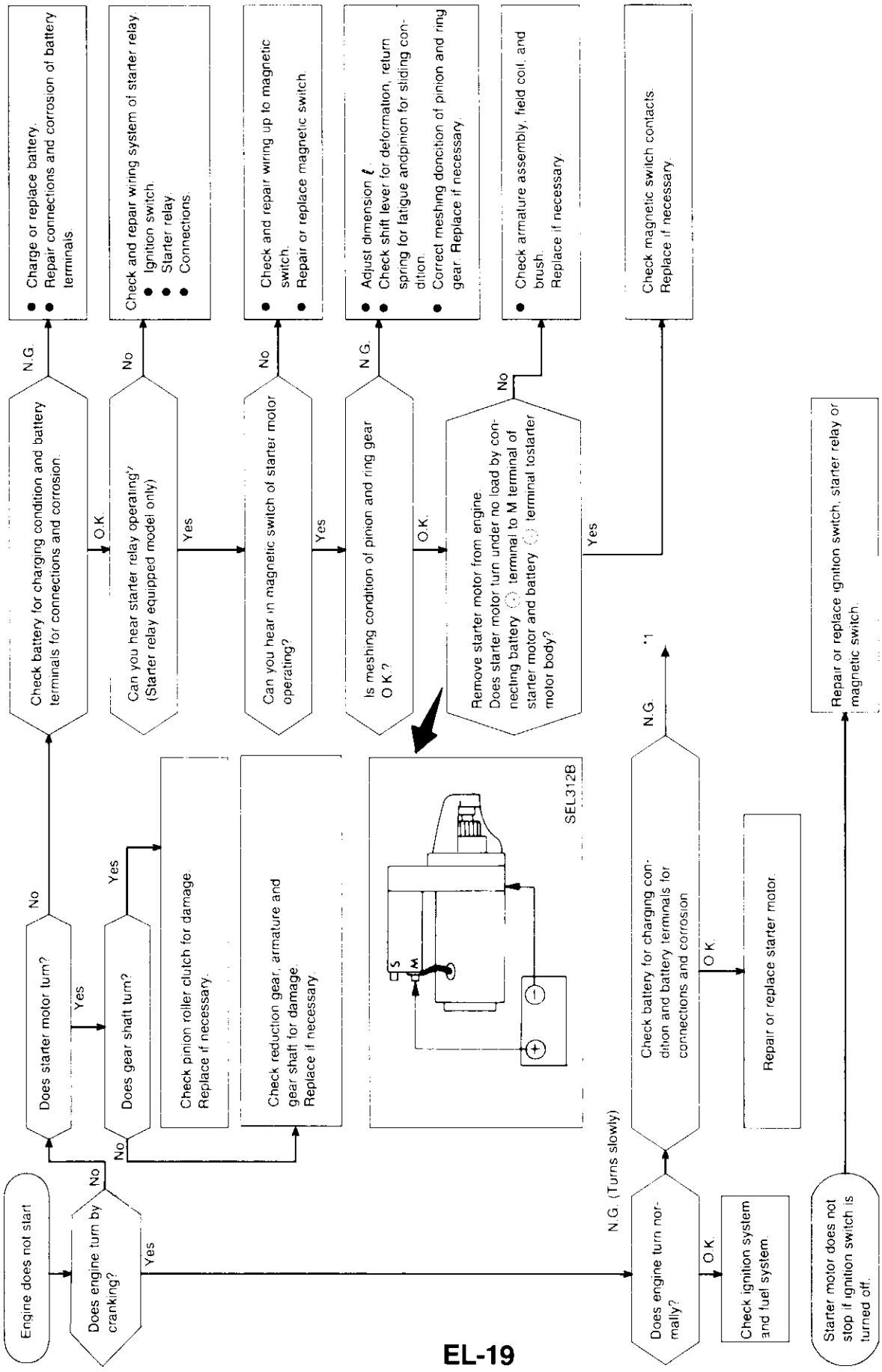
Destination	For North Europe			Except for North Europe		
Engine	SR20DE	GA16DE	LD20II	SR20DE	GA16DE	LD20II
Type	46B24R	28B19R	95D31R	80D26R	55D23R	115D31R
Capacity V-AH	12–45	12–30	12–80	12–65	12–60	12–80

Wiring Diagram



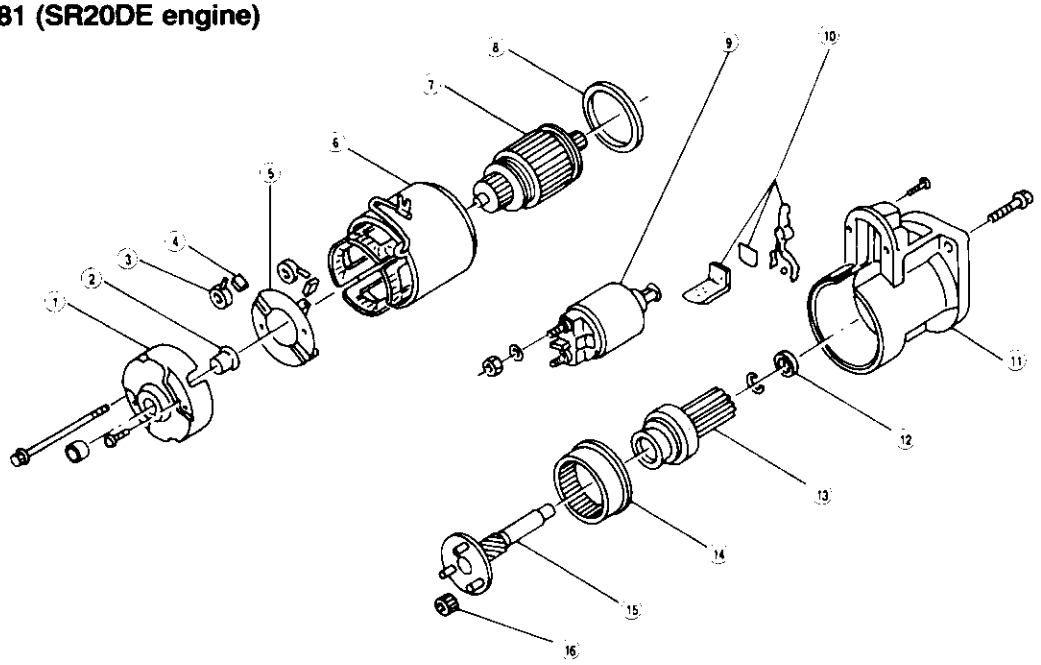
Trouble-shooting

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



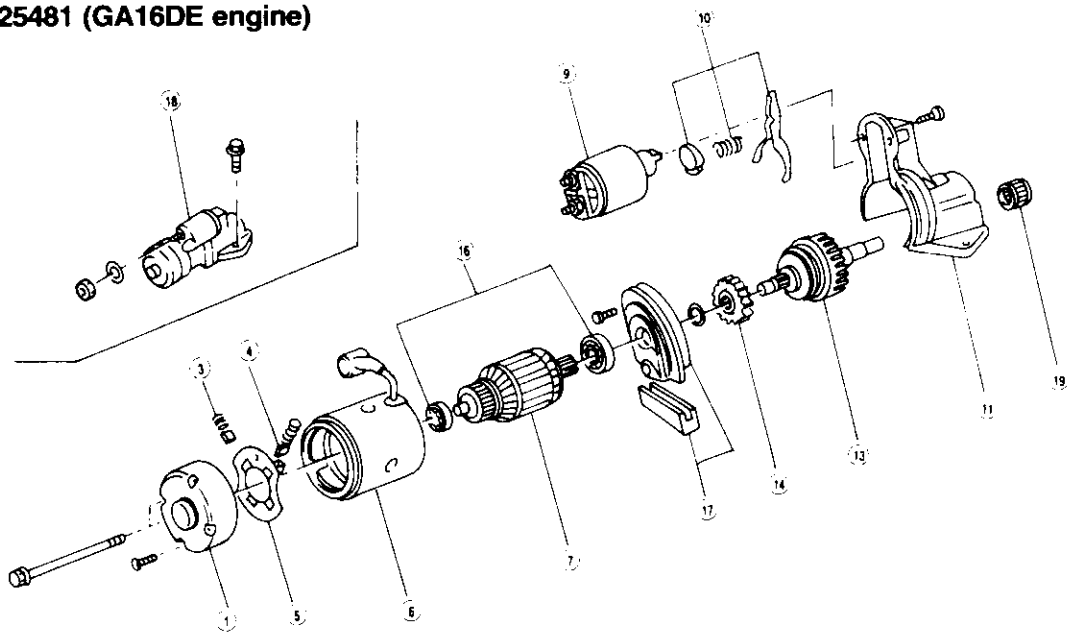
Construction (Mitsubishi make)

M1T60581 (SR20DE engine)



EEL001

M002T25481 (GA16DE engine)

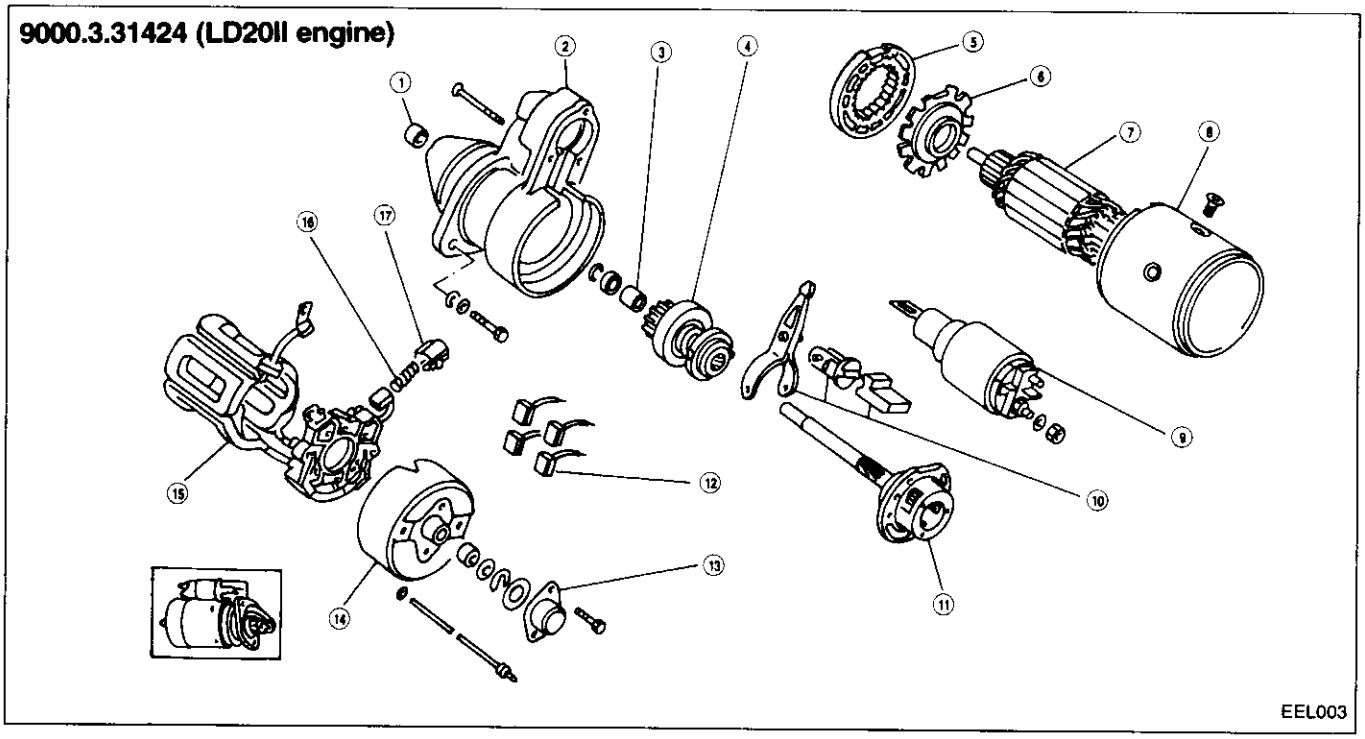


EEL002

① Rear cover
② Metal rear cover
③ Brush spring
④ Brush
⑤ Brush holder
⑥ Field coil
⑦ Armature
⑧ Pack
⑨ Magnetic switch
⑩ Shift lever
⑪ Gear case
⑫ Stopper pinion
⑬ Pinion shaft
⑭ Gear
⑮ Pinion
⑯ Bearing
⑰ Housing
⑱ Starter motor assembly
⑲ Gear case metal

Construction (Cont'd) (BOSCH make)

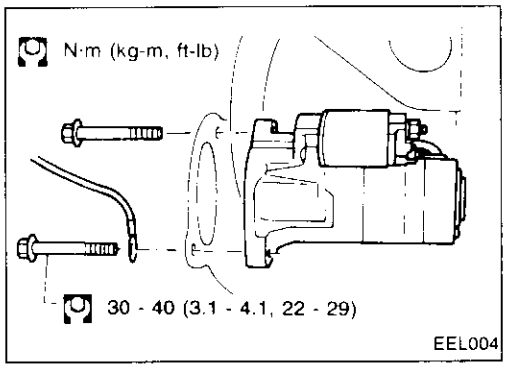
9000.3.31424 (LD20II engine)



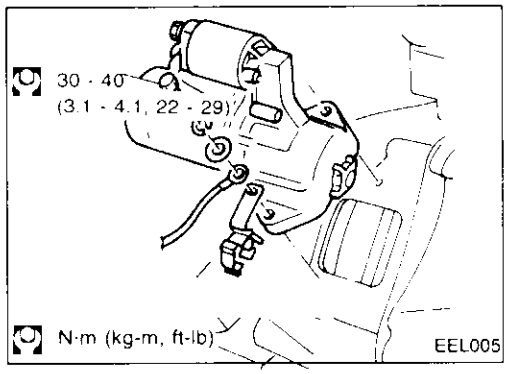
① Bearing
② Gear case
③ Bushing
④ Pinion assembly
⑤ Wheel crown
⑥ Plate
⑦ Armature assembly
⑧ Armature frame
⑨ Solenoid
⑩ Shift lever
⑪ Pinion shaft
⑫ Brush
⑬ Dust cap
⑭ Rear cover
⑮ Field coil
⑯ Brush spring
⑰ Brush spring guide

Removal and Installation

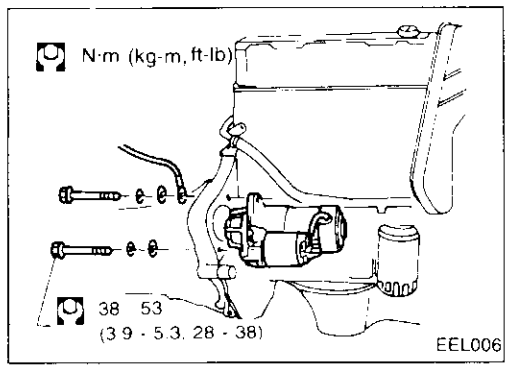
SR20DE ENGINE



GA16DE ENGINE



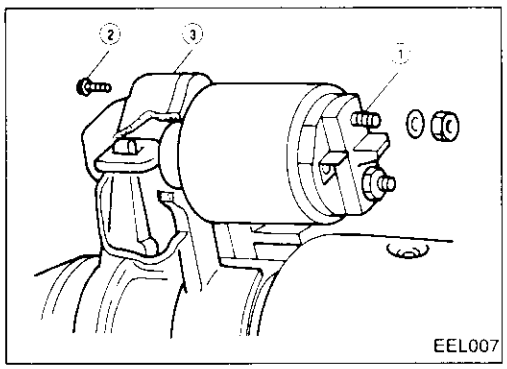
LD20II ENGINE



Dismantling (SR20DE, GA16DE)

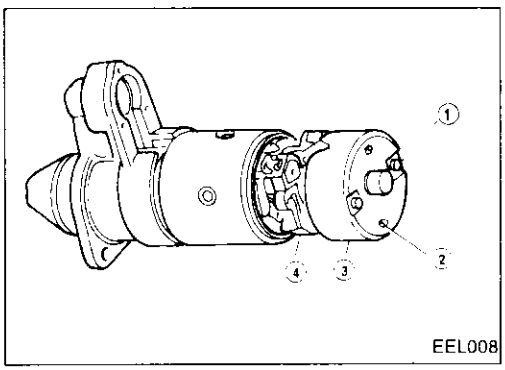
REMOVING THE MAGNETIC SWITCH

- Disconnect the feed wire from the solenoid terminal ①.
- Remove the screws ②, securing the switch to the end housing ③.
- Lift the front end of the solenoid to disengage the plunger from the engagement lever. Remove the solenoid.

