

ELECTRICAL SYSTEM



SECTION



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Refer to Section EF (Engine Fuel) for:

- EFI SYSTEM

Refer to Section EC (Emission Control System) for:

- EMISSION CONTROL SYSTEM

Refer to Section HA (Heater & Air Conditioner) for:

- HEATER
- AIR CONDITIONER

ELECTRICAL DIAGNOSIS INTRODUCTION

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

The key to timely and accurate diagnosis of electrical problems is to:

- Have a basic understanding of electrical principles and electrical component operation.
- Be able to interpret wiring diagrams and schematics.
- Know the various test methods and when to use each.
- Have a systematic approach to identify the specific cause of an electrical problem.

BASIC RULE OF ELECTRICITY

A complete electrical circuit must have:

- A Source (battery, alternator)
- A Load (lights, coil, amplifiers, motor, etc.)
- Electrical Pathway [connecting from the source to the load and back to the source]; [wires, switches, body of car (ground)].

Remembering this basic rule will make it a lot easier to troubleshoot













electrical problems.

WIRING DIAGRAMS

There are several wiring diagrams and schematics illustrating each electrical circuit in the S130. Accurate diagnosis of electrical problems requires that you effectively use and interpret these diagrams. Since they have a special language, i.e., symbols, codes and abbreviations, let's review the following chart.

ELECTRICAL SYMBOLS AND ABBREVIATIONS

SYMBOLS

	Single filament bulb		or		Switch (Normally open)
	Dual filament bulb		or		Switch (Normally closed)
	Fuse				Ground
	Fusible link				No connection between wires
	Diode				Connection between wires


















WIRE COLOR CODING

B = Black	Y = Yellow
W = White	Lg = Light Green
R = Red	Br = Brown
G = Green	Gr = Gray
L = Blue	

In case of color coding with Tracers, Base Color is given first, followed by the Tracer Color:

Example: LW = Blue w/White Tracers

CONNECTORS

	Resistor		Pin-type connector (Male)	
	Coil		Pin-type connector (Female)	
	Variable resistor		Plain-type connector (Male)	
	Thermistor		Plain-type connector (Female)	
	Reed switch		Bullet connector (Female and male)	
	Circuit breaker		Plain connector (Female and male)	
	Condenser			

ABBREVIATIONS

- Ⓐ Automatic transmission models
- Ⓜ Manual transmission models
- Ⓣ 2 seater models
- Ⓖ 2+2 seater models
- Ⓝ Grand luxury models
- ⓌⒹ Warning display
- Ⓚ Air conditioner
- Ⓓ Except grand luxury models
- ⓄⓀ Air conditioner equipped models except grand luxury
- Ⓤ U.S.A. models
- Ⓝ Canada models

To trace a problem in any electrical circuit, several types of diagrams can be used.

Fusible Link Supply Routing & Fuse Block Circuit Supply Routing (Refer to pages EL-5, 6). This diagram is helpful in identifying specific problems in the power supply portion of the electrical circuits. For example, let's say a car has inoperative instrument meter lights. A quick check proves that all other lights in the car are operative. The power supply diagram shows that there cannot be a problem between the battery, ignition relay, ignition switch or fuse since the power supply circuit for the instrument meter lights is common with the clearance, tail, side marker and license plate lights. Therefore, the cause of this specific problem must lie past the fuse, such as in the wiring, meter lights, or ground.

Schematic. A schematic is a very simplified wiring diagram useful for tracing electrical current flow and studying the operation of an electrical circuit.

Circuit Wiring Diagram. This diagram is a more "true to life" layout of a complete circuit than the schematic. It identifies types and number of connectors, electrical terminal positions in the connector, color coding of wires, and connector codes. In order to quickly find the exact location of a connector, the connector codes can be cross-referenced to the harness layout illustrations in the back of this section.

Complete Wiring Diagram (Fold-out page). The complete wiring diagram will assist in locating interrelated circuits i.e., circuits which share common ground circuits, power circuits, etc.

TESTING

Many people think of electrical testing as connecting electrical test instruments into a circuit and measuring amps, volts and ohms. But there is really a lot more. In fact using test instruments should be one of the last steps in correcting an electrical problem.

SIGHT AND SOUND play an important role in electrical testing. Relays click, blowers spin, air condition clutches engage, lights illuminate, etc. Even though we cannot observe current flowing through a wire or a component, we can observe the effect it has on an electrical component. Sight and sound testing methods should be thoroughly exhausted before hooking-up any test instrument.

SUBSTITUTION is another test method. For example, you suspect a bad ground at the tail lamp. Try a jumper wire from ground to the lamp. What about a questionable fuse? Simply replace it with another. In several instances substitution may turn out to be the most effective method of correcting an electrical problem.

TEST INSTRUMENTS

Problems that cannot be solved through sight, sound, or substitution can be solved by using the appropriate test instrument. The charts on the back of the car wiring diagram, illustrates how and when these instruments should be used.

A general rule to follow while trouble-shooting is to perform the easiest and least expensive checks first. This often means giving some careful thought to a trouble-shooting plan. Some of the most frustrating and confusing electrical problems begin with a haphazard and planless start. Make sure the checks you have selected are going to give the answers you need. If you test the wrong circuit, use the wrong meter, or forget to check the meter scale and calibration, you just can't diagnose the problem.

TROUBLE-SHOOTING APPROACH

You should have a routine procedure or approach when trouble-shooting a problem, a method you are familiar with which gives you the maximum amount of information at minimum expense and effort. Sometimes it is helpful to ask yourself some questions first. For example:

WHAT IS THE PROBLEM? While

this may seem a foolish question at first glance, the problem involved may not be the same as stated on the repair order or even as observed by the customer. Sometimes, other problems or symptoms have been overlooked. Do not forget to identify the problem and controls involved. Check to see what electrical components work and what components do not work. This is an opportune time to use sight and sound testing methods.

HOW DOES THE CIRCUIT WORK? Once the electrical problem has been identified, consult the various wiring diagrams in the service manual.

Study the simplified schematic to develop an understanding of how the circuit is supposed to work. Then use the circuit wiring diagram, harness layout illustration, fusible link supply routing & fuse block circuit supply routing, and car wiring diagram. Get an idea of how the circuit is laid out in the car and how it interrelates with other circuits.

WHICH TEST IS BEST? Stop and think of exactly what information you need to reach a proper solution. Decide which test will give you the most information. Do not forget to think of where you are going to make your test connections. Make sure you are performing your test at the most advantageous point. You do not want to dismantle a dash assembly to check a component which could be tested at a more accessible location. For instance, it is much easier to check terminal connectors and plugs than to break into a harness.

Once the tests have been performed, you should have the information you need to reach a logical conclusion and solve the problem but, if not, then review your testing procedure. Be certain that you are performing the test correctly and your procedure is valid.

Remember the most complex circuits are constructed from combinations and/or variations of the basic circuit: Source, Conductors, and Load. If you keep this in mind, use the service manual, and follow a logical trouble-shooting sequence, you can effectively troubleshoot electrical problems.

BODY ELECTRICAL WIRING

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

DESCRIPTION

Cables are covered with color-coded vinyl for easy identification. In the wiring diagram, colors are indicated by one or two alphabetical letters.

It is recommended that the battery be disconnected before performing any electrical service other than bulb or fuse replacement.

In addition to fuses, a fusible link

has been installed to protect wiring. The fusible link functions almost the same as a fuse, though its characteristics are slightly different than normal fuses.

CABLE COLORS

Cable colors are generally used as shown in the following table.

Circuit system	Color
Starting and ignition system	B (Black)
Charging system	W (White)
Lighting system	R (Red)
Signal system	G (Green)
Instrument system	Y (Yellow)
Others	L, Br, Lg (Blue), (Brown), (Light green)
Grounding system	B (Black)

The main cable of each system is generally coded with a single color. These colors are represented by such letters as G, W, or Br. Minor items of each circuit's terminal are coded with a two-tone color as follows:

BW : Black with white stripe
LgR : Light green with red stripe

INSPECTION

Inspect all electrical circuits, referring to wiring or circuit diagrams. Circuits should be tested for continuity or short circuit with a conventional test lamp or low reading voltmeter. Before inspecting circuit, ensure that:

1. Each electrical component part or cable is securely fastened to its connector or terminal.

2. Each connection is firmly in place and free from rust and dirt.
3. No cable covering shows any evidence of cracks, deterioration or other damage.
4. Each terminal is at a safe distance away from any adjacent metal parts.
5. Each cable is fastened to its proper connector or terminal.
6. Each grounding bolt is firmly planted.
7. Wiring is kept away from any adjacent parts with sharp edges or high temperature parts (such as exhaust pipe).
8. Wiring is kept away from any rotating or working parts: fan pulley, fan belt, etc.
9. Cables between fixed portions and moving parts are long enough to withstand shocks and vibratory forces.

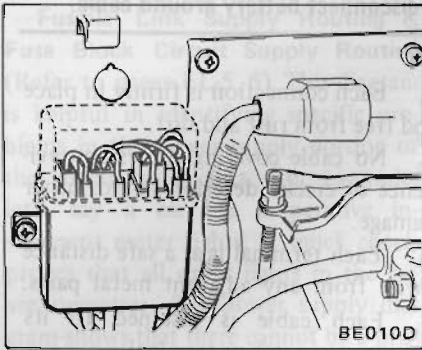
- a. Before starting to inspect and repair any part of electrical system or other parts which may lead to a short circuit, be sure to turn ignition switch "OFF" and then disconnect cables at battery terminals as follows:

Disconnect cable at negative (–) terminal, and then disconnect cable at positive (+) terminal.

Before connecting cables to battery terminal, be sure to clean terminals with a rag. Fasten cable at positive (+) terminal, and then ground cable at negative (–) terminal. Apply grease to top of these terminals to prevent rust from developing on them.

- b. Never use a screwdriver or service tool to conduct a continuity test. Use test leads.
- c. Never ground an open circuit or circuits under no load. Use a test lamp (12V-3W) or circuit tester as a load.

FUSIBLE LINK

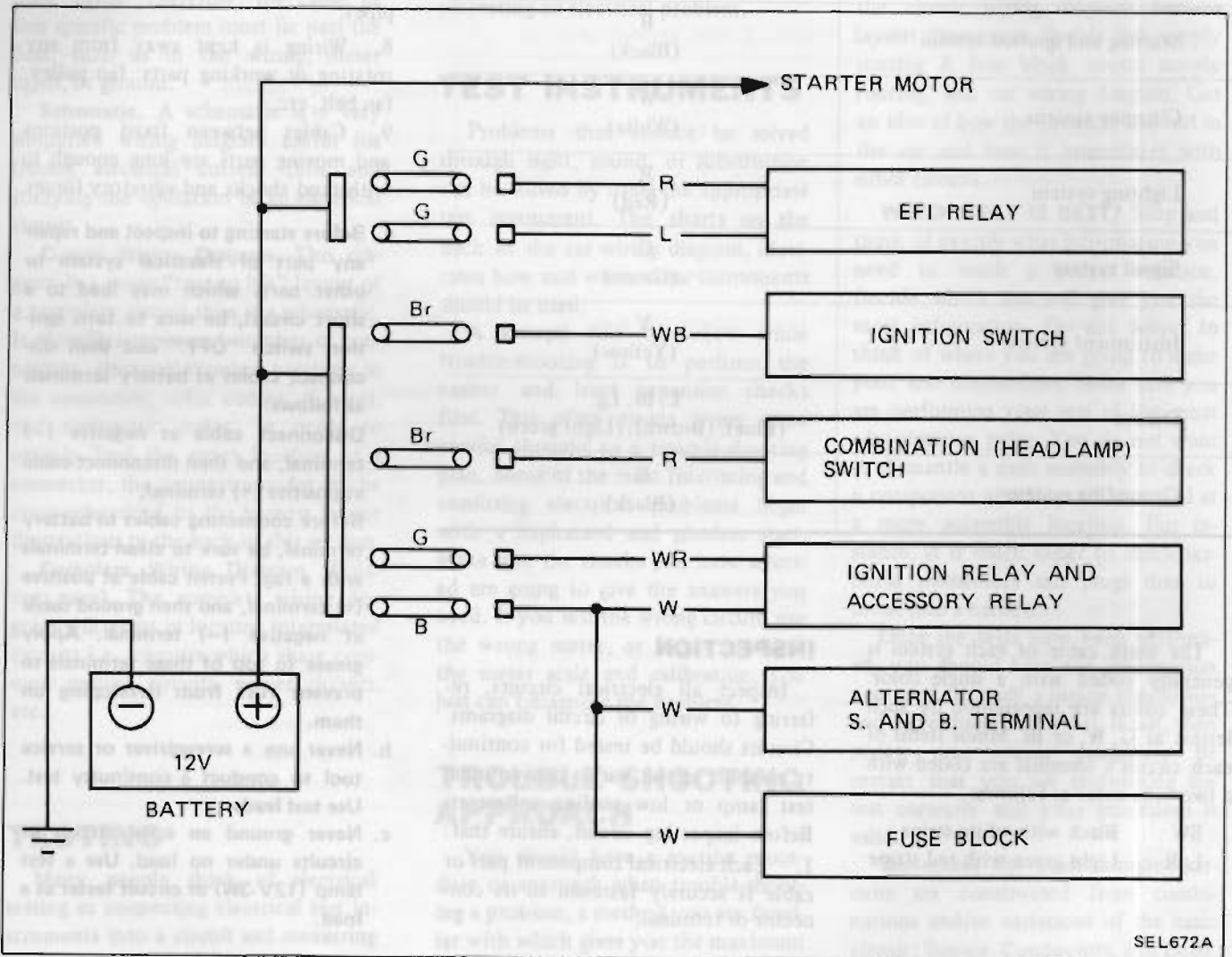


CAUTION:

- 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.