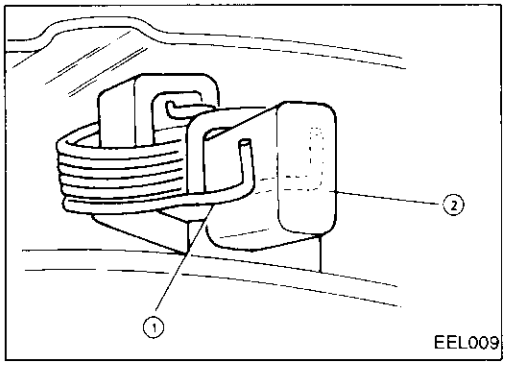


REMOVING THE REAR COVER

- Take out the through bolts.
- Remove the screws ②, securing the rear cover ③ and the bruchplate ④,respecitvely.
- Remove the rear plate taking care that the brushplate does not move from its place.



Dismantling (SR20DE, GA16DE) (Cont'd)



REMOVE THE BRUSH PLATE

- By means of a pliers, move the end ① of the brush springs from the rear to the left side of the brush. This is to release the brushes from pressure.
  Repeat the same operation for the rest of brushes.
- Take out the brush plate assembly.

REMOVING THE FIELD COIL AND THE ARMATURE

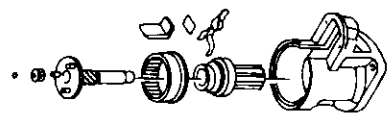
- Withdraw both the field coil and the armature at the same time.

(SR20DE engine)

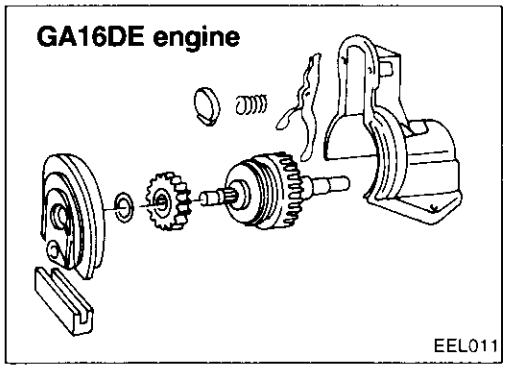
Take care not to lose the ball located inside the planeting assembly. This ball is for bearing the armature end.

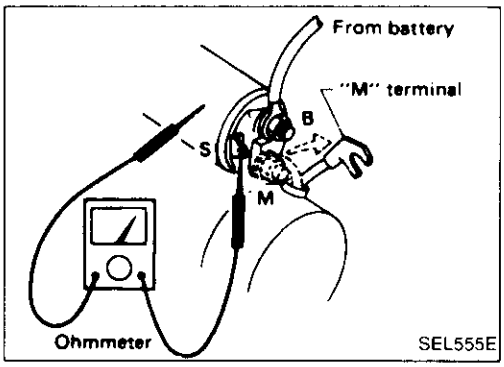
Dismantling gear case

SR20DE engine



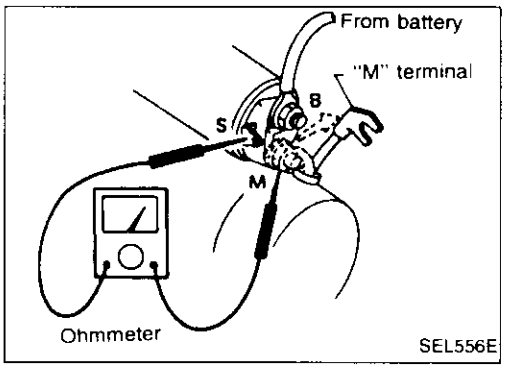
GA16DE engine



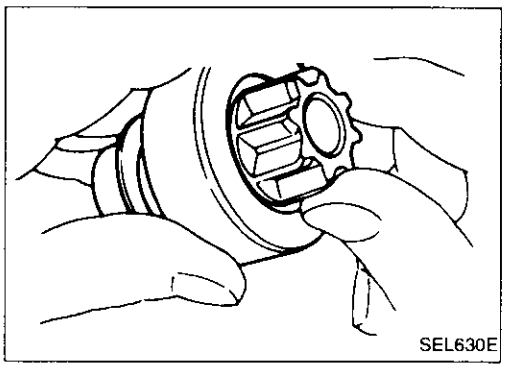


Magnetic Switch Check

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

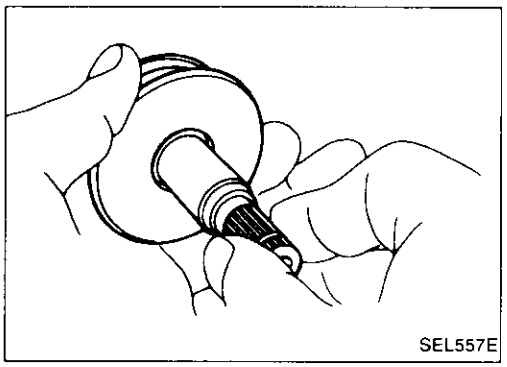


Continuity between	Continuity	Action
"S" terminal and switch body	Yes	O.K.
	No	Replace
"S" terminal and "M" terminal	Yes	O.K.
	No	Replace



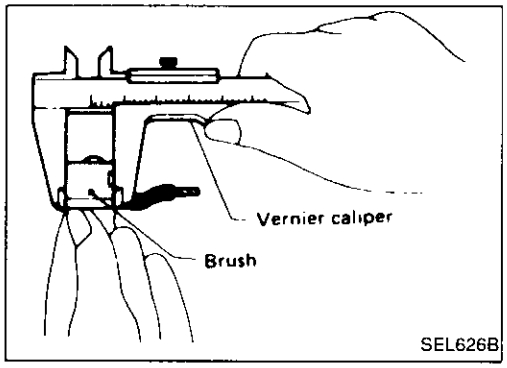
Pinion/Clutch Check

1. Inspect pinion teeth.
- Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)
2. 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.



REDUCTION GEAR TYPE

3. Inspect reduction gear teeth.
- Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)



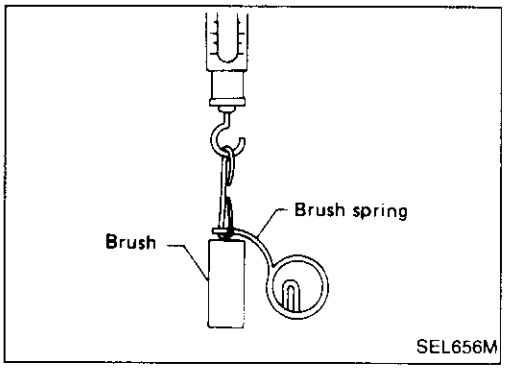
Brush Check

BRUSH

Check wear of brush.

Wear limit length:
Refer to S.D.S.

- Excessive wear ... Replace.

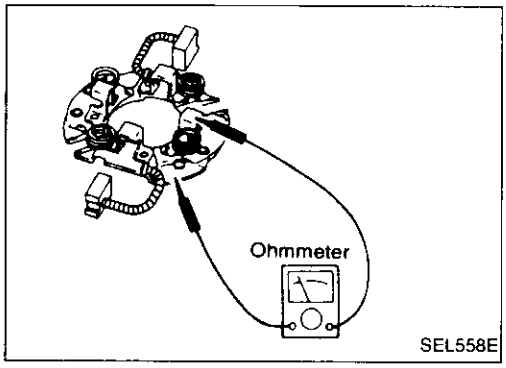


BRUSH SPRING PRESSURE

Check brush spring pressure with brush spring detached from brush.

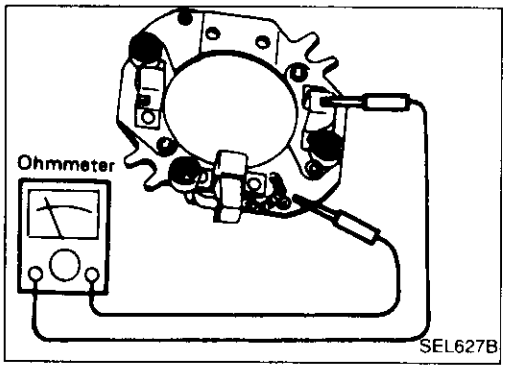
Spring pressure (with new brush):
Refer to S.D.S.

- Not within the specified values ... Replace.

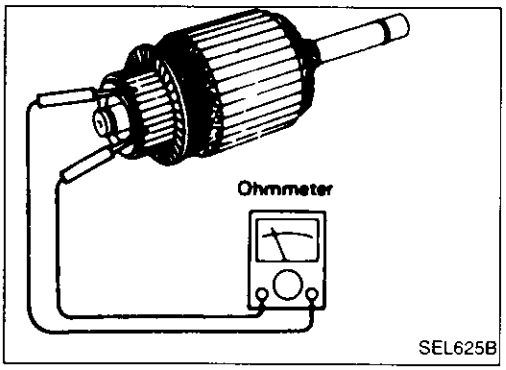


BRUSH HOLDER

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.



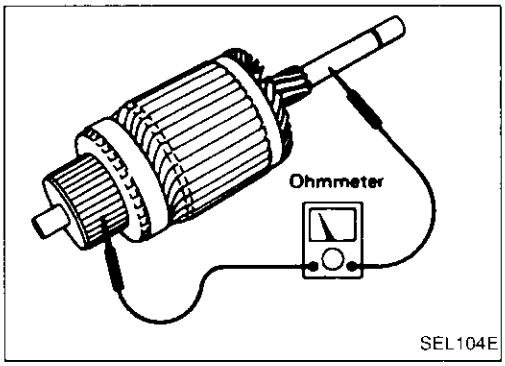
Continuity between brush holder and....	Continuity?	Action
Negative brush (isolated)	Yes	Change
	No	OK
Positive brush	Yes	OK
	No	Change



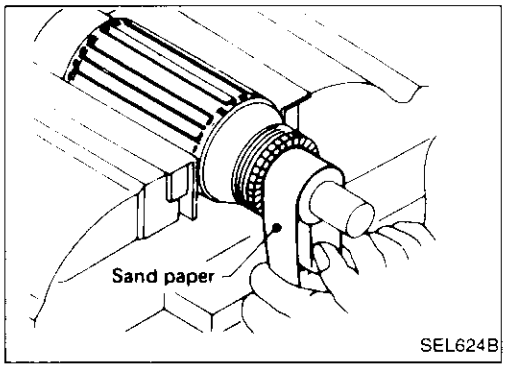
Armature Check

1. Continuity test (between two segments side by side).
- No continuity ... Replace.

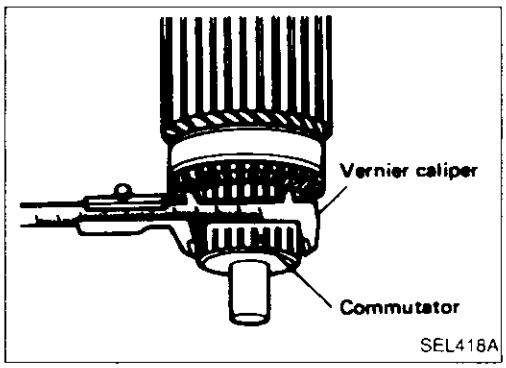
Armature Check (Cont'd)



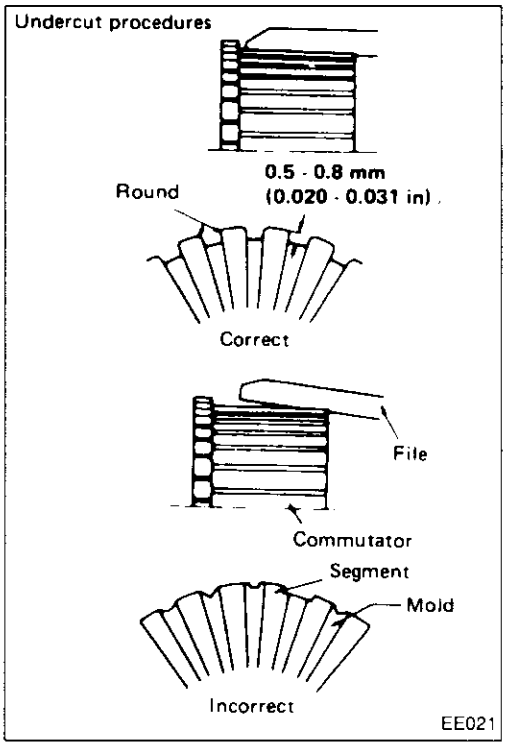
2. Insulation test (between each commutator bar and shaft).
- Continuity exists. ... Replace.



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



4. Check diameter of commutator.
   Commutator minimum diameter:
   Refer to S.D.S.
- Less than specified value ... Replace.