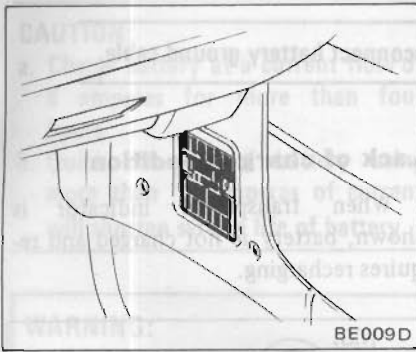
A melted fusible link can be detected either by visual inspection or by feeling with finger-tip. If its condition is questionable, use circuit tester or test lamp, as required, to conduct continuity test. This continuity test can be performed in the same manner as for any conventional fuse.

FUSIBLE LINK SUPPLY ROUTING



SEL672A

FUSE



The fuse box is installed on the side wall under the dash board.

When, for one reason or another, fuse has melted, use systematic procedure to check and eliminate cause of problem before installing new fuse.

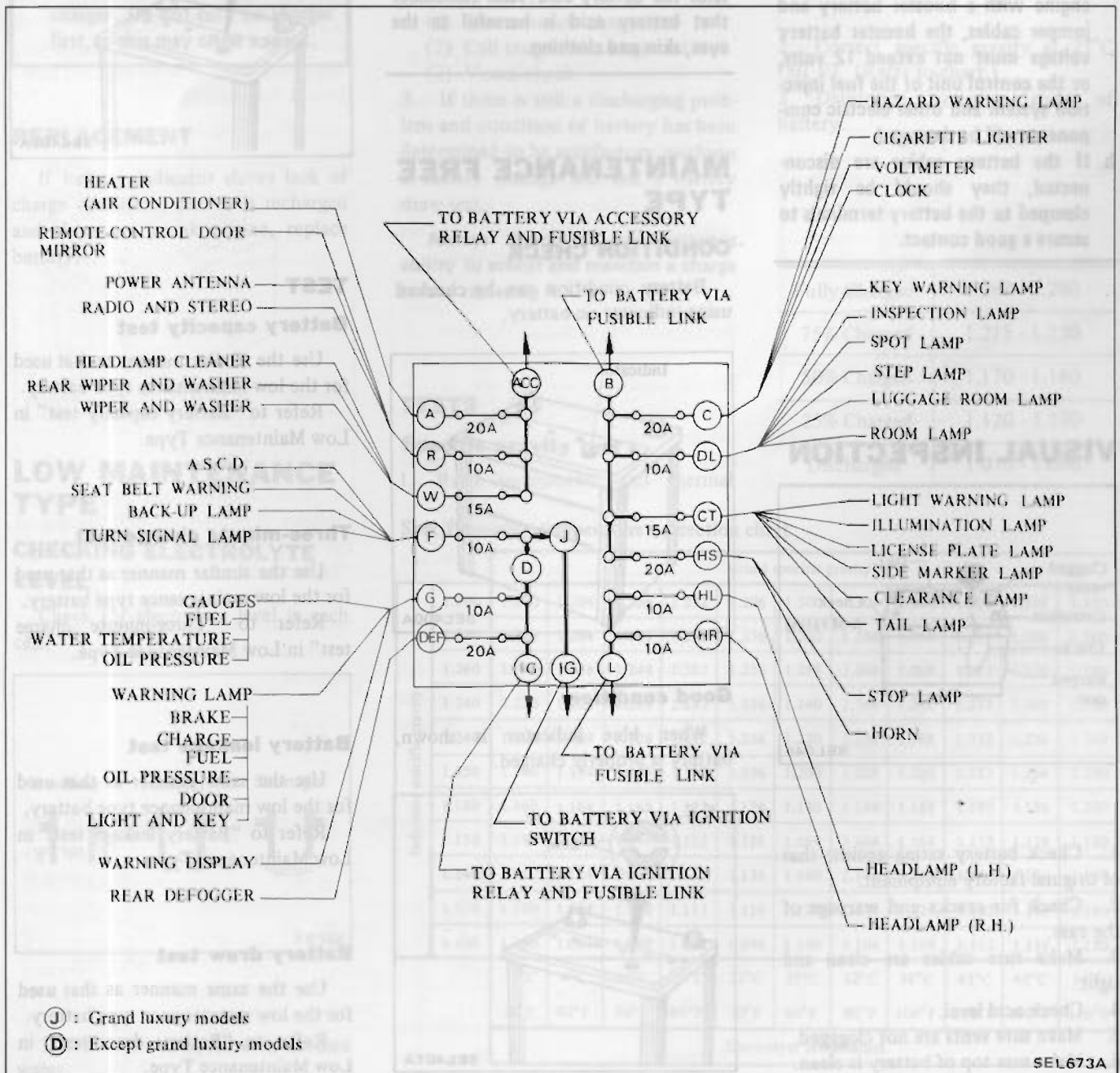
b. Use fuse of specified rating. Never use fuse of more than specified rating.

c. Check condition of fuse holders. If much rust or dirt is found thereon, clean metal parts with fine-grained sandpaper until proper metal-to-metal contact is made.

Poor contact in any fuse holder will often lead to voltage drop or heating in the circuit and could result in improper circuit operation.

a. If fuse is blown, be sure to eliminate cause of problem before installing new fuse.

FUSE BLOCK CIRCUIT ROUTING



BATTERY

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

WARNING:

Never touch positive and negative terminals at the same time with bare hands. This could result in injury.

CAUTION:

- a. If it becomes necessary to start the engine with a booster battery and jumper cables, the booster battery voltage must not exceed 12 volts, or the control unit of the fuel injection system and other electric components will be damaged.
- b. If the battery cables are disconnected, they should be tightly clamped to the battery terminals to secure a good contact.

CLEANING

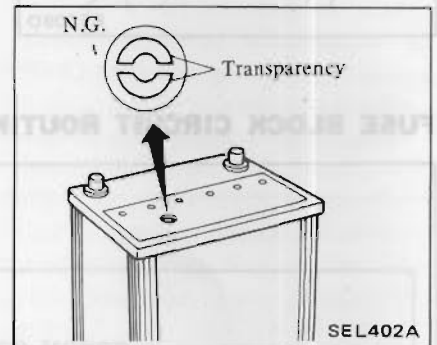
Use a stiff brush and a common baking soda and water solution to clean the battery surface, terminals and cable ends.

CAUTION:

Never allow the solution to enter individual cells. The baking soda will react with the battery acid. Also remember that battery acid is harmful to the eyes, skin and clothing.

Lack of charge condition

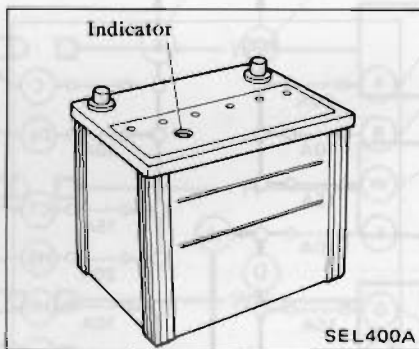
When transparent indicator is shown, battery is not charged and requires recharging.



MAINTENANCE FREE TYPE

CONDITION CHECK

Battery condition can be checked using indicator on battery.



TEST

Battery capacity test

Use the similar manner as that used for the low maintenance type battery. Refer to "Battery capacity test" in Low Maintenance Type.

Three-minute charge test

Use the similar manner as that used for the low maintenance type battery. Refer to "Three-minute charge test" in Low Maintenance Type.

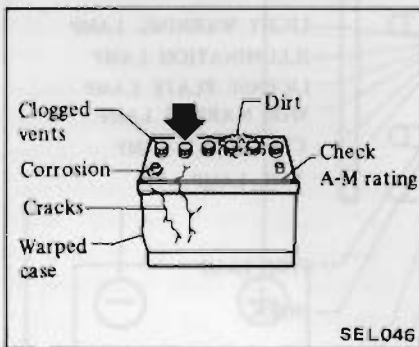
Battery leakage test

Use the same manner as that used for the low maintenance type battery. Refer to "Battery leakage test" in Low Maintenance Type.

Battery draw test

Use the same manner as that used for the low maintenance type battery. Refer to "Battery draw test" in Low Maintenance Type.

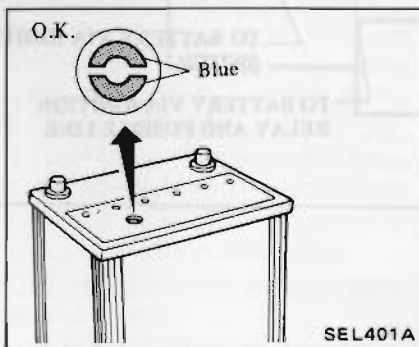
VISUAL INSPECTION



1. Check battery rating against that of original factory equipment.
2. Check for cracks and warpage of the case.
3. Make sure cables are clean and tight.
4. Check acid level.
5. Make sure vents are not clogged.
6. Make sure top of battery is clean.

Good condition

When blue indicator is shown, battery is properly charged.



CHARGING

CAUTION:

- a. Charge battery at a current flow of 6 amperes for more than four hours.
- b. Quick charging of battery using more than 10 amperes of current will shorten service life of battery.

WARNING:

- a. Keep battery away from open flame while it is being charged.
- b. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.

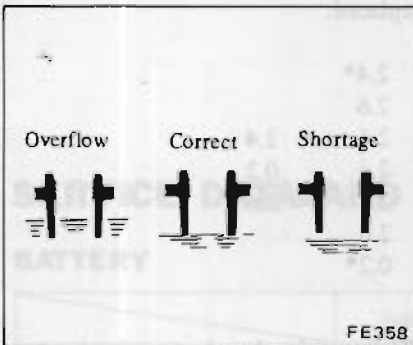
REPLACEMENT

If battery indicator shows lack of charge condition, and it is recharged and does not crank engine, replace battery.

LOW MAINTENANCE TYPE

CHECKING ELECTROLYTE LEVEL

Check for electrolyte level in each cell.



If the level is low, fill with distilled water.

TESTING SEQUENCE

1. Determine battery's state of charge by using the following tests:

- (1) Specific Gravity Test
- (2) Battery Capacity Test

Do not perform battery capacity test unless specific gravity is more than 1.220.

Otherwise faulty reading will be obtained.

2. If battery passes both tests, it is O.K. If battery fails either test, connect a battery charger with a variable amperage control and perform the following tests:

- (1) Three-minute charge test
- (2) Cell test under charge test
- (3) Visual check

3. If there is still a discharging problem and condition of battery has been determined to be satisfactory, perform a battery leakage test and a battery draw test.

Always thoroughly test battery's ability to accept and maintain a charge before replacing it.

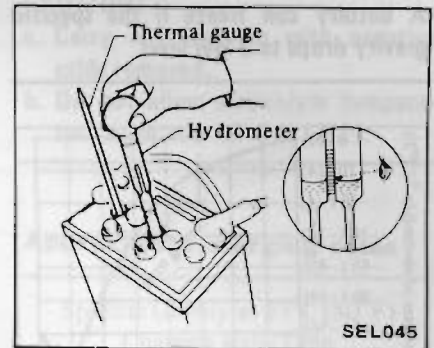
TESTS

Specific gravity test

1. Read hydrometer and thermal

gauge indications at eye level.

Read top level with scale.