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

Assembly

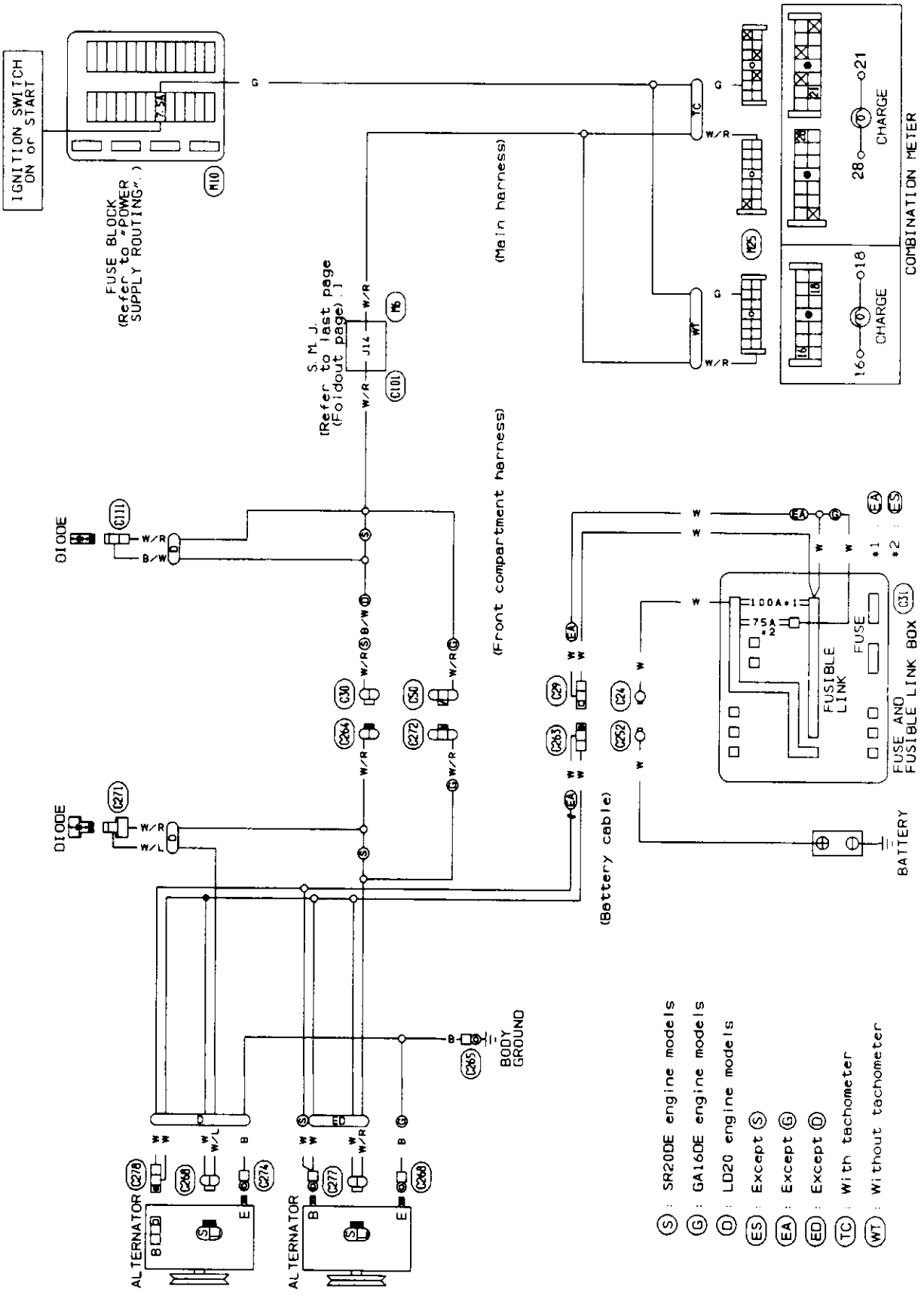
Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter.
Carefully observe the following instructions.
Assembly at next order:

- Gear case
  Pinion assembly and shift lever, must be mounted together.
- Ring and pinion shaft.
- (SR20DE) Put the ball in its hole.
- Field coil and armature frame, must be mounted together.
  Don't lock the holes of screws.
- Armature frame.
- Brush holder.
  Check the correct alignment of holes of screws.
- Rear cover.
- Magnetic switch.

Service Data and Specifications (S.D.S.)

Type		MITSUBISHI		BOSCH
		M1T60581	M0O2T25481	9000.3.31424
Engine applied		SR20DE	GA16DE	LD20II
System voltage	V	12		
No load				
Terminal voltage	V	11	11.5	12
Current	A	Max. 88	50	More than 150
Revolution	rpm	More than 3,000	5,600	Less than 4,500
Minimum diameter of commutator	mm (in)	28.8	28.8 (1.134)	28.9 (1.138)
Minimum length of brush	mm (in)	12.0	12.0 (0.472)	7 (0.028)
Brush spring tension	N (kg, lb)	13.7 - 25.5 (1.4 - 2.6 3.1 - 5.7)	13.7 - 25.5 (1.4 - 2.6 3.1 - 5.7)	16.5 - 32.0 (1.7 - 3.3 3.7 - 7.3)

Wiring Diagram



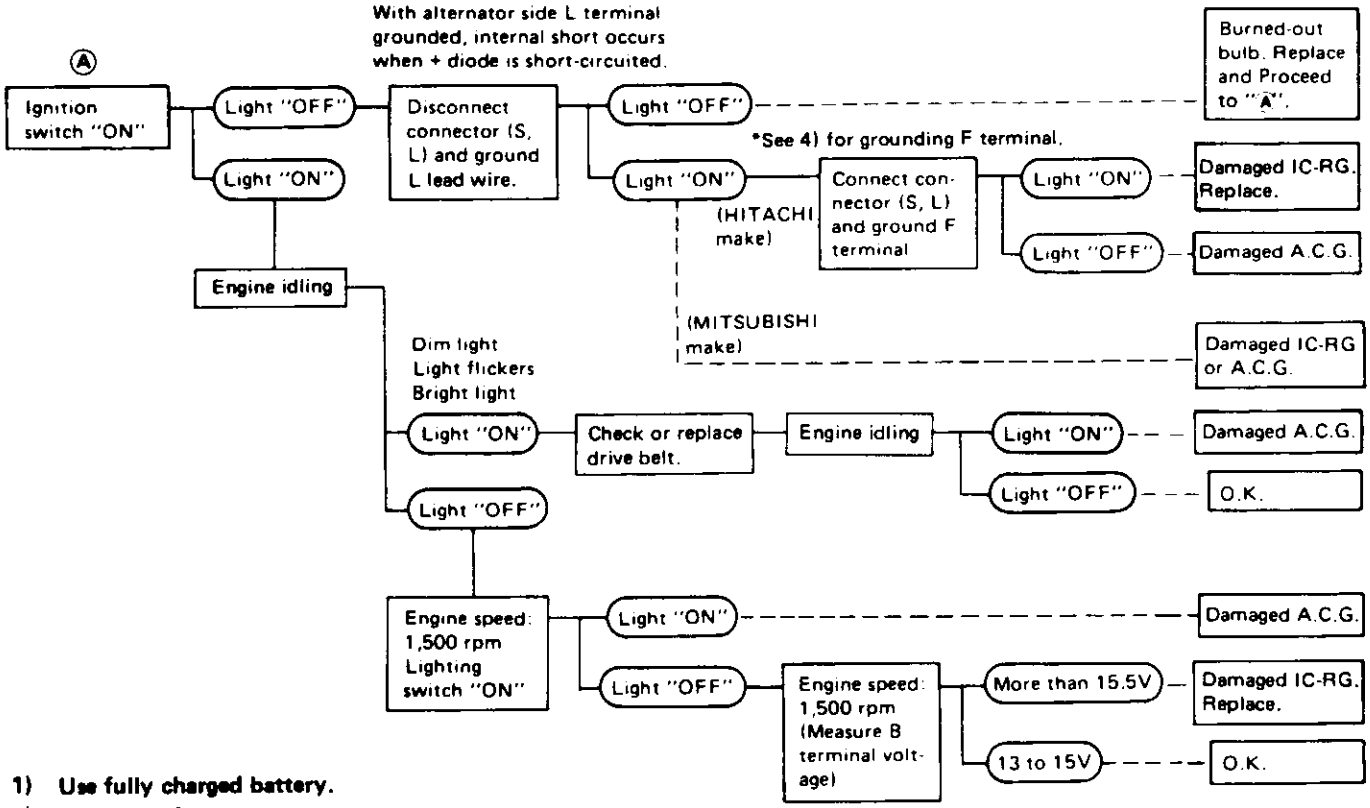
MEL672B

Trouble-shooting

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 trouble-shooting, inspect the fusible link.

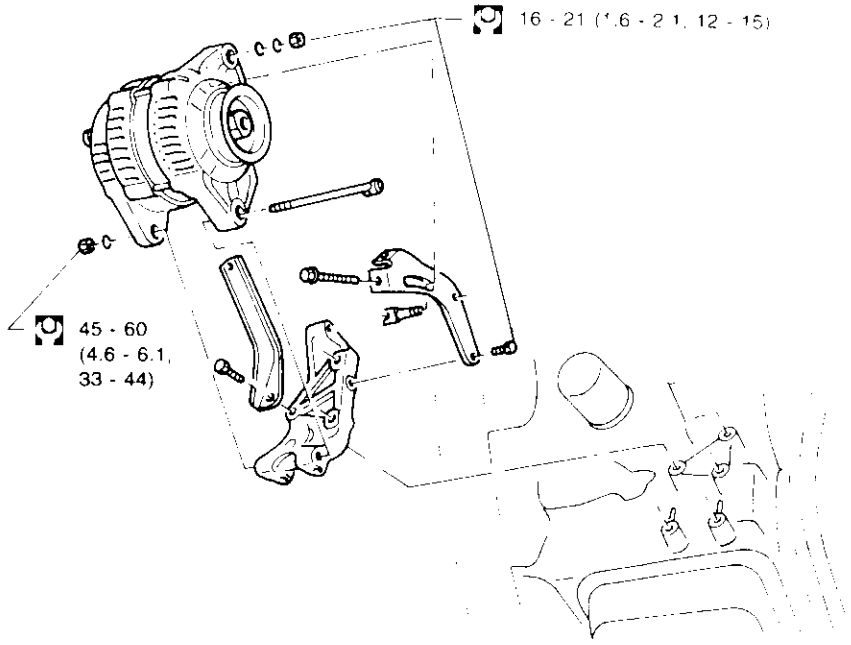
WITH IC REGULATOR



1) **Use fully charged battery.**
2) **Light : Charge warning light**
   A.C.G. : Alternator parts except IC regulator
   IC-RG : IC regulator
   O.K. : IC-alternator is in good condition.
3) **When reaching "Damaged A.C.G.", remove alternator from vehicle and disassemble, inspect and correct or replace faulty parts.**
4) ***Method of grounding F terminal (HITACHI make only)**

Removal and Installation

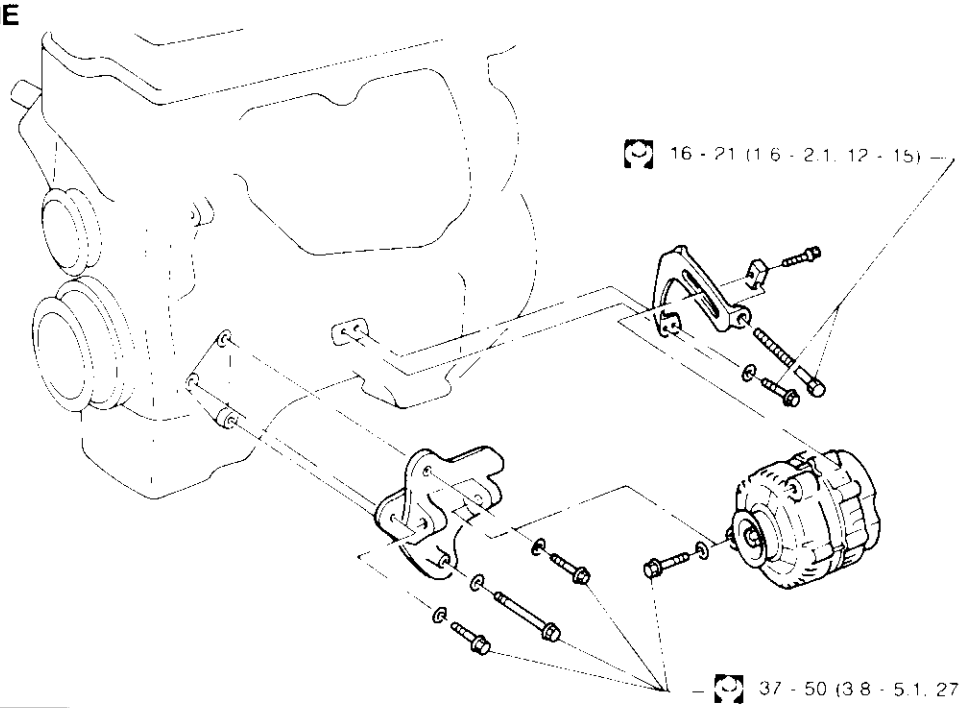
SR20DE ENGINE



: N·m (Kg-m, ft-lb)