2. Correct specific gravity at 27°C (80°F). (Refer to chart.)

3. Determine charging state of battery.

Fully Charged	1.260 - 1.280
75% Charged	1.215 - 1.230
50% Charged	1.170 - 1.180
25% Charged	1.120 - 1.130
Discharged	1.070 - 1.080

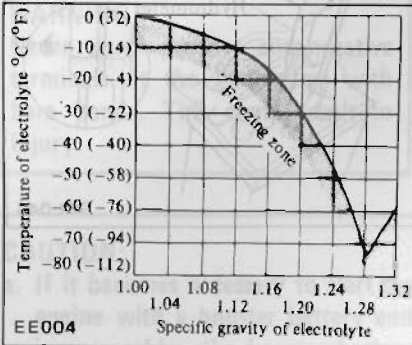
Specific gravity temperature correction chart

		Actual specific gravity											
Indicated specific gravity	1.300	1.280	1.284	1.288	1.292	1.296	1.300	1.304	1.308	1.312	1.316	1.320	
	1.280	1.260	1.254	1.268	1.272	1.276	1.280	1.284	1.288	1.292	1.296	1.300	
	1.260	1.240	1.244	1.248	1.252	1.256	1.250	1.264	1.268	1.272	1.276	1.280	
	1.240	1.220	1.224	1.228	1.232	1.236	1.240	1.244	1.248	1.252	1.256	1.250	
	1.240	1.200	1.204	1.208	1.212	1.216	1.220	1.224	1.288	1.232	1.236	1.240	
	1.200	1.180	1.184	1.188	1.192	1.196	1.200	1.204	1.208	1.212	1.216	1.220	
	1.180	1.160	1.164	1.168	1.172	1.176	1.180	1.184	1.188	1.192	1.196	1.200	
	1.150	1.140	1.144	1.148	1.152	1.156	1.160	1.164	1.168	1.172	1.176	1.180	
	1.140	1.120	1.124	1.128	1.132	1.136	1.140	1.144	1.148	1.152	1.156	1.160	
	1.120	1.100	1.104	1.108	1.112	1.116	1.120	1.124	1.128	1.132	1.136	1.140	
1.100	1.080	1.084	1.088	1.092	1.096	1.100	1.104	1.108	1.112	1.116	1.120		
		-1°C	4°C	10°C	16°C	21°C	27°C	32°C	38°C	43°C	49°C	54°C	
		30°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	
		Electrolyte temperature											

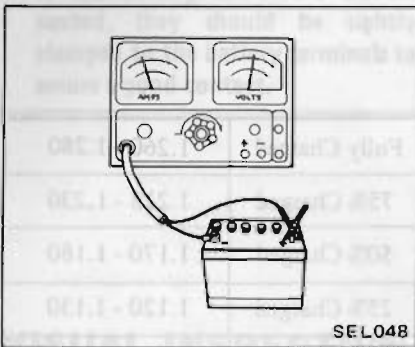
Battery Freezing

CAUTION:

A battery can freeze if the specific gravity drops to a low level.

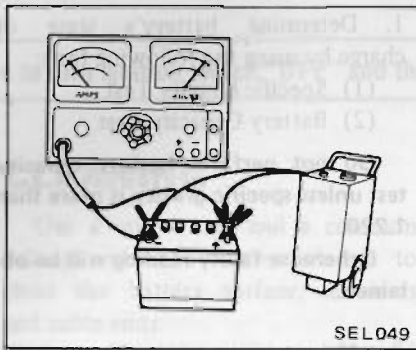


Battery capacity test



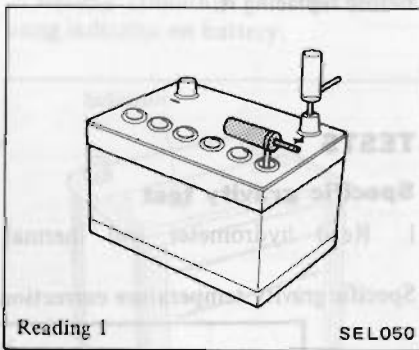
1. Check battery rating against that of original factory equipment.
2. With battery connected to tester as shown, turn load knob until a draw of 3 times the battery rating is shown. (Example: Battery rating 60AH Turn load to 180A draw.)
3. Hold this draw for 15 seconds, then look at voltage. If voltage remains at 9.6 volts or above, THE BATTERY IS GOOD. You need not perform any further tests. If voltage drops below 9.6 volts, then proceed to next test.

Cell test under charge

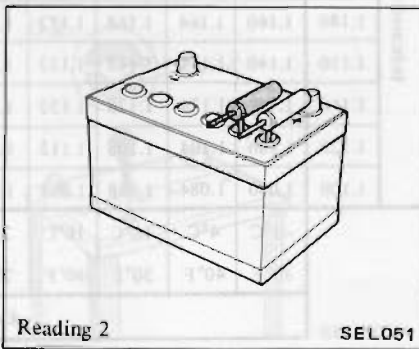


Connect tester and battery charger. Set to fast charge rate (35 to 40A).

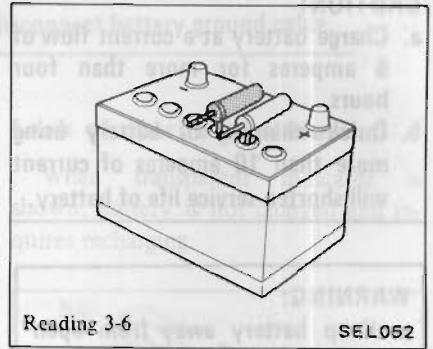
1. Turn to low range voltmeter.
2. Attach special cell probes to voltmeter leads.
3. Touch positive probe to battery positive (+) terminal.
4. Stick black probe in battery cell nearest the battery positive post. WRITE DOWN voltmeter reading.



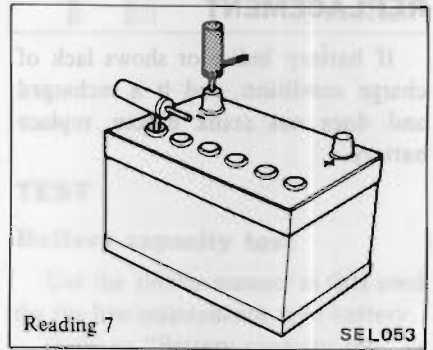
5. Now put positive probe in cell nearest the positive post. Put negative probe in next cell down. Record reading.



6. Continue on down the battery, recording reading each time.



7. When you get to point where positive probe is in last cell of battery, touch negative probe to negative post. Record this reading.



8. You should now have seven readings. Now add the first reading to the last; this will give you six readings. They should all be within 0.2 (two-tenths) volt of each other. If one cell varies more than this amount from any other, then battery is bad and must be replaced.

$$\begin{array}{r}
 2.4^* \\
 2.6 \\
 2.6 \quad 2.4 \\
 2.6 \quad \underline{0.2} \\
 2.6 \quad = 2.6^* \\
 2.6 \\
 0.2^*
 \end{array}$$

Three-minute charge test

This test identifies a battery as being sulfated and should only be performed if the battery has failed the capacity test.

1. Connect a good quality battery charger. Remove cell caps.
2. Turn charger to a fast rate not over 40A.
3. After three minutes, check voltmeter reading. If it is over 15.5 volts (16.5 for maintenance free batteries) battery should be replaced.

1. Set voltmeter to low range.
2. Touch negative lead of voltmeter to negative battery post.
3. Touch positive lead of voltmeter to top of battery, and move it around. If reading goes over 0.5 volts, then clean off top of battery and retest.

CHARGING

CAUTION:

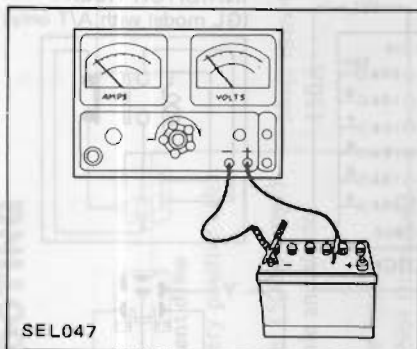
- a. Carry out charging with negative cable removed.
- b. Do not allow electrolyte temperature to go over 45°C (113°F).

Visual check under charge

This test can be performed in conjunction with "Cell test under charge" or "Three-minute charge test". While fast charging simply inspect each cell for signs of bubbling. A cell in which no bubbling action occurs is an indication of a weak cell.

Battery leakage test

Check to make sure battery is not discharging across top, between two posts.



Battery draw test

For discharging problems after other battery tests show that the battery is good and capable of holding a charge perform the battery draw test.

1. Disconnect battery ground cable.
2. Insert test light in series between cable end and the negative battery post.
3. With all switches and systems off the test light should not be lit.
4. If the light is lit begin disconnecting fuses and units until the light goes out. **The clock is designed to run at all times. Be sure it is not the cause of the light being on.**
5. Repair the circuit causing the draw.

Approximate charging rates

Specific Gravity at 27°C (80°F) Charging Rate/Time	
1.150 or less	40 amps/45 minutes
1.150 to 1.175	40 amps/30 minutes
1.175 to 1.200	40 amps/20 minutes
1.200 to 1.225	40 amps/10 minutes
above 1.225	slow charge

WARNING:

- a. Keep battery away from open flame while it is being charged.
- b. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

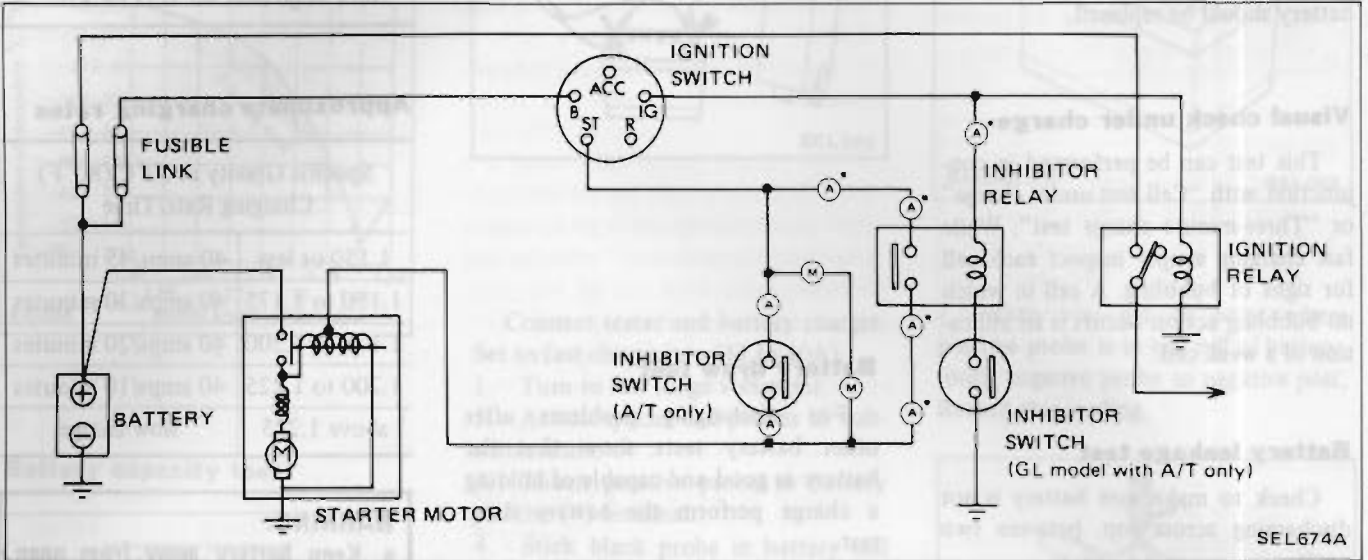
BATTERY

	N60MF	N70Z
Applied model	U.S.A.	Canada
Capacity V-AH	12-60	12-70
Full charging specific gravity at 20°C (68°F)	—	1.28

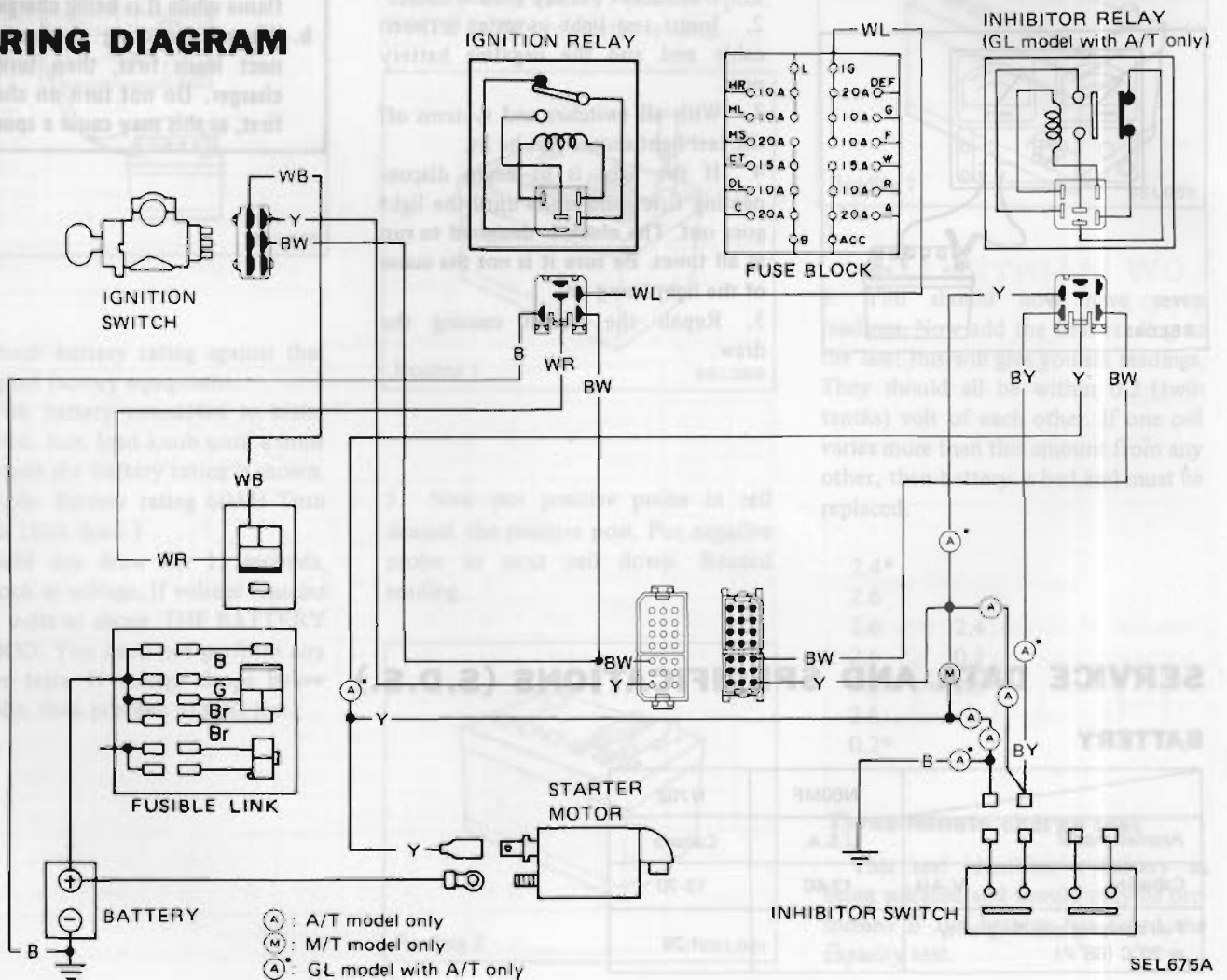
STARTING SYSTEM

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

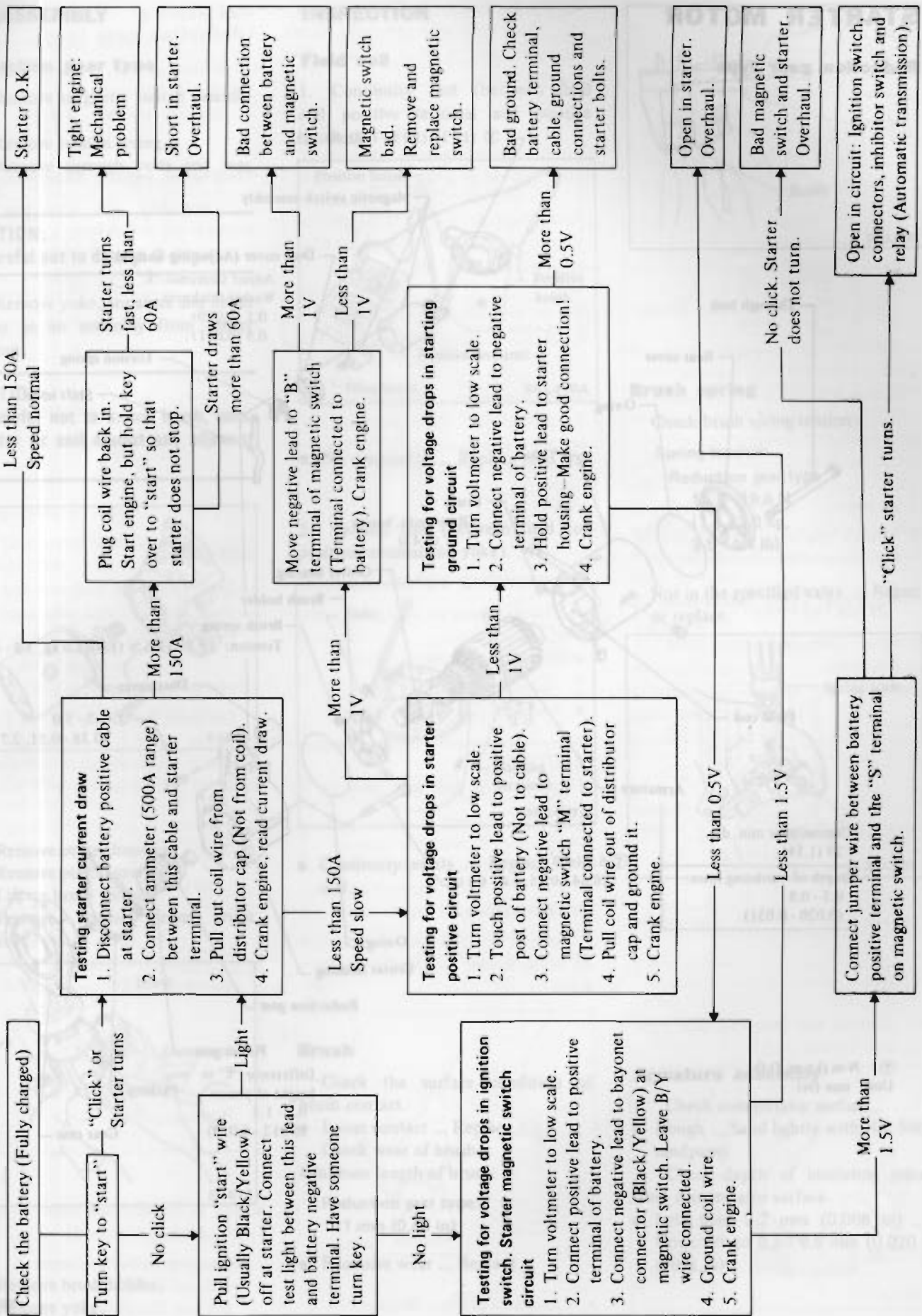
SCHEMATIC



WIRING DIAGRAM

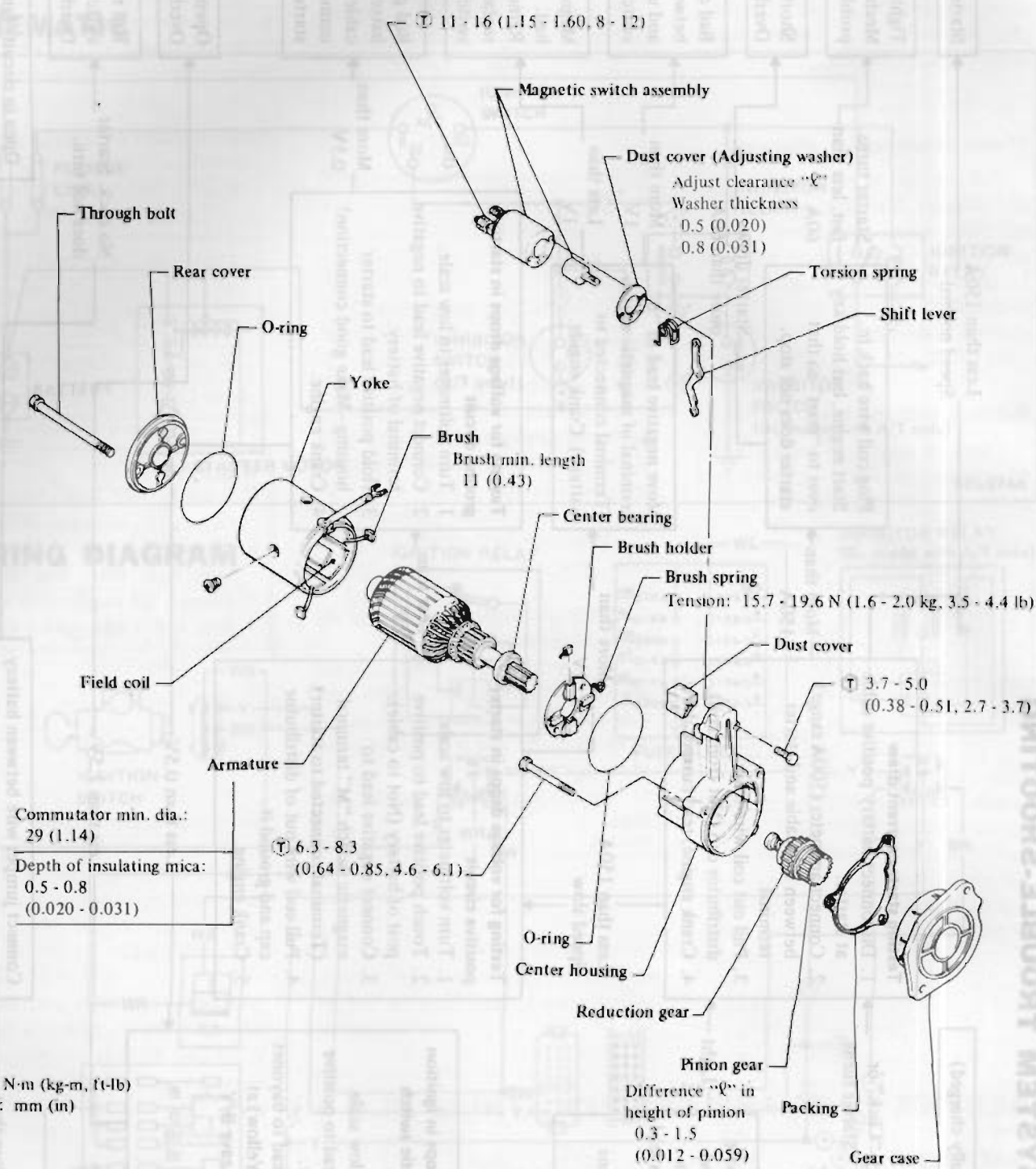


STARTING SYSTEM TROUBLE-SHOOTING



STARTER MOTOR

Reduction gear type



τ : N·m (kg·m, ft·lb)
Unit: mm (in)

DISASSEMBLY

Reduction gear type

1. Remove magnetic switch assembly.
2. Remove torsion spring.
3. Remove through bolts and rear cover.

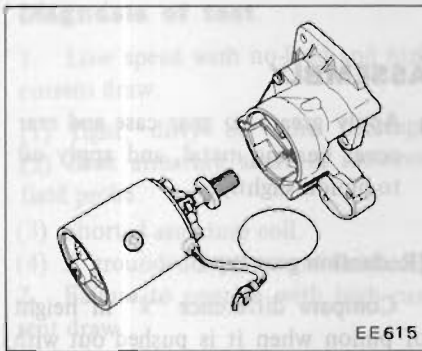
CAUTION:

Be careful not to damage O-ring.

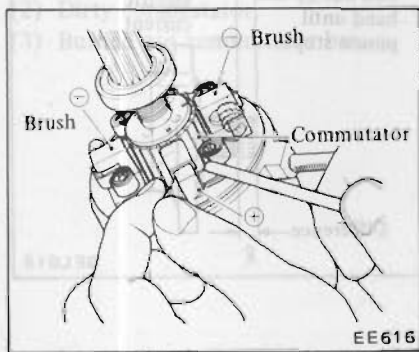
4. Remove yoke, armature and brush holder as an assembly from center housing.

CAUTION:

Be careful not to knock brush, commutator or coil against any adjacent part.



5. Remove center housing.
6. Remove pinion gear.
7. Lift up brush springs.
8. Remove brushes from brush holder.

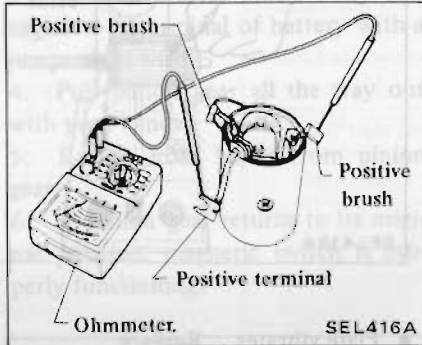


9. Remove brush holder.
10. Remove yoke.

INSPECTION

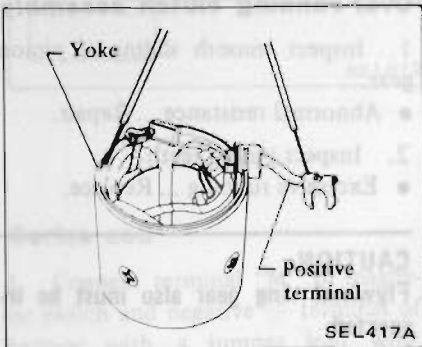
Field coil

1. Continuity test (between field coil positive terminal and positive brushes).



- No continuity ... Replace field coil.

2. Ground test. (between field coil positive terminal and yoke).



- Continuity exists ... Replace field coil.

Brush

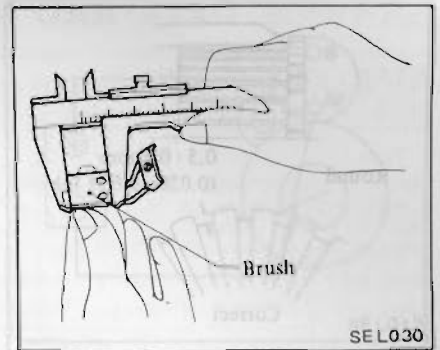
Check the surface condition of brush contact.

- Loose contact ... Replace.
- Check wear of brush.

Minimum length of brush:

Reduction gear type:
11 mm (0.43 in)

- Excessive wear ... Replace.



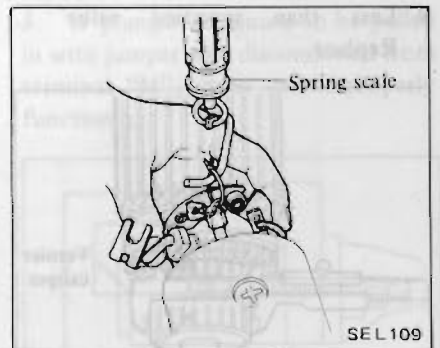
Brush spring

Check brush spring tension.