EEL012

GA16DE ENGINE

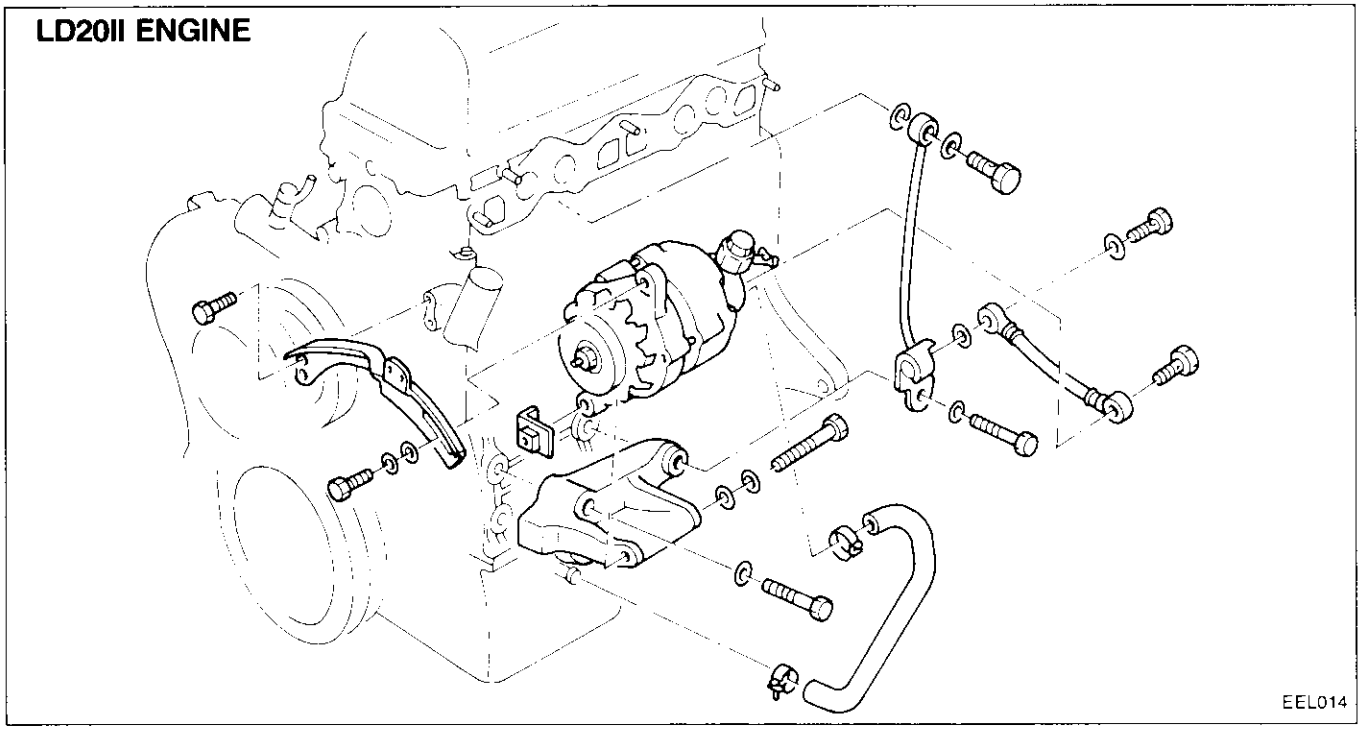


N·m (kg-m, ft-lb)

EEL013

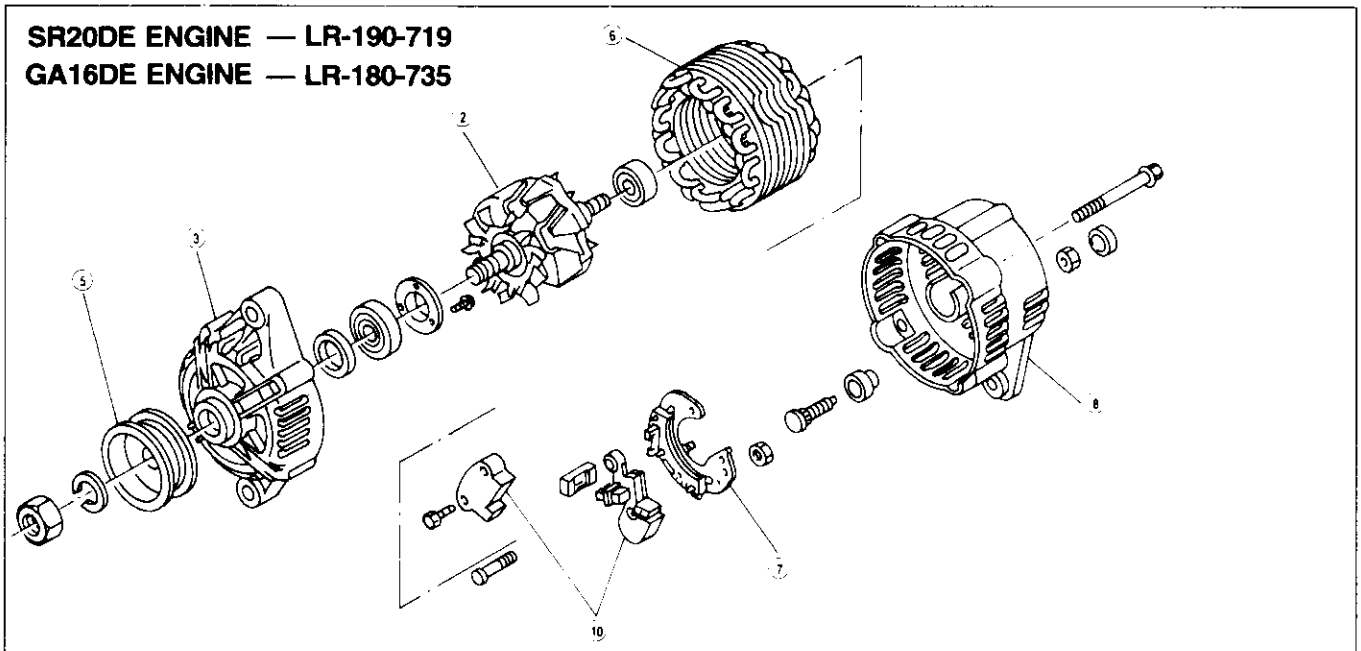
Removal and Installation (Cont'd)

LD20II ENGINE



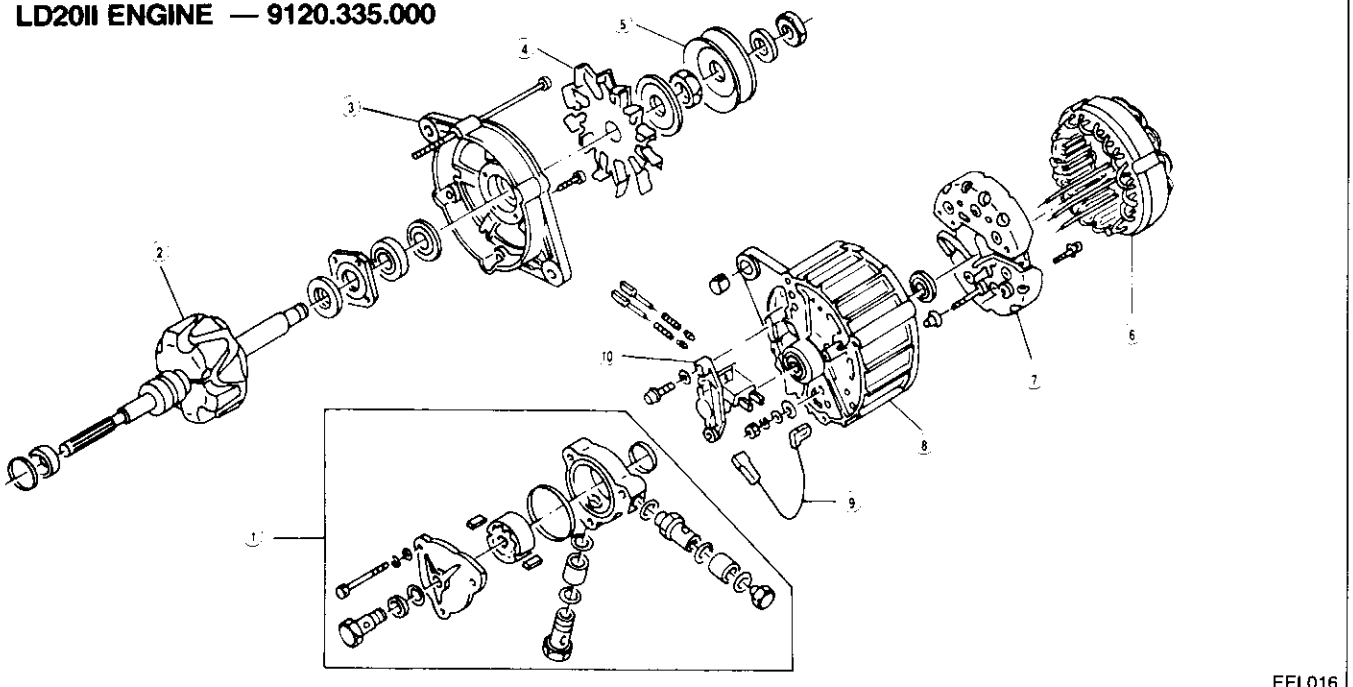
Construction

SR20DE ENGINE — LR-190-719
GA16DE ENGINE — LR-180-735



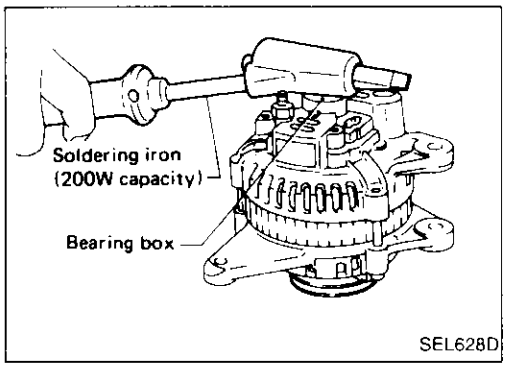
EEL015

LD20II ENGINE — 9120.335.000



EEL016

① Vacuum pump
② Rotor
③ Front cover
④ Fan
⑤ Pulley
⑥ Stator
⑦ Diode plate assy.
⑧ Rear cover
⑨ Voltage regulator
⑩ Brush



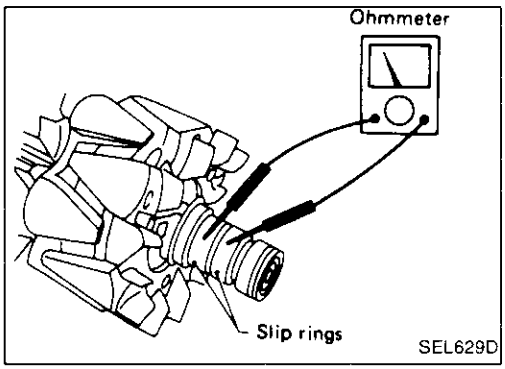
Disassembly

REAR COVER REMOVAL

CAUTION:

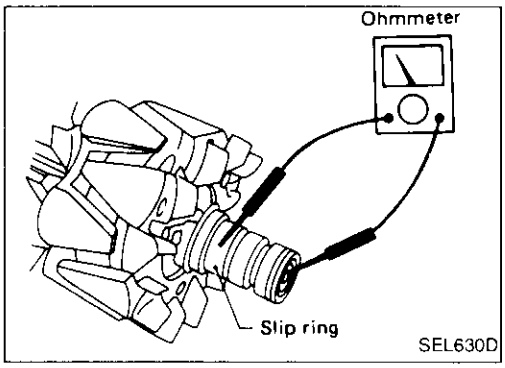
Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. To facilitate removal of rear cover, heat just bearing box section with a 200-watt soldering iron.

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

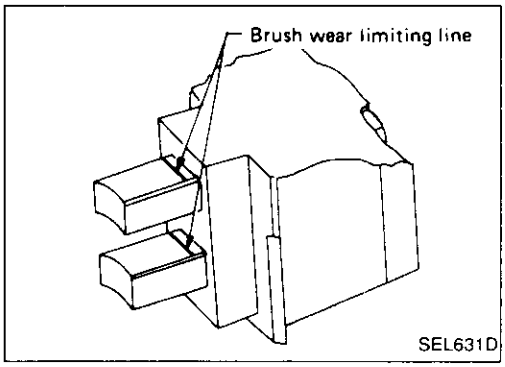


Rotor Slip Ring Check

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

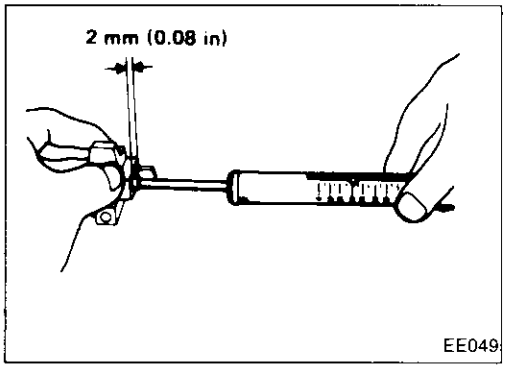


2. Insulator test
   - Continuity exists ... Replace rotor.
3. Check slip ring for wear.
   Slip ring minimum outer diameter:
   Refer to S.D.S.

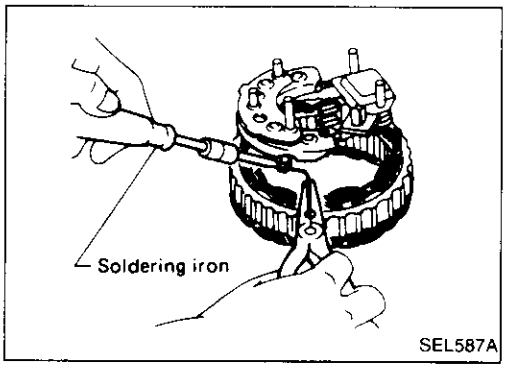


Brush Check

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.

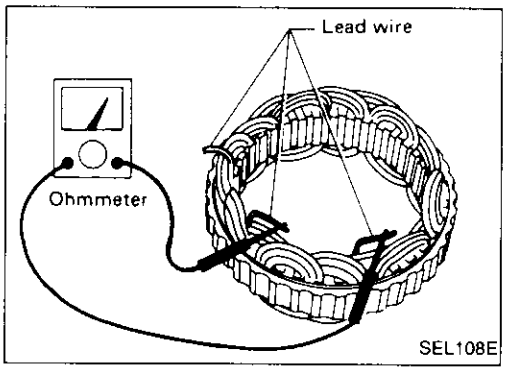


3. Check brush lead wire for damage.
   - Damaged ... Replace.
4. Check brush spring pressure.
   Measure brush spring pressure with brush projected approximately 2 mm (0.08 in) from brush holder.
   Spring pressure:
   Refer to S.D.S.
   - Not within the specified values ... Replace.

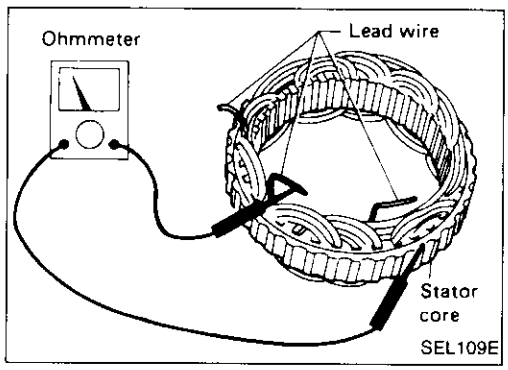


Stator Check

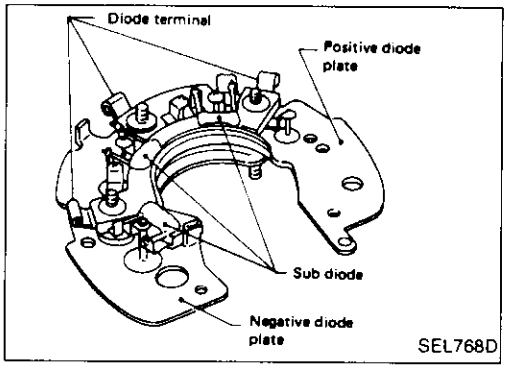
To test the stator or diode, separate them by unsoldering the connecting wires.
CAUTION:
Use only as much heat as required to melt solder. Otherwise, diodes will be damaged by excessive heat.