Spring tension:

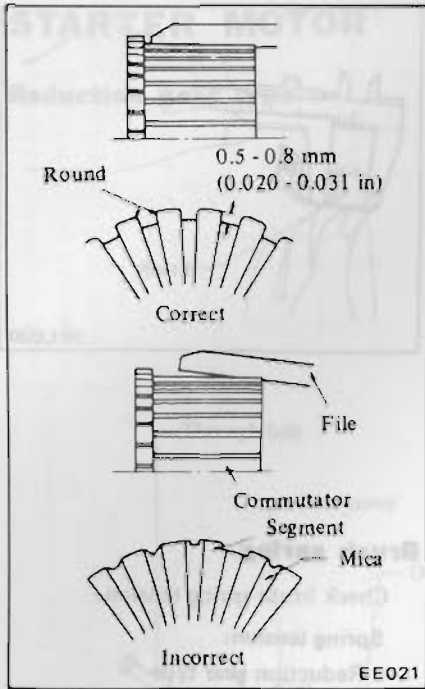
Reduction gear type
15.7 - 19.6 N
(1.6 - 2.0 kg,
3.5 - 4.4 lb)

- Not in the specified value. ... Repair or replace.



Armature assembly

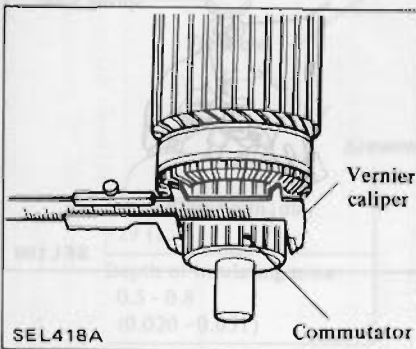
1. Check commutator surface.
 - Rough ... Sand lightly with No. 500 sandpaper.
2. Check depth of insulating mica from commutator surface.
 - Less than 0.2 mm (0.008 in) ... Undercut to 0.5 - 0.8 mm (0.020 - 0.031 in)



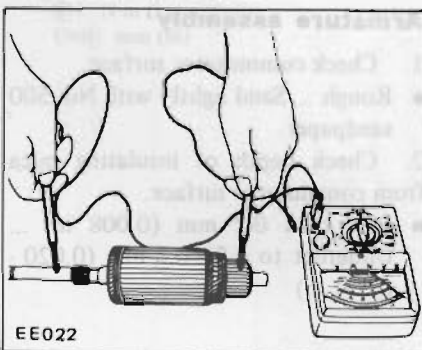
3. Check diameter of commutator. Commutator minimum diameter:

Reduction gear type:
29 mm (1.14 in)

- Less than specified value ... Replace.



4. Ground test (between each commutator bar and shaft).



- Continuity exists ... Replace.
5. Short test with armature tester (growler) and a piece of iron over armature core.



- Plate vibrates ... Replace.
6. Continuity test (between two segments side by side).
- No continuity ... Replace.

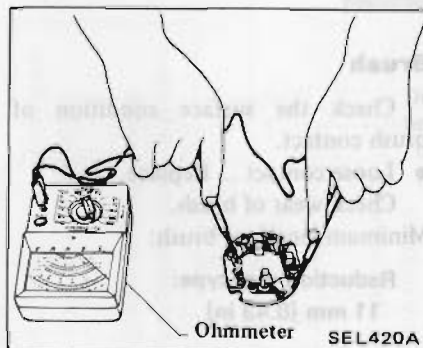
Over-running clutch assembly

1. Inspect smooth sliding of pinion gear.
 - Abnormal resistance ... Repair.
2. Inspect pinion teeth.
 - Excessive rubbing ... Replace.

CAUTION:
Flywheel ring gear also must be inspected.

Brush holder

Ground test (between negative side of brush holder and another positive side).



- Continuity exists ... Replace.

Ball bearing (Reduction gear type)

Holding outer race with finger, rotate bearing.

- Any play or bind ... Replace.

Magnetic switch assembly

1. Continuity test (between "S" terminal and switch body).

- No continuity ... Replace.
2. Continuity test (between terminals "S" and "M").
- No continuity ... Replace.

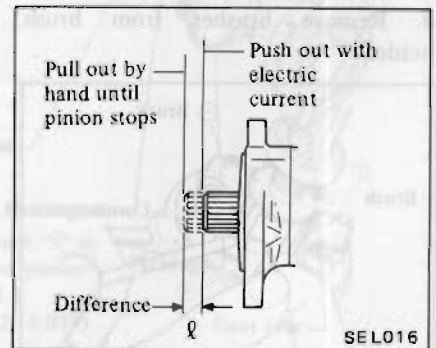
ASSEMBLY

- Apply grease to gear case and rear cover bearing metal, and apply oil to pinion slightly.

(Reduction gear type)

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

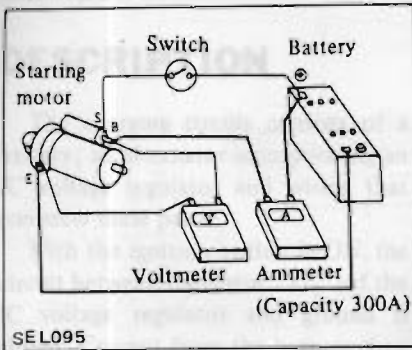
Difference "ℓ":
0.3 - 1.5 mm
(0.012 - 0.059 in)



- Not in the specified value ... Adjust by adjusting washer(s).

Adjusting washer thickness:

0.5 mm (0.020 in)
0.8 mm (0.031 in)

TESTING**Performance test****No-load test****Specifications**

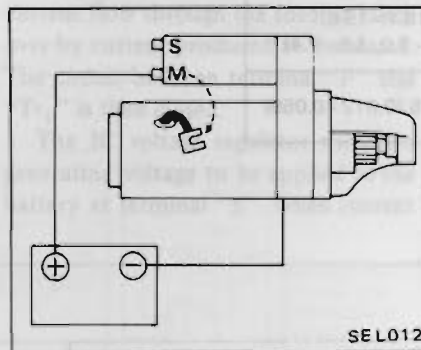
Refer to S.D.S.

Diagnosis of test

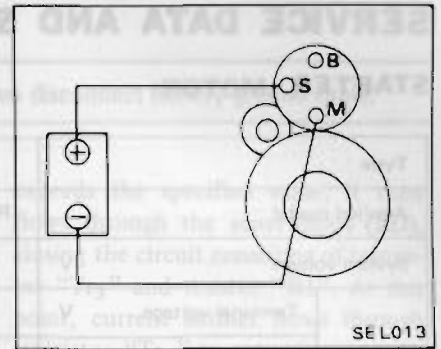
1. Low speed with no-load and high current draw.
 - (1) Tight, dirty or worn bearings.
 - (2) Bent armature shaft or loosened field probe.
 - (3) Shorted armature coil.
 - (4) A grounded armature of field coil.
2. Failure to operate with high current draw.
 - (1) A grounded or open field coil.
 - (2) Burned out commutator bar.
 - Weak brush spring tension
 - Thrust out of mica in commutator
 - Loose contact between brush and commutator.
3. Low current draw and low no-load speed.
 - (1) Loose connections.
 - (2) Dirty commutator.
 - (3) Burned out commutator bar.

Magnetic switch returnability

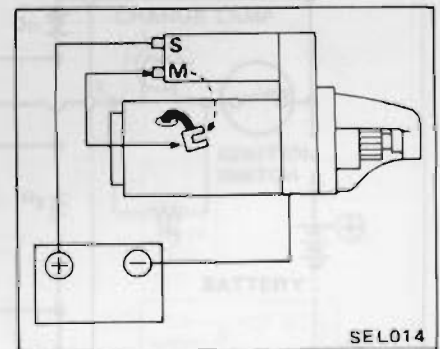
1. Disconnect lead wire from terminal "M" of magnetic switch.
2. Connect terminal "M" and positive \oplus terminal of battery with a jumper lead wire.
3. Connect starter motor body and negative \ominus terminal of battery with a jumper lead wire.
4. Pull pinion gear all the way out with your hands.
5. Release your hands from pinion gear.
6. If pinion gear returns to its original position, magnetic switch is properly functioning.

**Series coil**

1. Connect terminal "M" of magnetic switch and negative \ominus terminal of battery with a jumper lead wire.
2. Connect terminal "S" of magnetic switch and positive \oplus terminal of battery with a jumper wire.
3. With these connections having been made, if plunger is pulled in by force, series coil is properly functioning.

**Shunt coil**

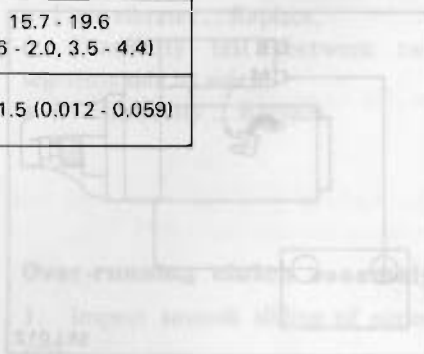
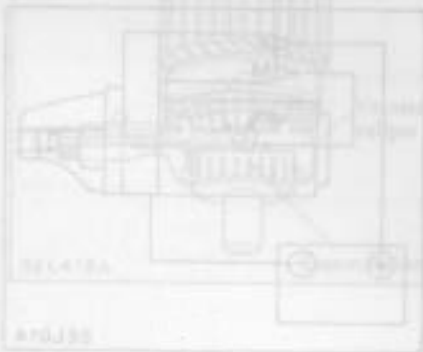
1. Disconnect lead wire which connects terminal "M" of magnetic switch and starting motor terminal, and connect a jumper wire in its place.
2. Connect terminal "S" of magnetic switch and positive \oplus terminal of battery with a jumper wire.
3. Connect negative \ominus terminal of battery and starting motor body with a jumper wire. Plunger should be pulled in by force.
4. Disconnect jumper wire from terminal "M".
5. If plunger continues to be pulled in with jumper wire disconnected from terminal "M", shunt coil is properly functioning.



SERVICE DATA AND SPECIFICATIONS (S.D.S.)

STARTER MOTOR

Type	S114-254D		
Applied model	Reduction gear type		
System voltage	V	12	
No load	Terminal voltage	V	11
	Current	A	Less than 100
	Revolution	rpm	More than 3,900
Outer diameter of commutator	mm (in)	More than 29 (1.14)	
Minimum length of brush	mm (in)	11 (0.43)	
Brush spring tension	N (kg, lb)	15.7 - 19.6 (1.6 - 2.0, 3.5 - 4.4)	
Difference "G" in height of pinion	mm (in)	0.3 - 1.5 (0.012 - 0.059)	



CAUTION:
 1. Connect terminal "M" of the switch and negative terminal of battery with a jumper lead wire.
 2. Connect terminal "S" of magnetic switch and positive terminal of battery with a jumper wire.
 3. With these connections change pinion gear. If pinion is pulled in to face, enter coil a properly fitting...



• Continuity tester ... Repair ...



Diagnosis of test

1. Low speed with no load and high current draw.
- (1) If the brush or wire bearings (2) Wear similar half of bonded field pole.
- (3) Spaced armature coil.
- (4) A grounded laminated field.
1. Failure to operate with high current draw.
- (1) A grounded or open field coil.
- (2) Burned out commutator bar.
- Work with spring tension.
- Turn out of mix in commutator.
- Loose contact between ring and commutator.
3. Low current draw and low no-load speed.



• Not in the specified value ... Adjust ...
 (1) 0.020 (0.8)
 (2) 0.025 (1.0)

CHARGING SYSTEM

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

DESCRIPTION

The charging circuit consists of a battery, an alternator incorporating an IC voltage regulator and wiring that connects these parts.

With the ignition switch in ON, the circuit between transistor "Tr₁" of the IC voltage regulator and ground is closed. Current from the battery then flows along the route shown by the arrow in Figure, turning on the charge warning lamp and flowing on through terminal "L" to excite the rotor.

When the alternator begins to operate, three-phase alternating current is produced in the stator coil. This alternating current is rectified by the positive and negative silicon diodes.