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



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

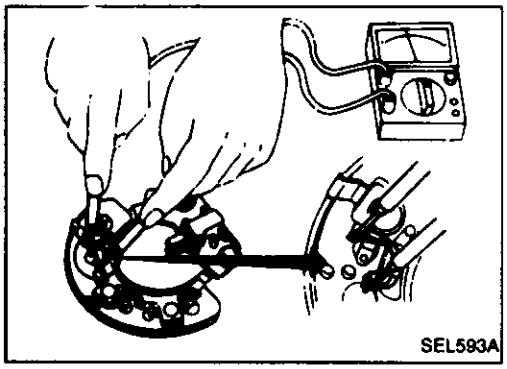


MAIN DIODES

- Use an ohmmeter to check condition of diodes as indicated in chart below.
- If any of the test results is not satisfactory, replace diode assembly.

Ohmmeter probes		Continuity
Positive ⊕	Negative ⊖	
Positive diode plate	Diode terminals	Yes
Diode terminals	Positive diode plate	No
Negative diode plate	Diode terminals	No
Diode terminals	Negative diode plate	Yes

Stator Check (Cont'd)



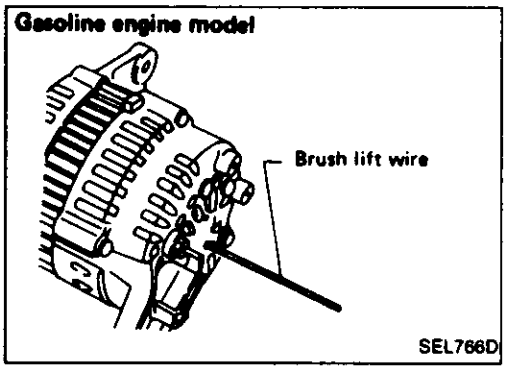
SUB-DIODES

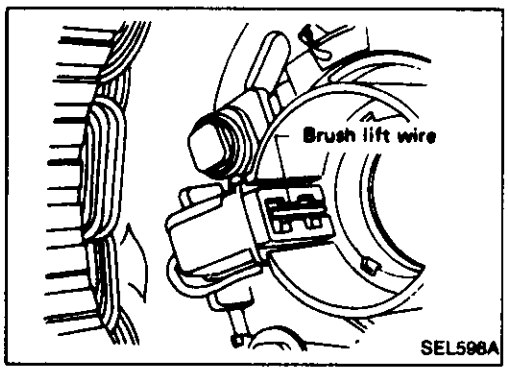
- Attach ohmmeter's probe to each end of diode to check for continuity.
- Continuity is N.G. ... Replace diode assembly.

Assembly

Carefully observe the following instructions.

- When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.





REAR COVER INSTALLATION

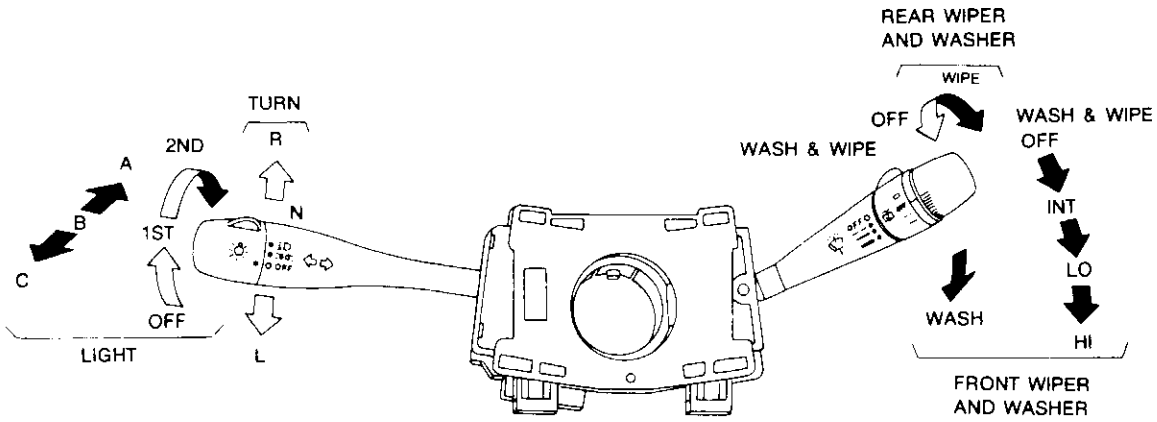
1. Before installing front cover with pulley and rotor with rear cover, push brush up with fingers and retain brush by inserting brush lift wire into brush lift hole from outside.
2. After installing front and rear sides of alternator, pull out brush lift wire.

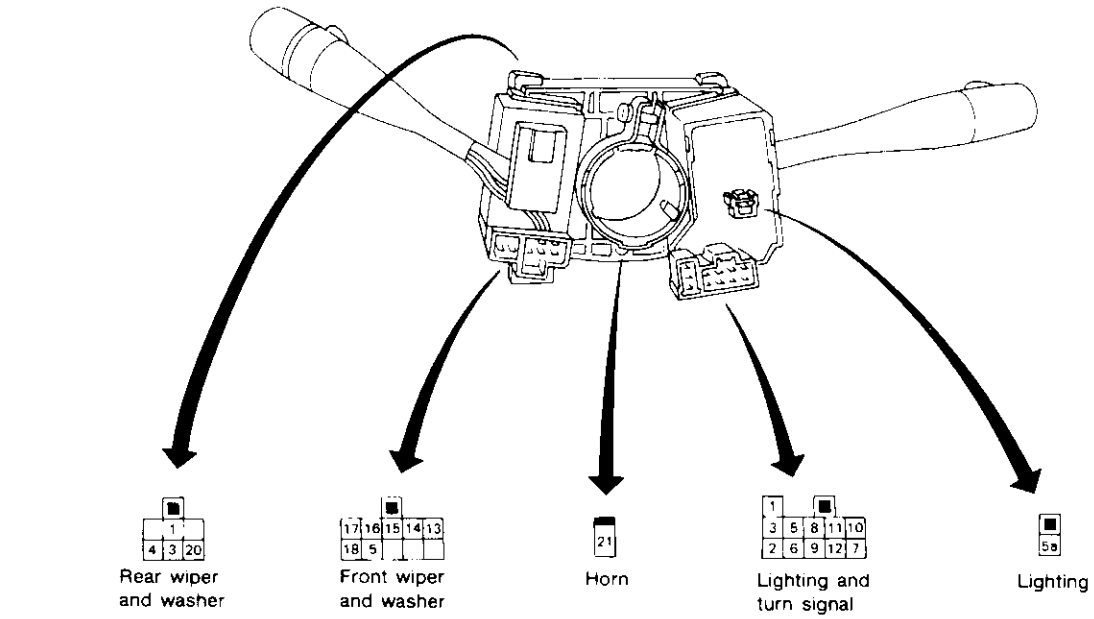
Service Data and Specifications (S.D.S.)

ALTERNATOR

Type		LR190-719	LR180-735	9 120.335.000
		HITACHI		BOSCH
Engine		SR20DE	GA16DE	LD20II
Nominal rating	V-A	12 - 90	12 - 80	12 - 90
Ground polarity		Negative		
Minimum revolution under no-load (When 13.5 volts is applied)	rpm	10500		—
Hot output current	A/rpm	23/1300 63/2500 87/5000	23/1300 63/2500 77/5000	16.5/1300 68.5/2500 83/5000
Regulated output voltage	V	14.1 - 14.7		
Minimum length of brush	mm (in)	6.0 (0.236)	7.0 (0.276)	10.0 (0.39)
Brush spring pressure	N (g, oz)	1.000 - 3.432 (102 - 350, 3.60 - 12.34)	1.863 - 3.040 (190 - 310, 6.70 - 10.93)	1.9 (194, 6.84)
Slip ring minimum outer diameter	mm (in)	26.0 (1.024)	30.6 (1.205)	15.3 (0.602)

Combination Switch/Check

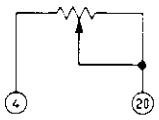




FRONT WIPER AND WASHER SWITCH

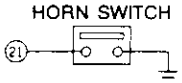
	FRONT WIPER					REAR WIPER			
	OFF	INT	LOW	HIGH	WASH	WIPE WASH	OFF	WIPE	WASH WIPE
13	○	○							
14	○	○	○						
15		○							
16				○					
17		○	○	○					
18					○				
1								○	
2									
3						○			○
4						○		○	○
5					○				

REAR WIPER AND WASHER SWITCH



INTERMITTENT
WIPER VOLUME

HORN SWITCH



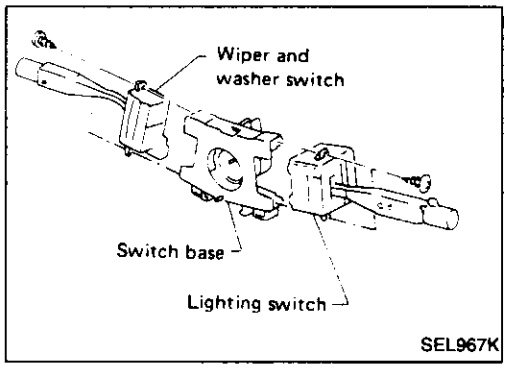
LIGHTING SWITCH

	OFF			1ST			2ND		
	A	B	C	A	B	C	A	B	C
5		○				○	○	○	○
5a							○	○	○
6		○				○	○		○
7								○	
8		○				○	○	○	○
9		○				○	○		○
10								○	
11			○	○	○	○	○	○	○
12			○	○	○	○	○	○	○

TURN SIGNAL SWITCH

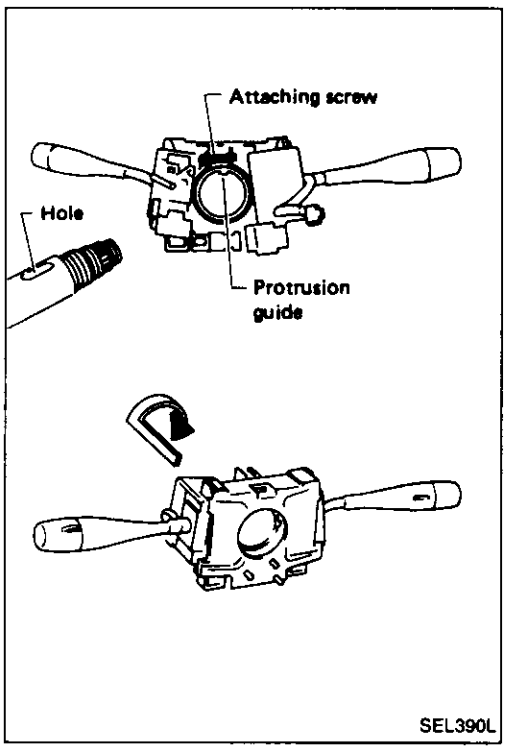
	R	N	L
1	○		○
2	○		
3			○

MEL636B



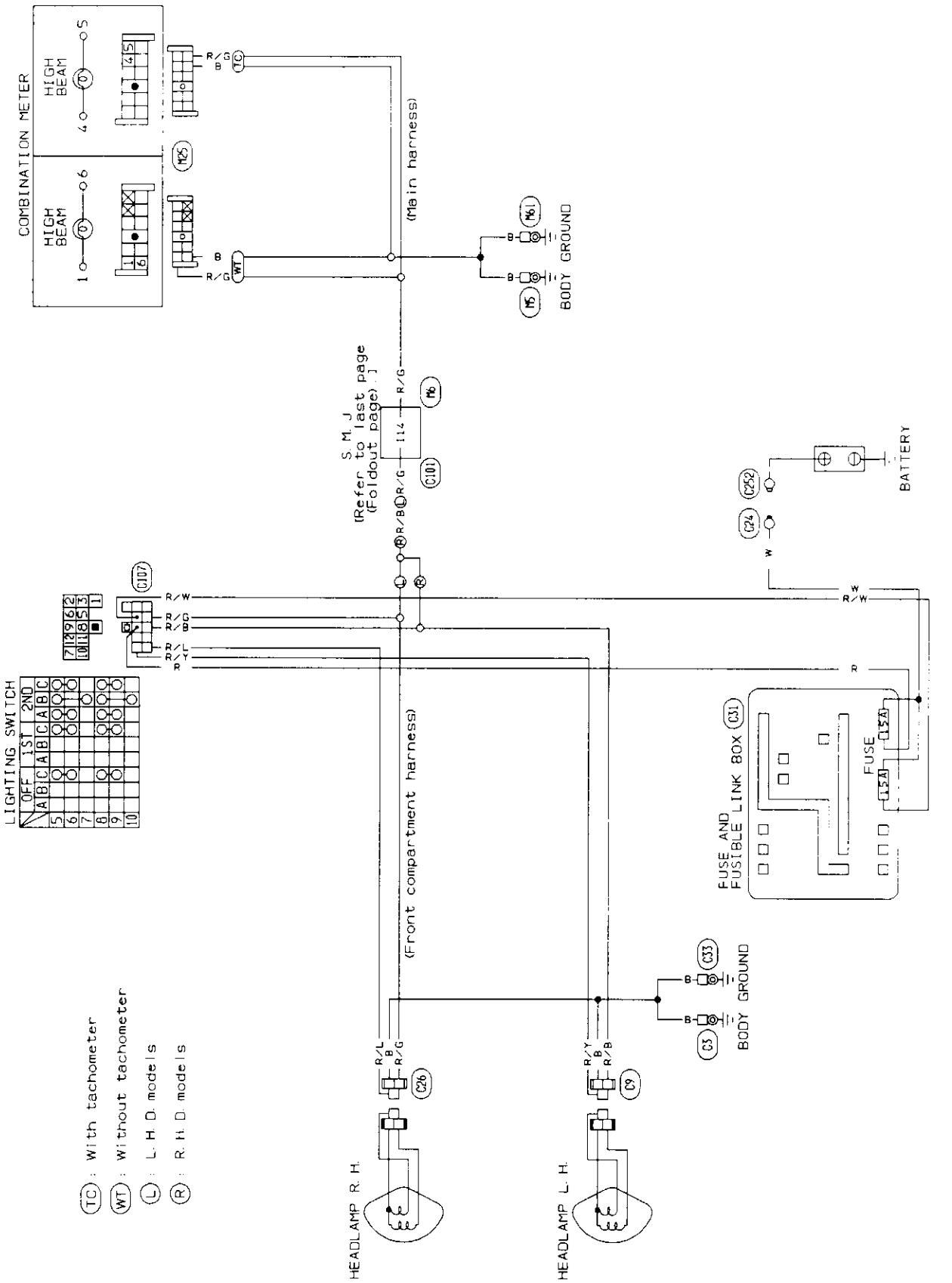
Replacement

- Each switch can be replaced without removing combination switch base.