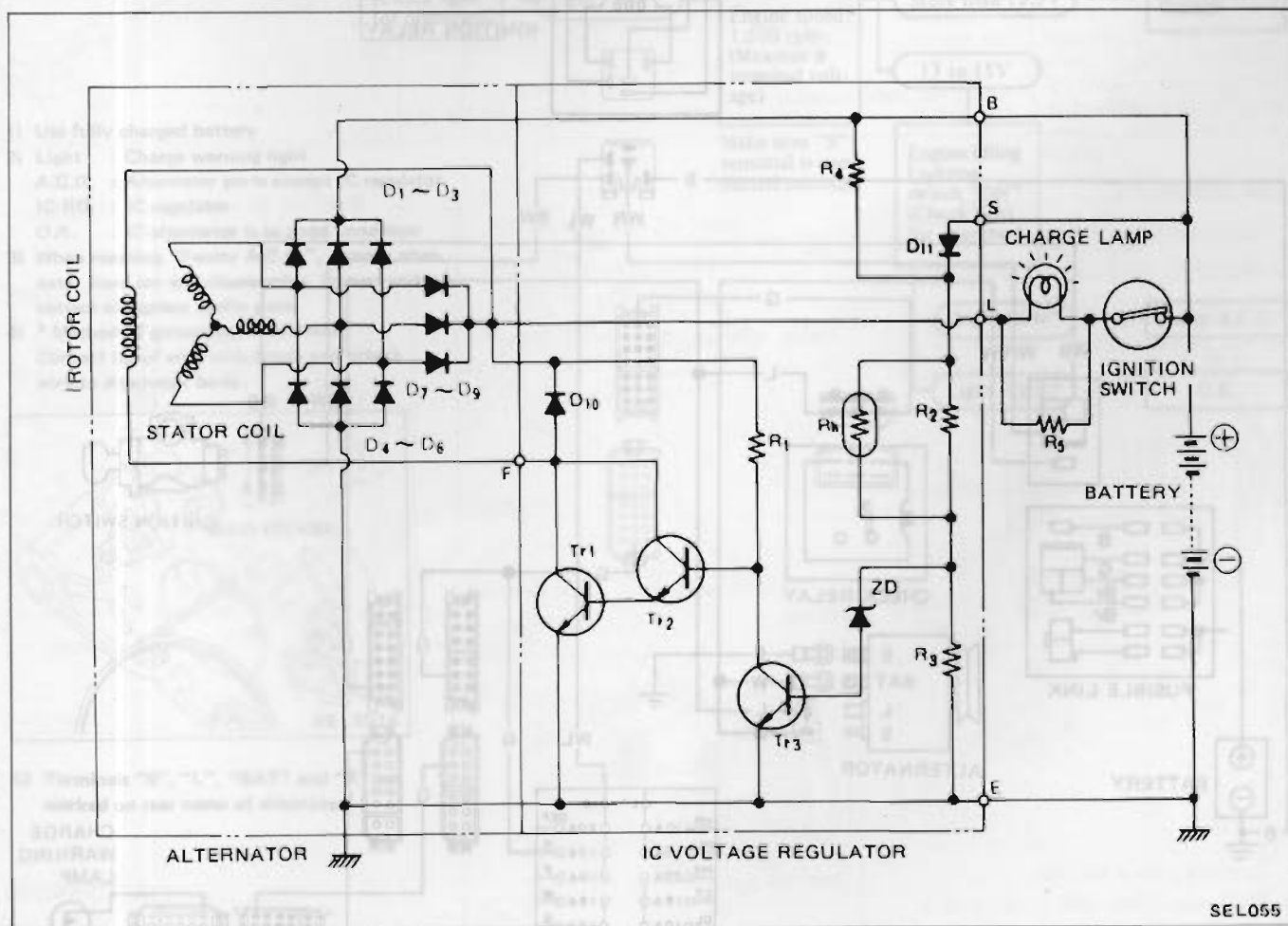
When the voltage at terminal "B" is higher than battery voltage, current produced at the stator flows to re-charge the battery. While the battery is being re-charged, the voltage at terminal "L" is equal to that of terminal "B". At this point, there is no voltage differential on either side of the charge warning lamp, which causes the charge warning lamp to turn off. In other words, current does not flow from the battery to terminal "L". Accordingly, current flow through the rotor is taken over by current produced at the stator. The circuit between terminal "F" and "Tr₁" is then closed:

The IC voltage regulator monitors generating voltage to be applied to the battery at terminal "S". When current

exceeds the specified value, it then flows through the zener diode (ZD), closing the circuit consisting of transistor "Tr₃" and resistor "R1". At this point, current neither flows through transistor "Tr₁" to ground nor to the rotor, thereby reducing the voltage generated at the stator.

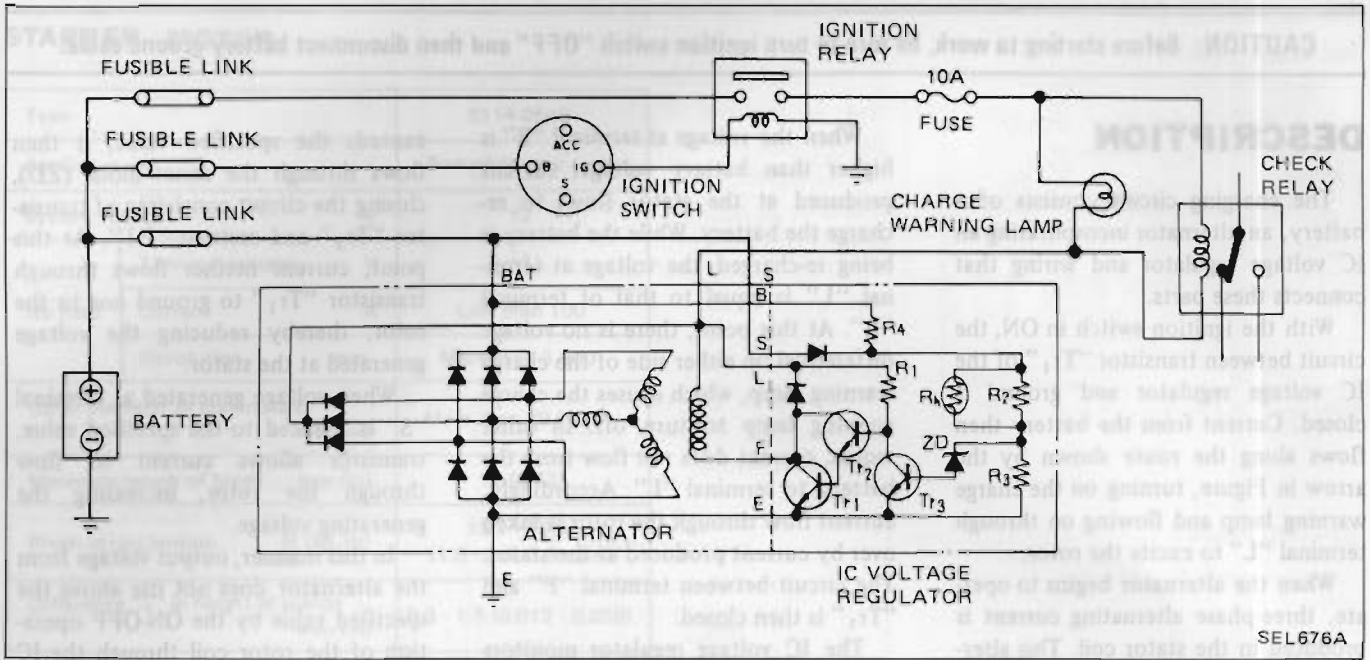
When voltage generated at terminal "S" is reduced to the specified value, transistor allows current to flow through the rotor, increasing the generating voltage.

In this manner, output voltage from the alternator does not rise above the specified value by the ON-OFF operation of the rotor coil through the IC voltage regulator.