- To remove combination switch base, remove base attaching screw and turn after pushing on it.

Wiring Diagram



MEL673B

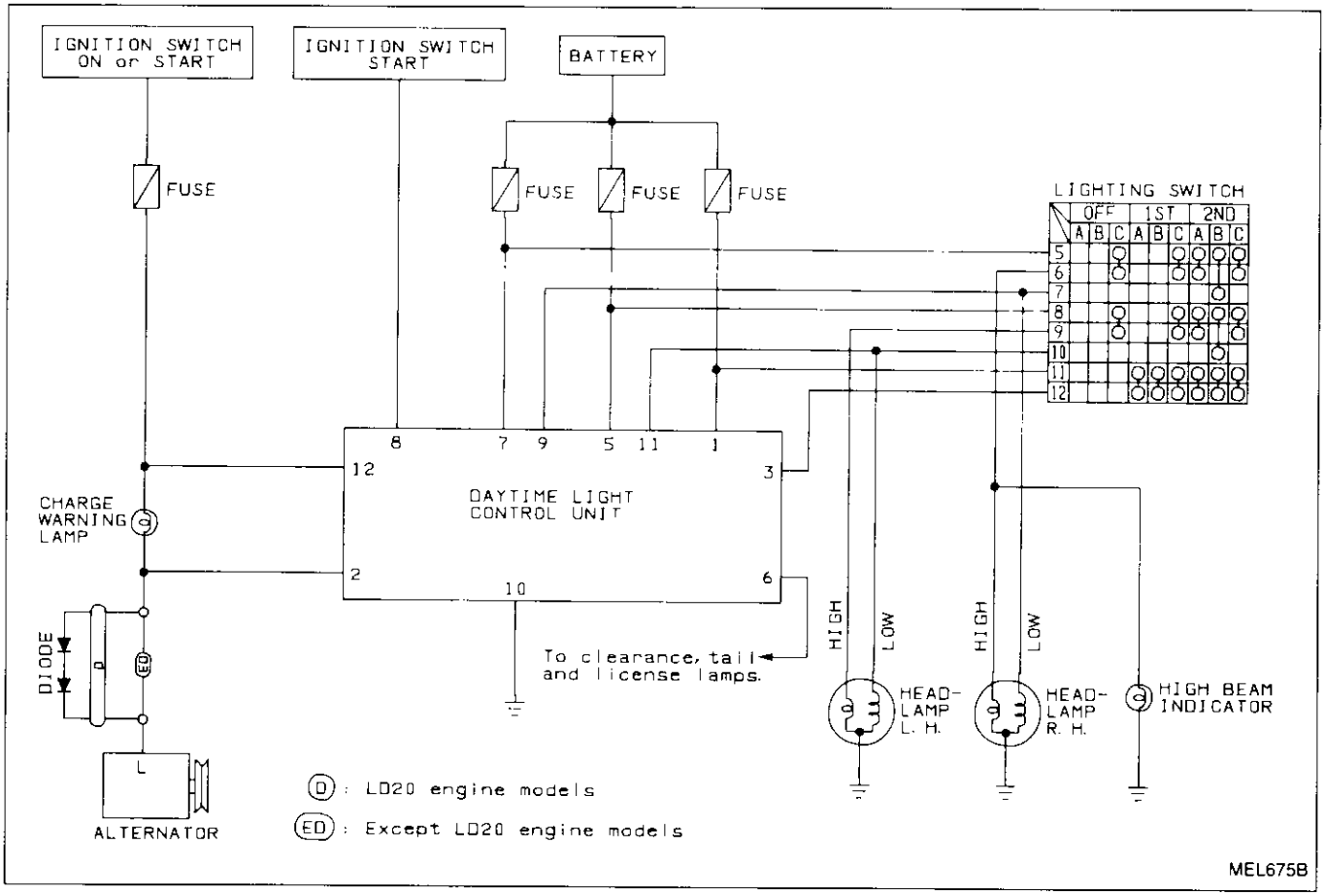
Operation

After starting the engine with the lighting switch in the "OFF" position, the headlamp low beam and clearance, tail, license and instrument illumination lamps automatically turn on. Lighting switch operations other than the above are the same as conventional light systems.

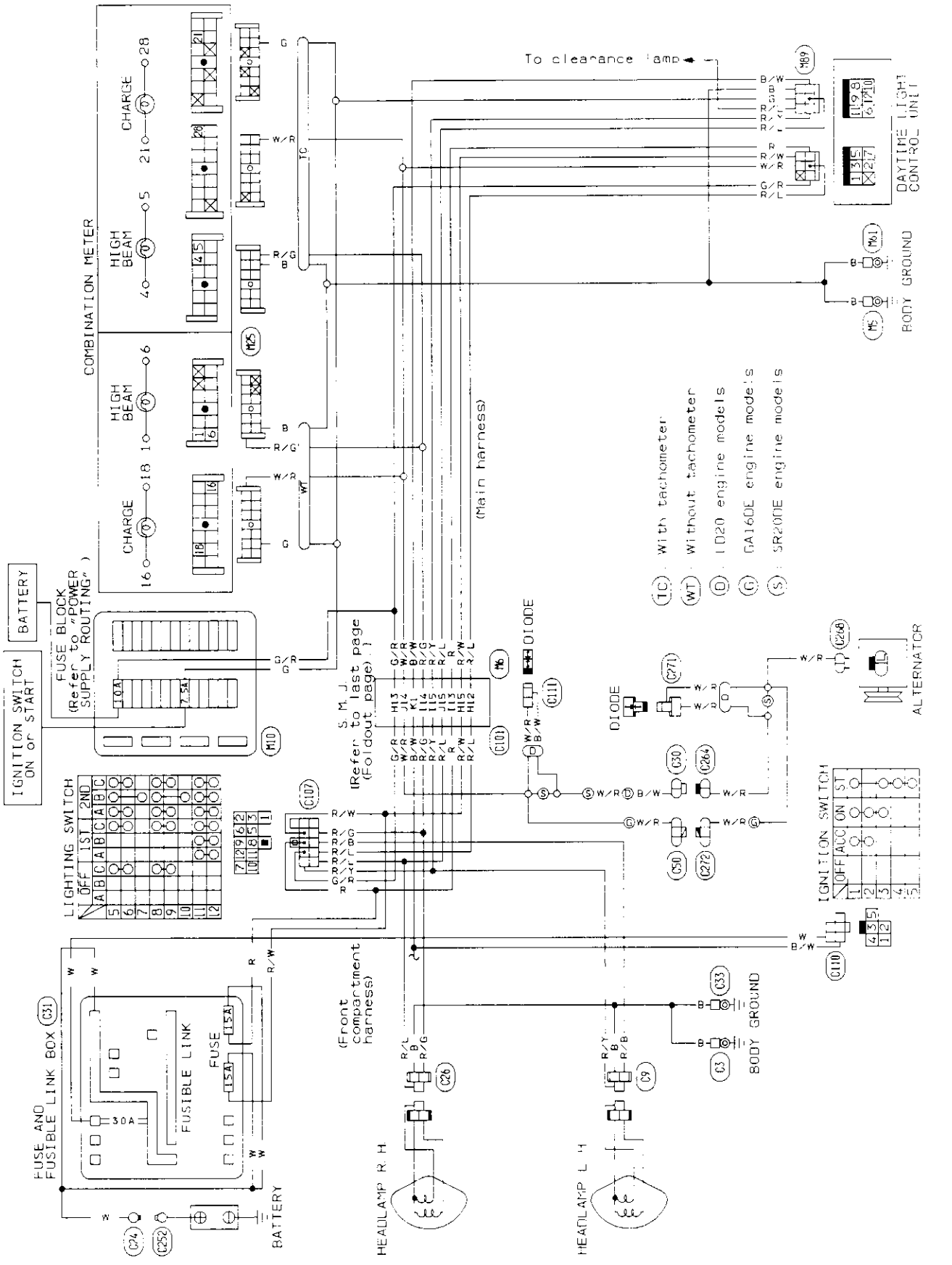
Engine		With engine stopped									With engine running								
Lighting switch		OFF			1ST			2ND			OFF			1ST			2ND		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Headlamp	High beam	X	X	O	X	X	O	O	X	O	X	X	O	X	X	O	O	X	O
	Low beam	X	X	X	X	X	X	X	O	X	O	O	O	X	X	X	X	O	X
Clearance and tail lamp		X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
License and instrument illumination lamp		X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

O: Lamp "ON"
X: Lamp "OFF"
□: Added functions

Schematic



Wiring Diagram



MEL674B

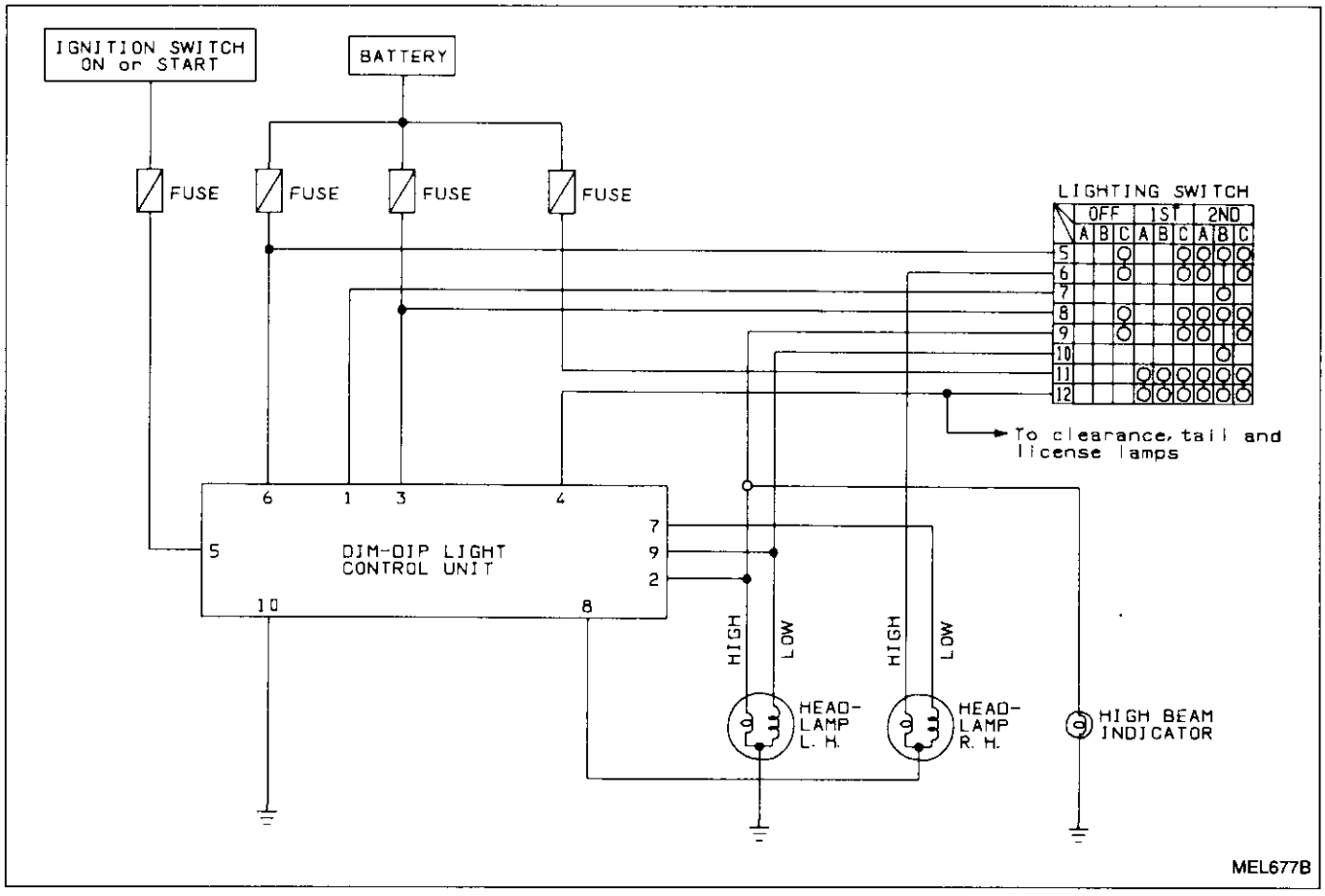
Operation

When ignition switch is in the "ON" position with the lighting switch in the "1ST" position, the headlamp low beam comes on dimly to function as a clearance lamp. Lighting switch operations other than the above are the same as conventional light systems.