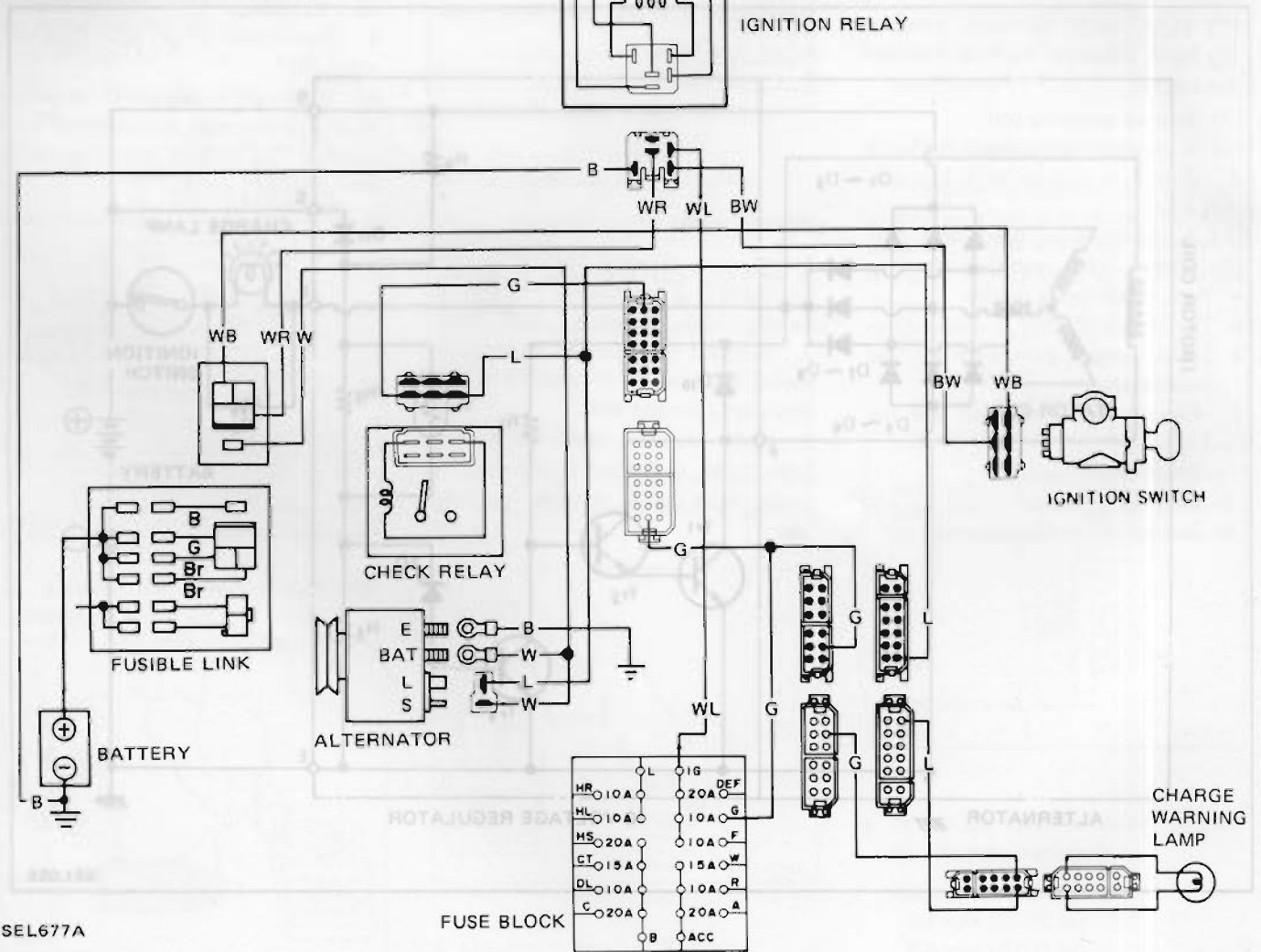


SEL055

SCHEMATIC



WIRING DIAGRAM



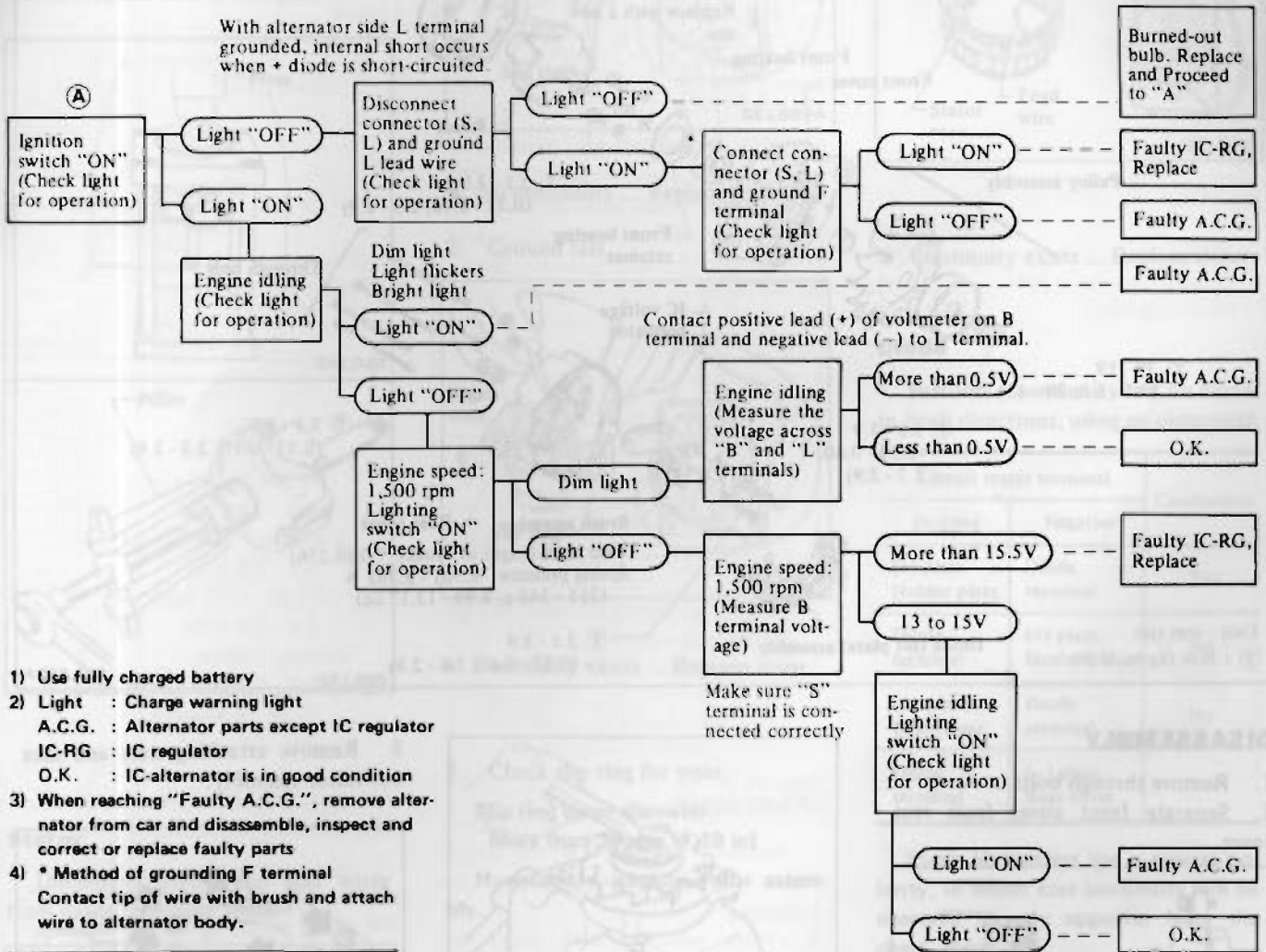
SEL677A

CHARGING SYSTEM TROUBLE-SHOOTING

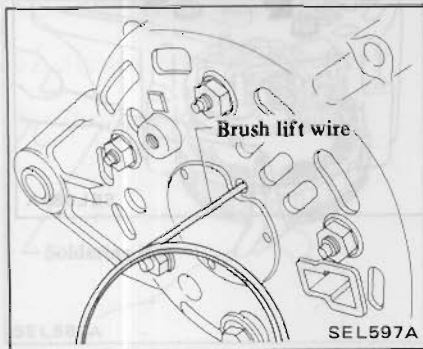
Before conducting an alternator test, make sure that the battery is fully charged.

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.



- 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 "Faulty A.C.G.," remove alternator from car and disassemble, inspect and correct or replace faulty parts
- 4) * Method of grounding F terminal
Contact tip of wire with brush and attach wire to alternator body.



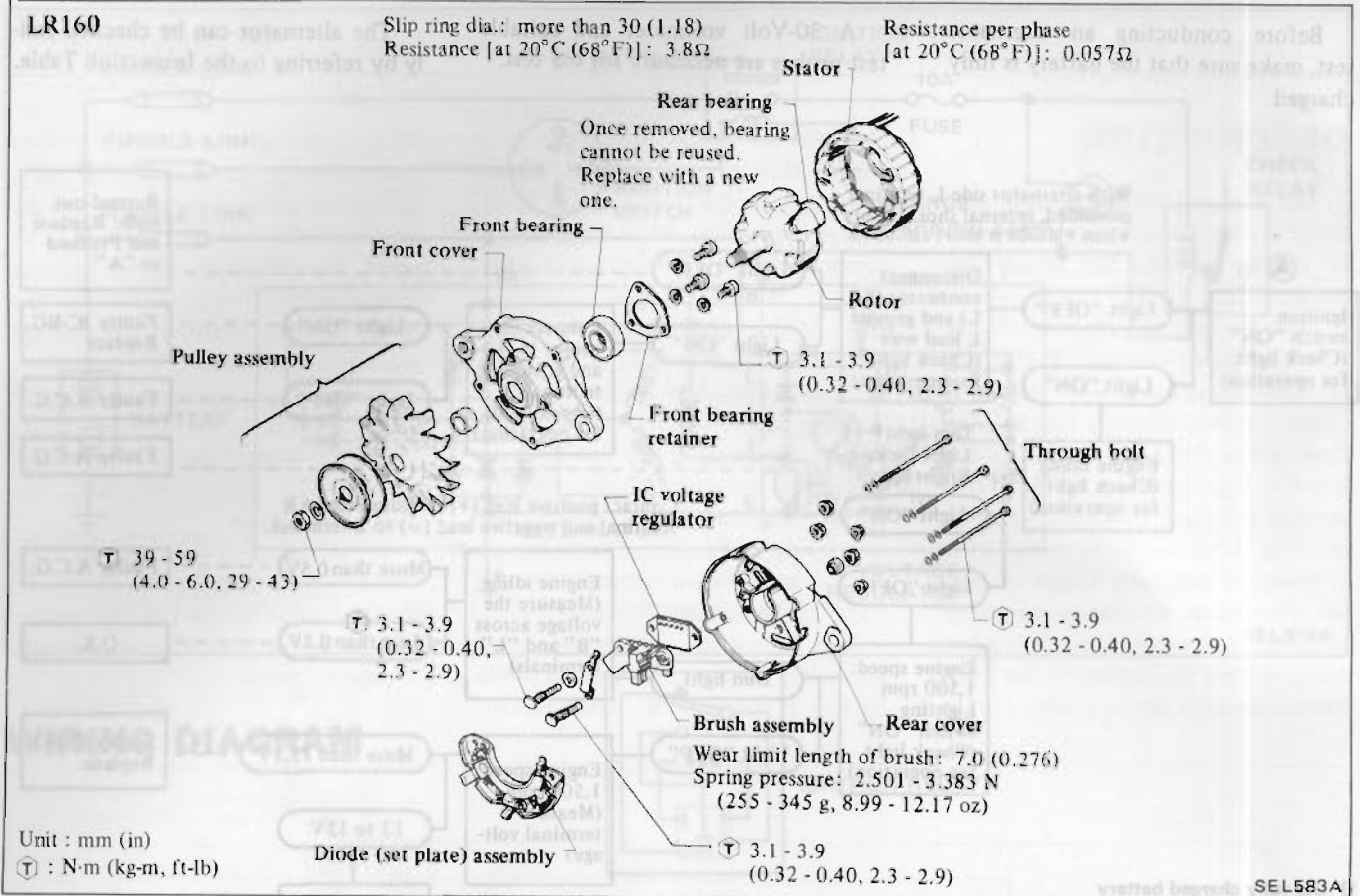
5) Terminals "S", "L", "BAT" and "E" are marked on rear cover of alternator.

INSPECTION

Meter

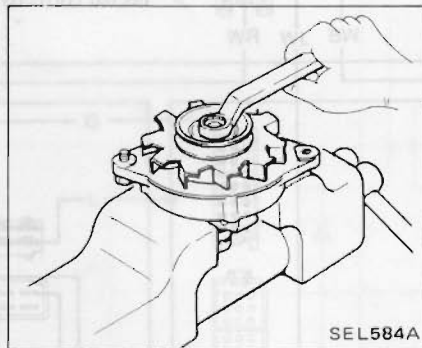
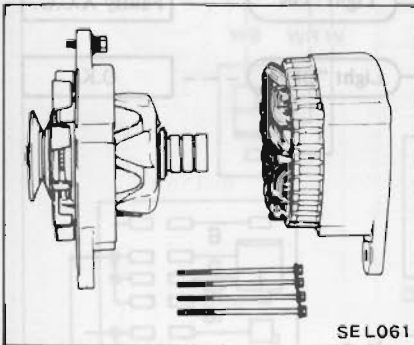
1. Centrality test

ALTERNATOR

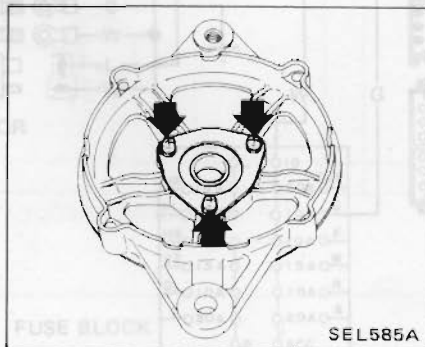


DISASSEMBLY

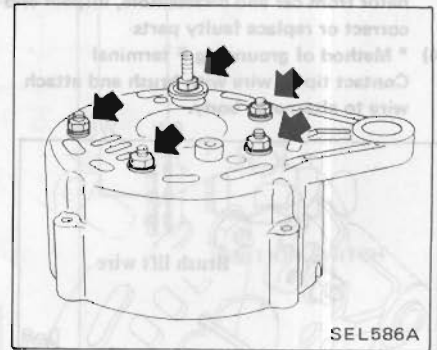
1. Remove through bolts.
2. Separate front cover from rear cover.



4. Remove setscrews from bearing retainer.



5. Remove attaching nuts and take out stator assembly.

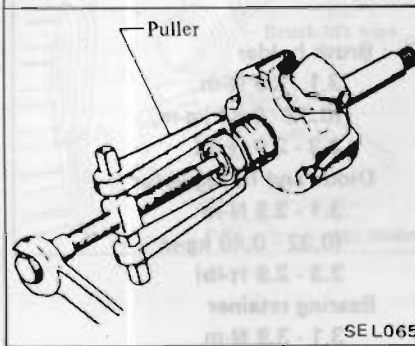
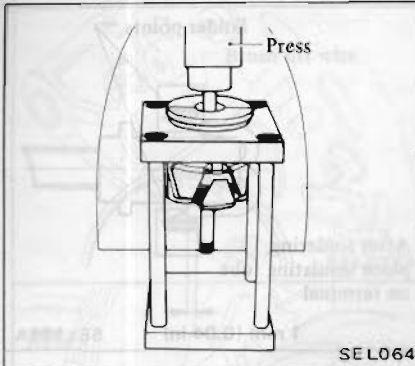


3. Remove pulley and fan.
 - (1) Place rear cover side of rotor in a vice.
 - (2) Remove pulley nut.

Rotor

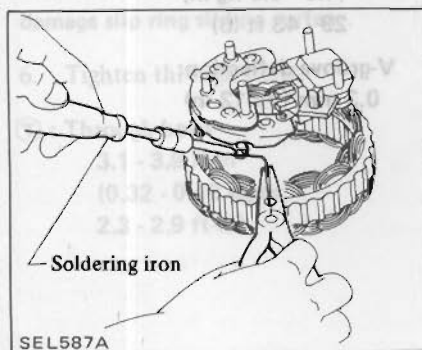
Pull rear bearing off from rotor assembly with a press or bearing puller.

Once removed, bearing cannot be reused. Replace with a new one.



Stator

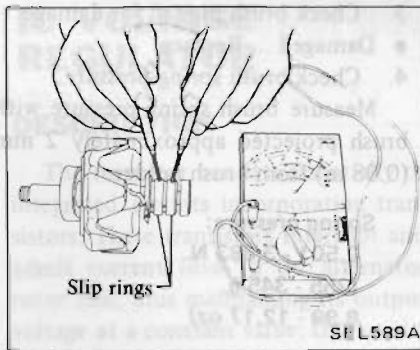
Disconnect stator coil lead wires from diode terminals.



INSPECTION

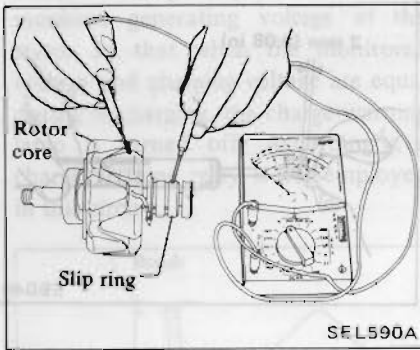
Rotor

1. Continuity test.



• No continuity ... Replace rotor.

2. Ground test



• Continuity exists ... Replace rotor.

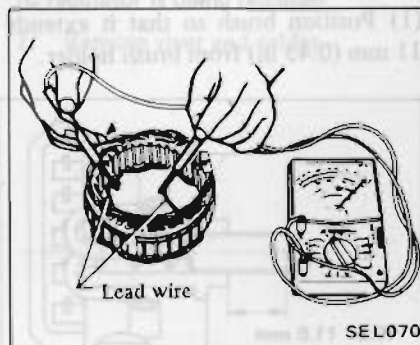
3. Check slip ring for wear.

Slip ring outer diameter
More than 30 mm (1.18 in)

If necessary, replace rotor assembly.

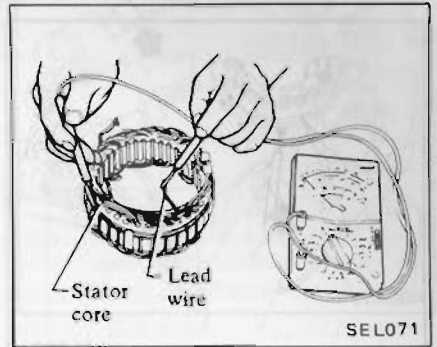
Stator

1. Continuity test



• No continuity ... Replace stator.

2. Ground test



• Continuity exists ... Replace stator.

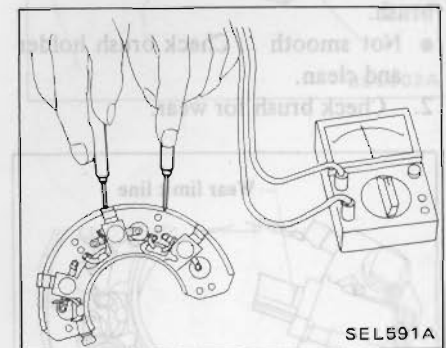
Diode

Perform a continuity test on diodes in both directions, using an ohmmeter.