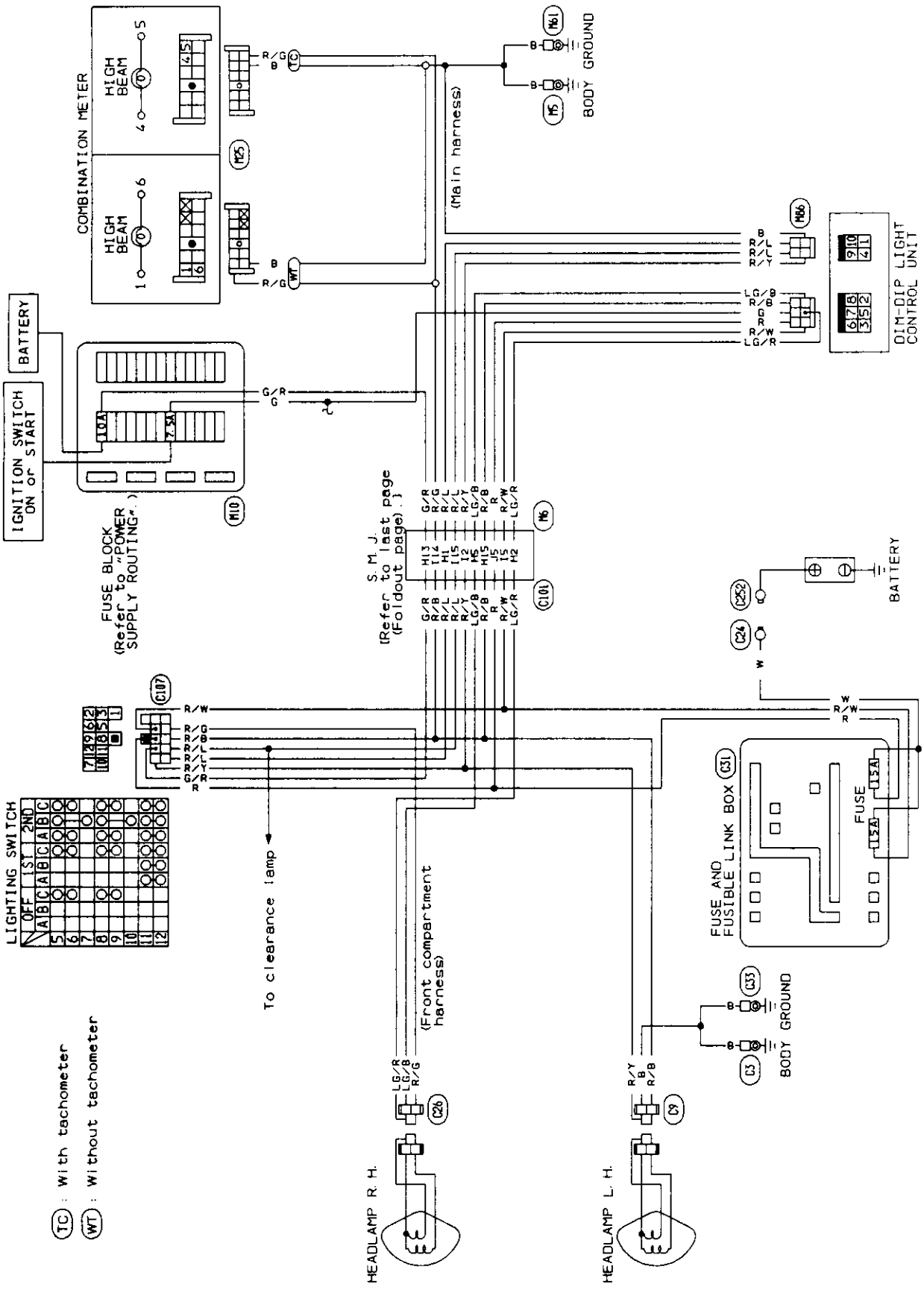
Ignition switch		OFF or ACC									ON								
Lighting switch		OFF			1ST			2ND			OFF			1ST			2ND		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Headlamp	High beam	X	X	O	X	X	O	O	X	O	X	X	O	X	X	O	O	X	O
	Low beam	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	O	X
	Dimp-dip (Low beam)	X	X	X	X	X	X	X	X	X	X	X	X	O	O	X	X	X	X
Clearance and tail lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O
License and instrument illumination lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O

O: Lamp "ON"
X: Lamp "OFF"
□: Added functions

Schematic



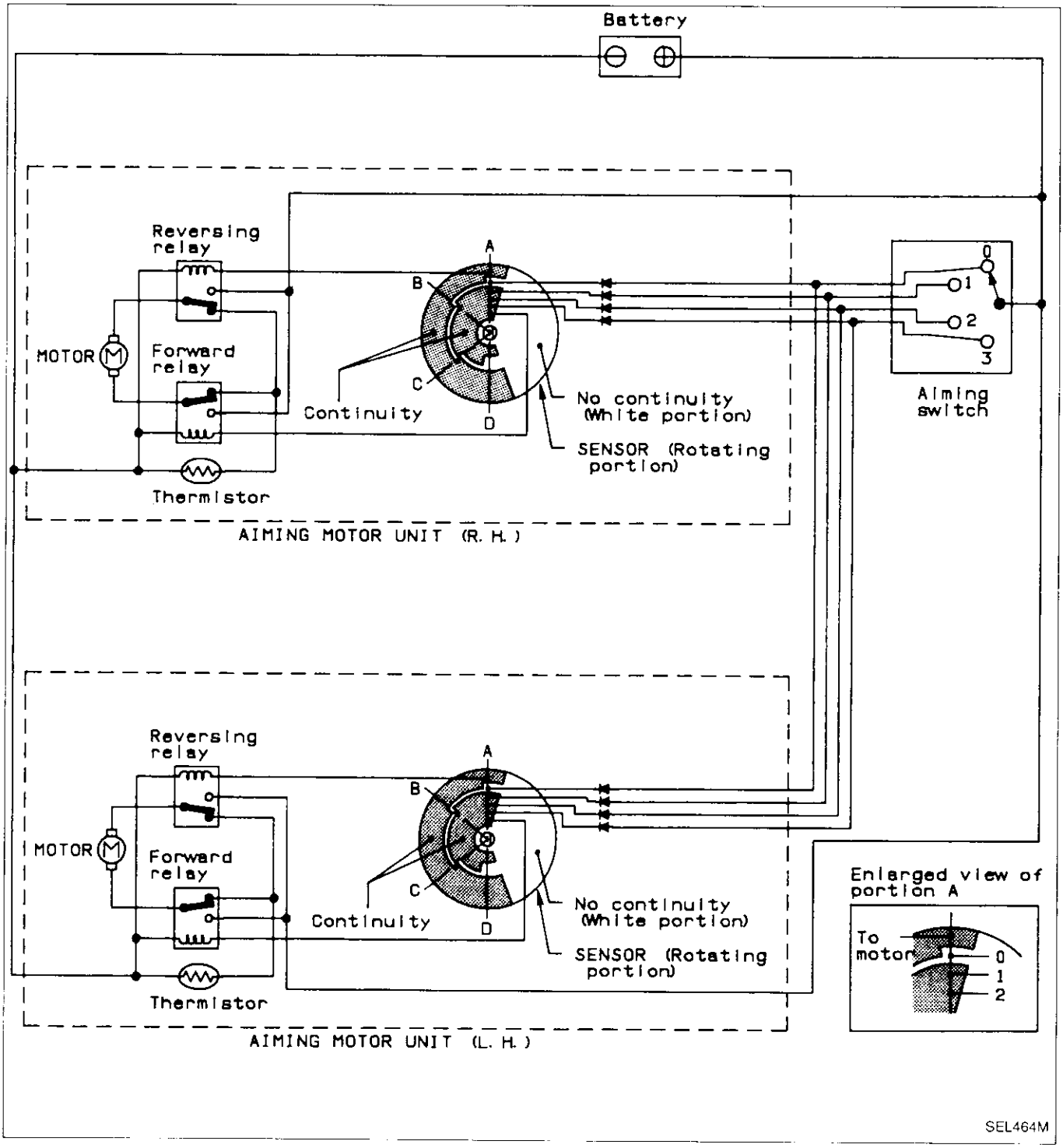
Wiring Diagram

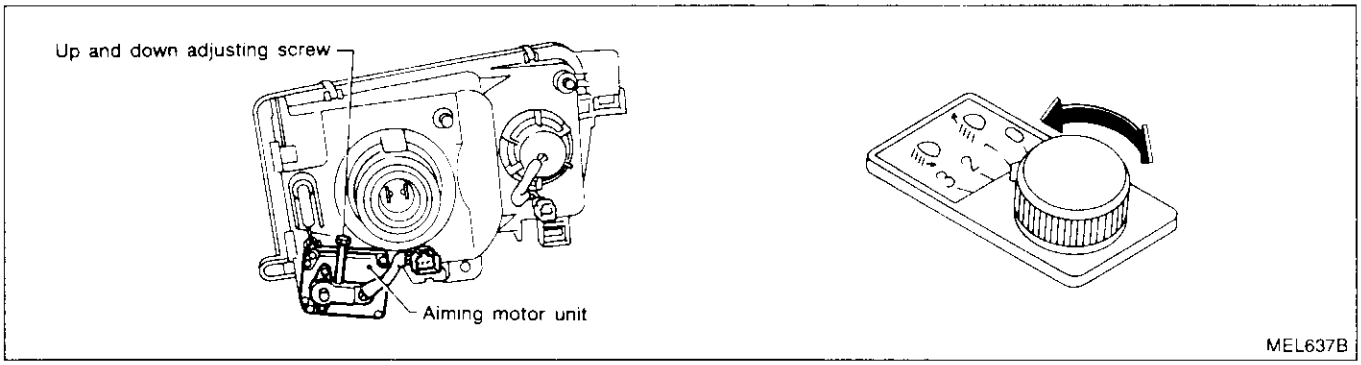


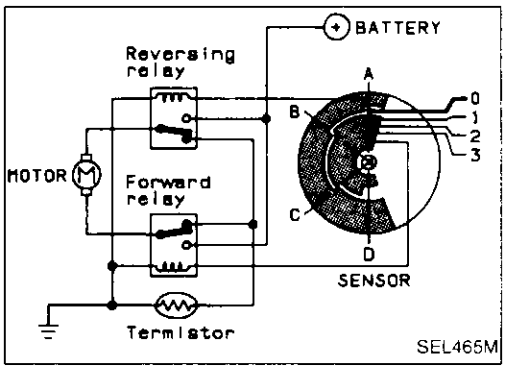
MEL676B

Description

- The vertical direction of the headlamp projection can be adjusted from inside the vehicle to prevent the headlight beam axis from facing upward due to a change in the number of occupants and load conditions in the vehicle.





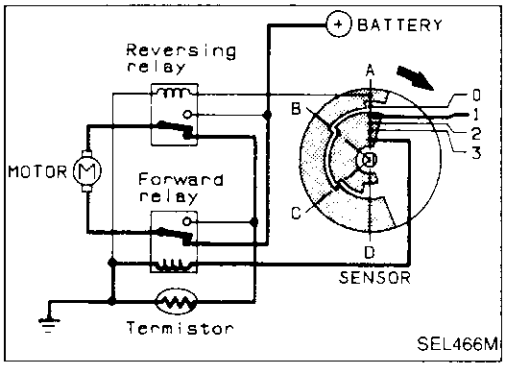


CIRCUIT OPERATION

[Example]

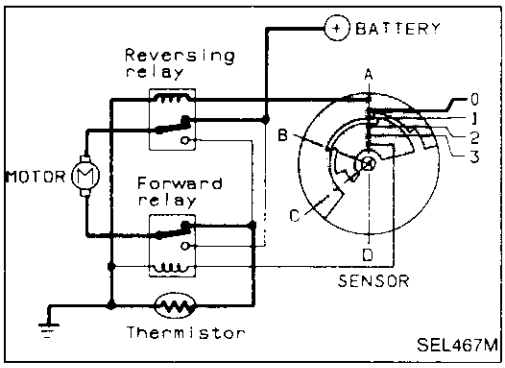
Aiming switch "0"

- When the aiming switch is set to "0", the motor will not start because the power terminals are positioned at the nonconductive section of the sensor's rotary unit.



Aiming switch "0" → "1"

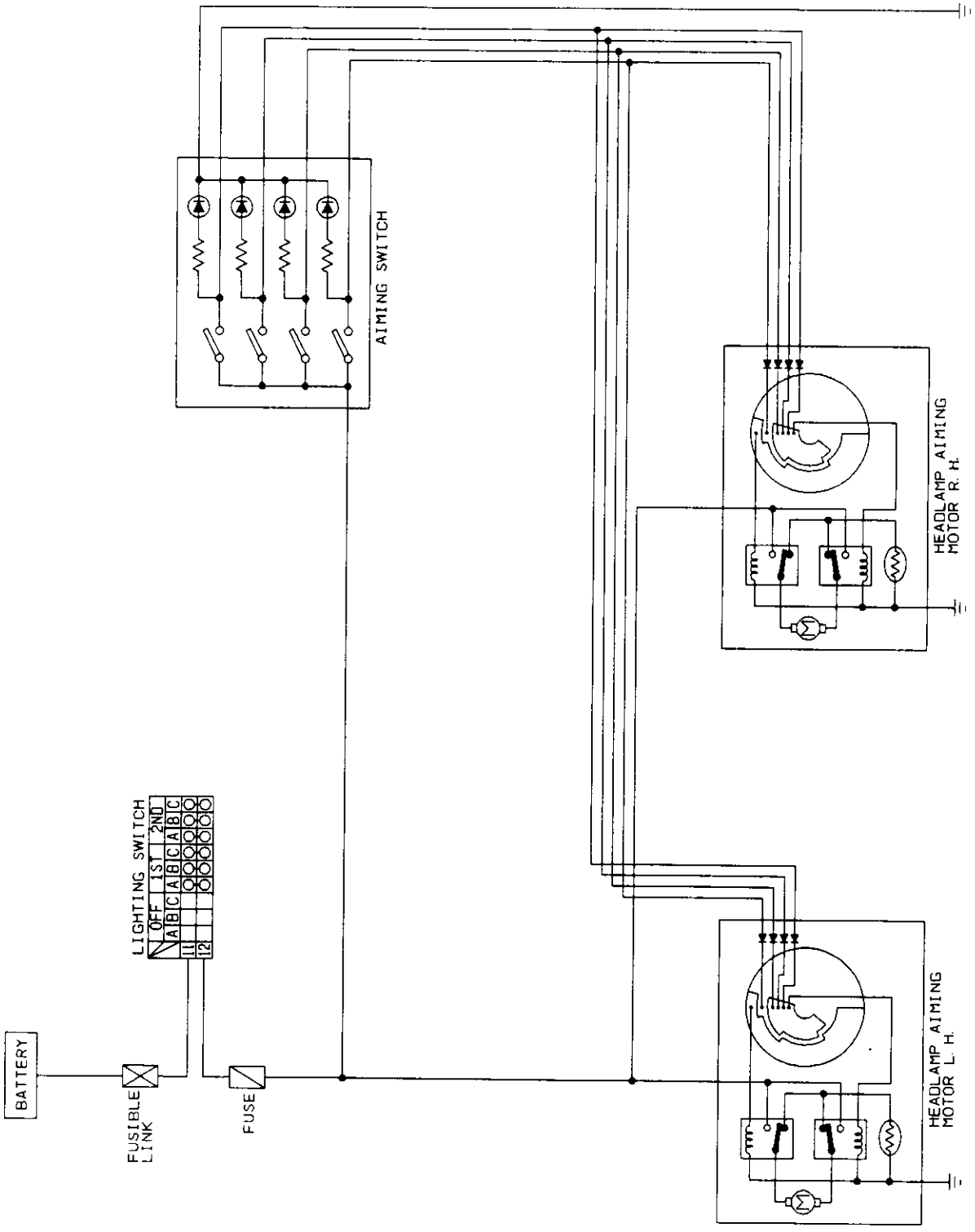
- When the aiming switchis moved from "0" to "1", power is applied to the motor through the relay operated by the sensor's conductive section. The headlamps will then move in the "DOWN" direction.
- The motor continues to rotate while the rotary unit of the sensors moves from point A to point B.
- The power terminals will then be positioned at the nonconductive section, disconnecting the power tothe motor. The motor then stops.



Aiming switch "1" → "0"

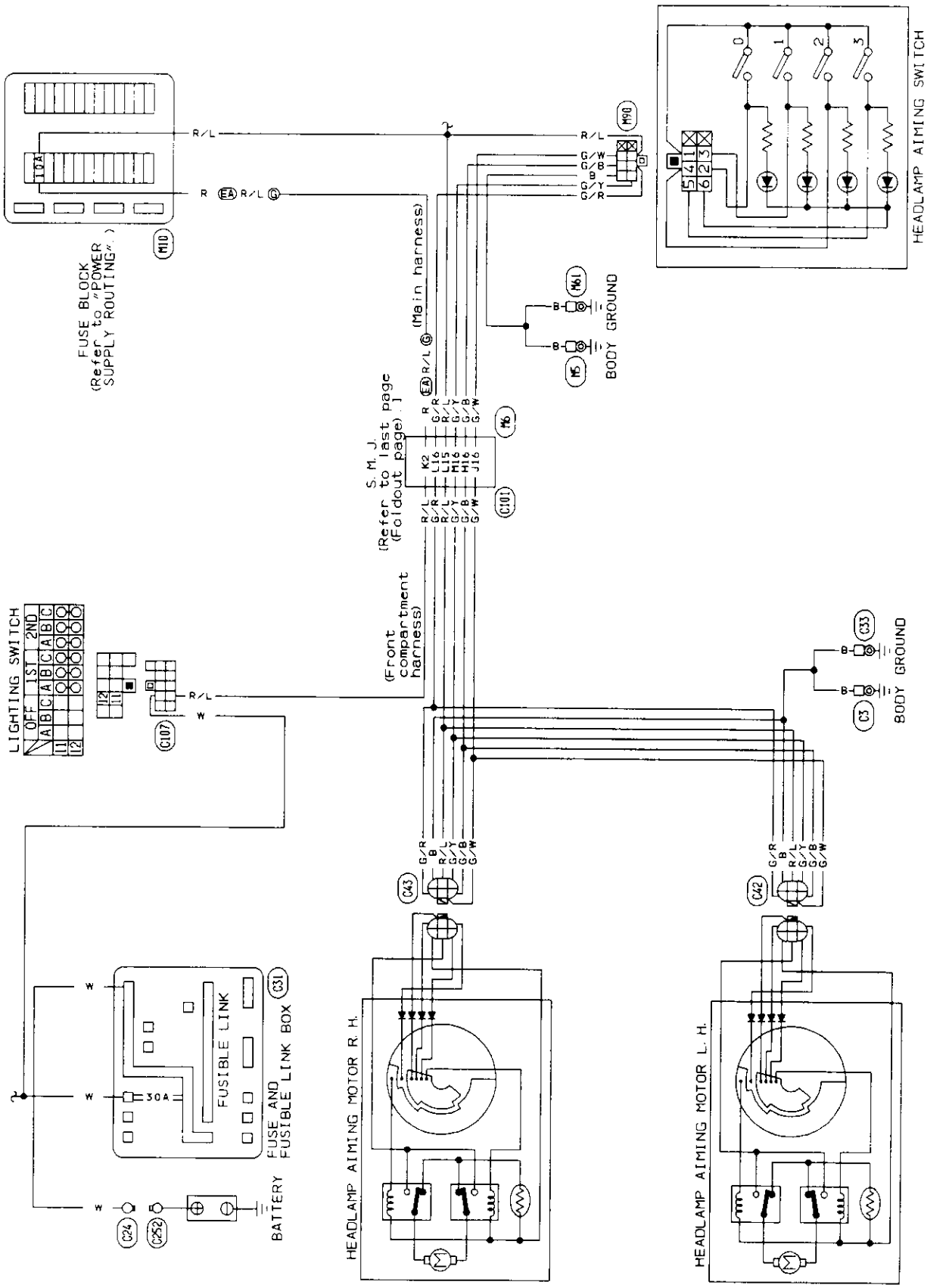
- When the aiming switch is moved from "1" to "0", power is applied to the motor through the relay operated by the conductive section of the sensor. The motor will rotate to move the headlamps in the "UP" direction.
- When the rotary unit of the sensor moves from point B to point A, the motor will stop.

Schematic



MEL679B

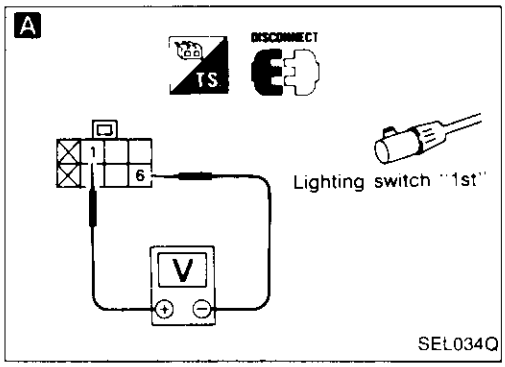
Wiring Diagram



MEL678B

Trouble-diagnoses

SYMPTOM: Headlamp aiming does not operate.



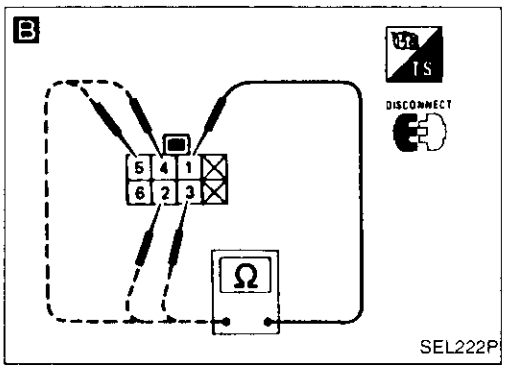
A

POWER SUPPLY CIRCUIT CHECK (For aiming switch)
Check if 12 volts exist between terminals ① and ⑥.

Voltmeter terminals (+)	Voltmeter terminals (−)	Voltage [V]
①	⑥	Approx. 12

N.G. → Check 10A fse at fuse block. (Refer to "POWER SUPPLY ROUTING.")

O.K. ↓



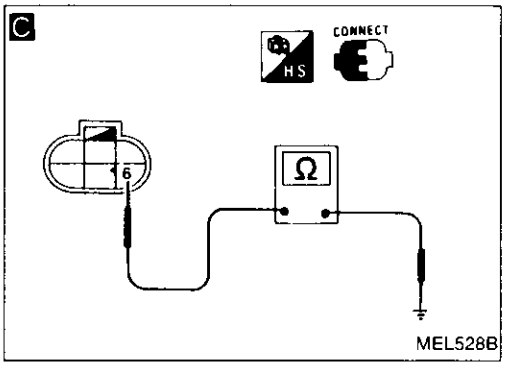
B

AIMING SWITCH CHECK
Check continuity between terminals at each switch position.

Switch position \ Terminal	①	②	③	④	⑤
0	o—o				
1	o—o		o		
2	o—o		o		o
3	o—o		o		o

N.G. → Replace aiming switch.

O.K. ↓

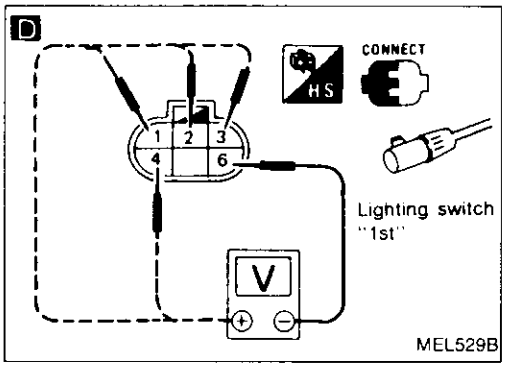


C

GROUND CIRCUIT CHECK FOR AIMING MOTOR
Check continuity between terminals ⑥ and body grround.
Continuity exists ... O.K.

N.G. → Repair harness between aiming motor and body ground.

O.K. ↓



D

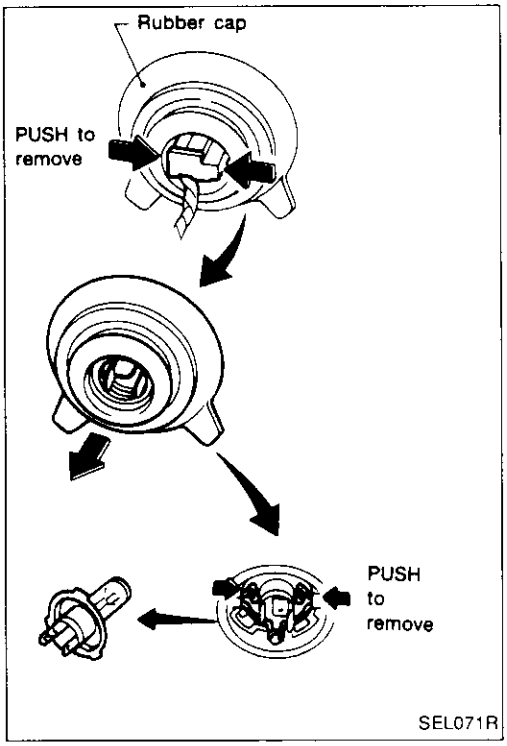
POWER SUPPLY CIRCUIT CHECK
(For aiming motor unit)
Check if 12 volts exist between terminals ①, ②, ③, ④ and ⑥.

Voltmeter terminals (+)	Voltmeter terminals (−)	Voltage [V]	Aiming switch position
①	⑥	Approx. 12	"0"
		0	Except "0"
②	⑥	Approx. 12	"1"
		0	Except "1"
③	⑥	Approx. 12	"2"
		0	Except "2"
④	⑥	Approx. 12	"3"
		0	Except "3"

N.G. → Check harness between aiming switch and aiming motor unit.

O.K. ↓

Replace aiming motor unit.



Bulb Replacement

The headlamp is a semi-sealed beam type which uses a replaceable halogen bulb. The bulb can be replaced from the front compartment side without removing the headlamp body.

- **Grasp only the plastic base when handling the bulb. Never touch the glass envelope.**

1. Disconnect the battery cable.
2. Disconnect the harness connector from the back side of the bulb.
3. Pull off the rubber cap.
4. Remove the headlamp bulb carefully. Do not shake or rotate the bulb when removing it.
5. Install in the reverse order of removal.

CAUTION:

- **Do not leave the bulb out of the headlamp reflector for a long period of time as dust, moisture, smoke, etc. may enter the headlamp body and affect the performance of the headlamp. Thus, the headlamp bulb should not be removed from the headlamp reflector until just before a replacement bulb is to be installed.**

Aiming Adjustment

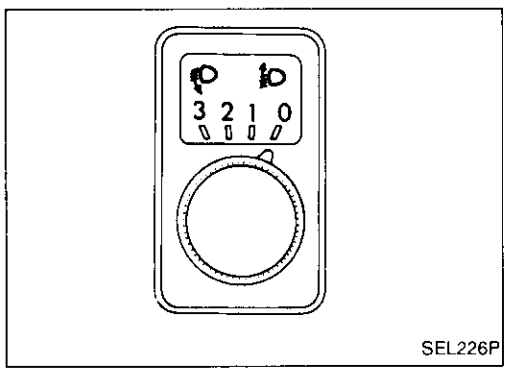
When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. For operating instructions of any aimer, it should be in good repair, calibrated and used according to respective operation manuals supplied with the unit.

If any aimer is not available, aiming adjustment can be done as follows:

For details, refer to the regulations in your own country.

CAUTION:

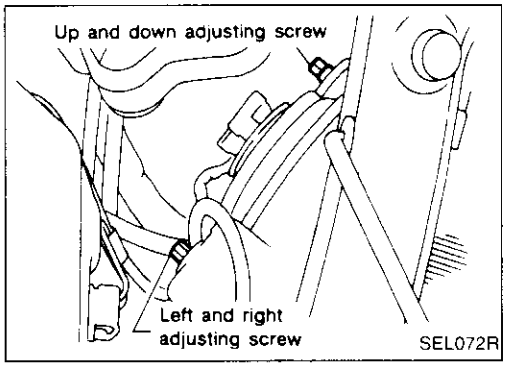
a. **Keep all tires inflated to correct pressures.**
b. **Place vehicle and tester on one and same flat surface.**
c. **See that there is no-load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).**



CAUTION:
Be sure aiming switch is set to "0" when performing aiming adjustment on vehicles equipped with headlamp aiming control.

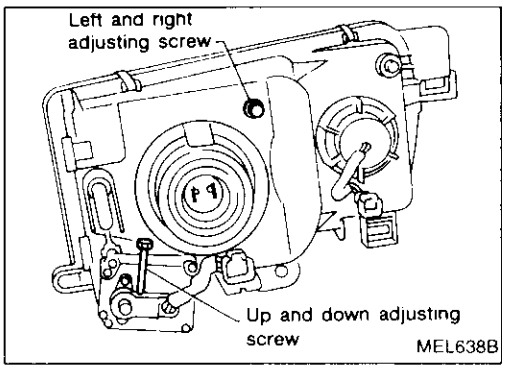
Aiming Adjustment (Cont'd)

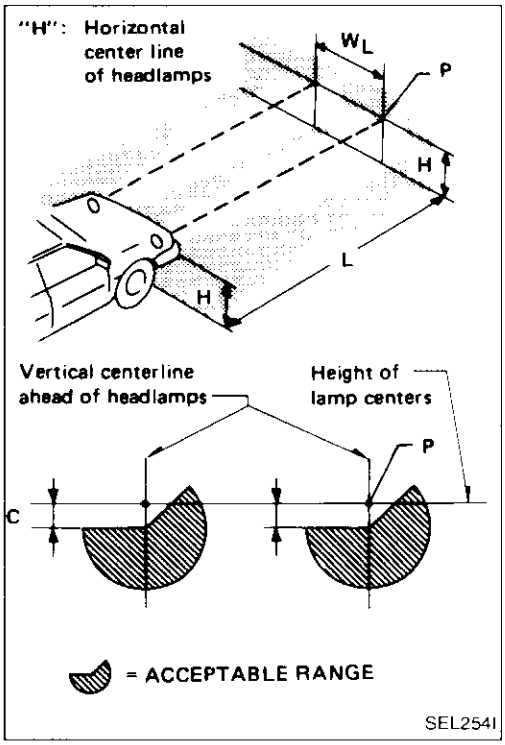
LOW BEAM



1. Turn headlamp low beam on.
2. Use adjusting screws to perform aiming adjustment.

- **First tighten the adjusting screw all the way and then make adjustment by loosening the screw.**





a. **Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in illustration.**
b. **Figure to the left shows headlamp aiming pattern for driving on right side of road; for driving on left side of road, aiming pattern is reversed.**
c. **Dotted lines in illustration show center of headlamp.**

"H": **Horizontal center line of headlamps**
"W_L": **Distance between each headlamp center**
"L": **5,000 mm (196.85 in)**
"C": **53 mm (2.09 in)**