Circuit tester terminal		Conduction
Positive	Negative	
(+) plate Holder plate	Diode terminal	Yes
Diode terminal	(+) plate Holder plate	No
(-) plate Rear cover	Diode terminal	No
Diode terminal	(-) plate Rear cover	Yes

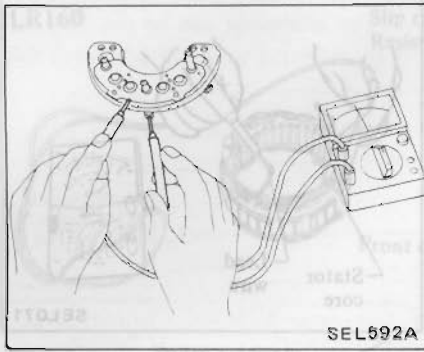
Some ohmmeters use a reverse polarity, in which case continuity will be observed exactly opposite from the chart above.

Positive diode



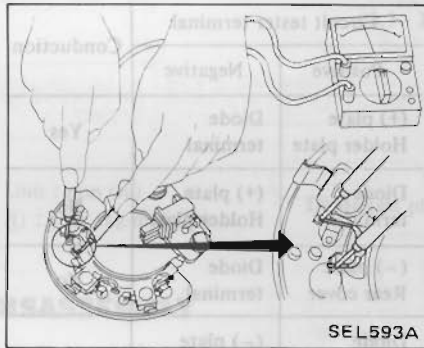
• Conduction test is N.G. ... Replace diode assembly.

Negative diode



- Conduction test is N.G. ... Replace diode assembly.

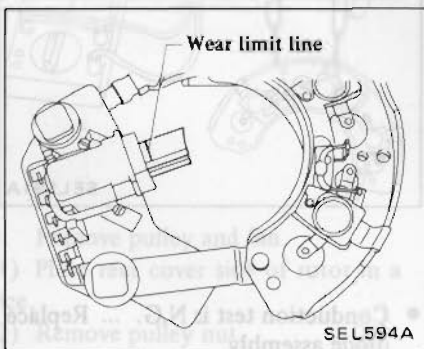
Sub-diode



- Conduction test is N.G. ... Replace diode assembly.

Brush

1. Check smooth movement of brush.
- Not smooth ... Check brush holder and clean.
2. Check brush for wear.

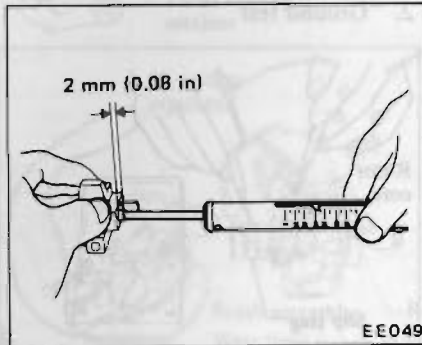


3. Check brush pig tail for damage.
 - Damaged ... Replace.
4. Check brush spring pressure.

Measure brush spring pressure with brush projected approximately 2 mm (0.08 in) from brush holder.

Spring pressure:
 2.501 - 3.383 N
 (255 - 345 g,
 8.99 - 12.17 oz)

When brush is worn, pressure decreases approximately 0.196 N (20 g, 0.71 oz) per 1 mm (0.04 in) wear.

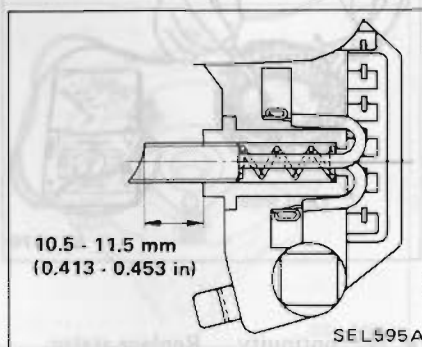


- Not in the specified value ... Replace brush assembly.

ASSEMBLY

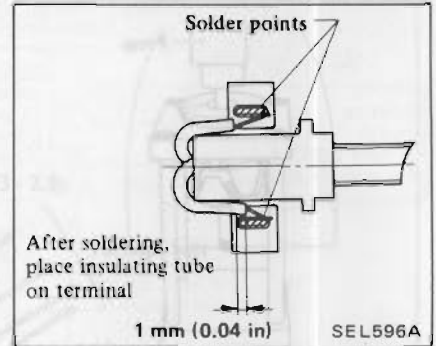
Assemble alternator in the reverse order of disassembly, noting the following:

1. When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.
2. When soldering brush lead wire, observe the following.
 - (1) Position brush so that it extends 11 mm (0.43 in) from brush holder.



- (2) Coil lead wire 1.5 times around terminal groove. Solder outside of terminal.

When soldering, be careful not to let solder adhere to insulating tube as it will weaken the tube and cause it to break.



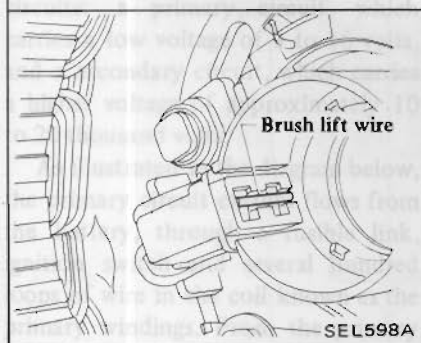
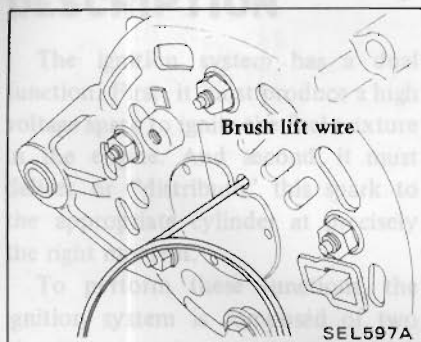
- ⊕ : Brush holder
 - 3.1 - 3.9 N·m
(0.32 - 0.40 kg-m,
2.3 - 2.9 ft-lb)
- Diode and IC regulator
 - 3.1 - 3.9 N·m
(0.32 - 0.40 kg-m,
2.3 - 2.9 ft-lb)
- Bearing retainer
 - 3.1 - 3.9 N·m
(0.32 - 0.40 kg-m,
2.3 - 2.9 ft-lb)

3. Tighten pulley nut and make sure that deflection of V-groove is proper.

- ⊕ : Pulley nut
 - 39 - 59 N·m
(4.0 - 6.0 kg-m,
29 - 43 ft-lb)

V-groove deflection:
 0.3 mm (0.012 in)

4. Before installing front and rear sides of alternator, push brush up with fingers and retain brush, by inserting brush lift wire into brush lift hole from outside.



5. After installing front and rear sides of alternator, pull brush lift wire by pushing toward center.

Do not pull brush lift by pushing toward outside of cover as it will damage slip ring sliding surface.

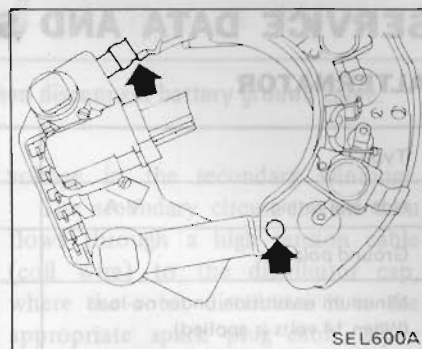
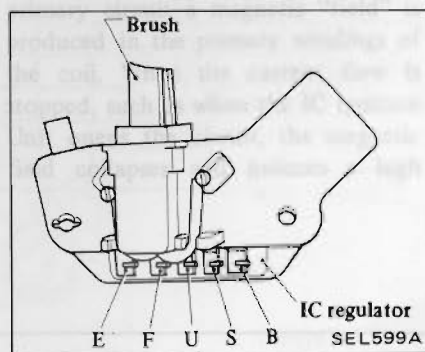
6. Tighten through bolts.

⊕ : Through bolts
 3.1 - 3.9 N·m
 (0.32 - 0.40 kg-m,
 2.3 - 2.9 ft-lb)

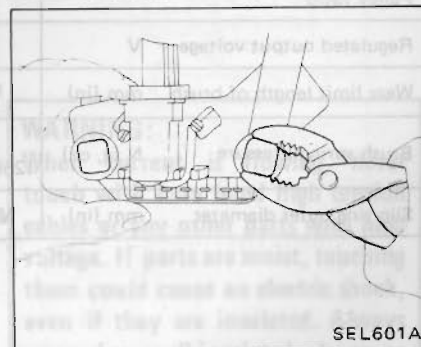
IC VOLTAGE REGULATOR

DESCRIPTION

The regulator consists essentially of integrated circuits incorporating transistors. These transistors interrupt and admit current flow to the alternator rotor coil, thus maintaining its output voltage at a constant value. Unlike in a mechanical type regulator, an electronic relay employing transistors is utilized. These transistors are enclosed in a very compact, sealed case. On the charge warning lamp circuit, a diode monitors generating voltage at the stator so that when the monitored voltage and charging voltage are equal during re-charging, the charge warning lamp is turned off. Accordingly, a charge warning relay is not employed in this circuit.

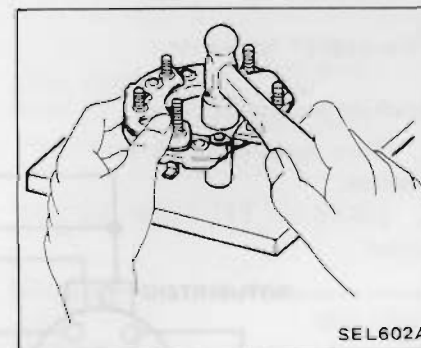


2. Remove the terminal's solder and take out bolts.



3. When installing the regulator, reverse order of removal, noting the following.

- (1) Put IC regulator on brush holder and press-fit bolts using hand press.
- (2) Stake rivets using Tool.



REPLACEMENT

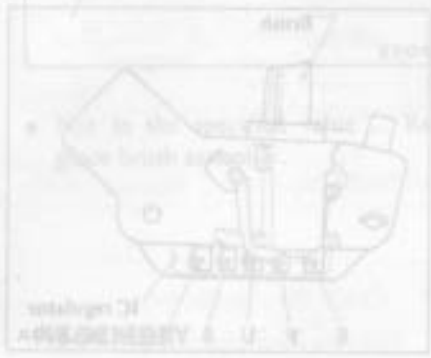
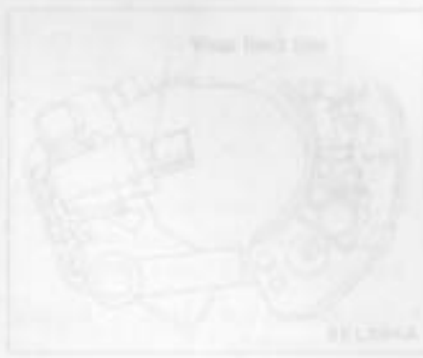
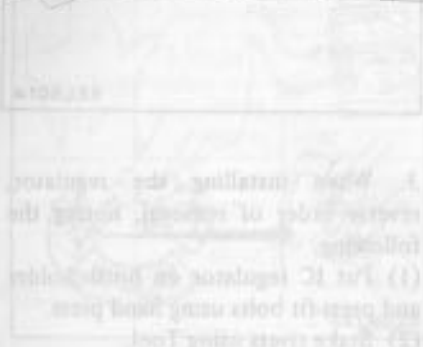
Removal should be done only when IC regulator is being replaced.

1. Remove rivet and solder.

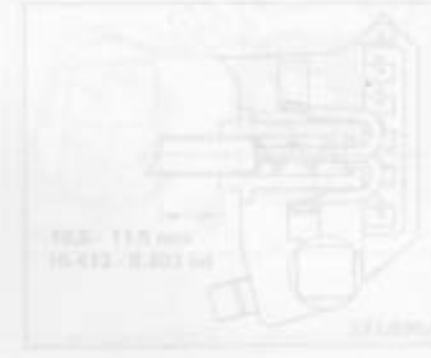
SERVICE DATA AND SPECIFICATIONS (S.D.S.)

ALTERNATOR

Type		LR160-82
Nominal rating	V-A	12-60
Ground polarity		Negative
Minimum revolution under no load (When 14 volts is applied)	rpm	Less than 1,000
Hot output current	A/rpm	More than 50/2,500 More than 60/5,000
Pulley ratio		2.09
Regulated output voltage	V	14.4 - 15.0
Wear limit length of brush	mm (in)	More than 7 (0.28)
Brush spring pressure	N (g, oz)	2.501 - 3.383 (255 - 345, 8.99 - 12.17)
Slip ring outer diameter	mm (in)	More than 30 (1.18)



Remove rotor and stator. (1) Use IC regulator as shown. (2) Check that spring force is correct.



Remove rotor and stator. (1) Use IC regulator as shown. (2) Check that spring force is correct.



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Remove rotor and stator. (1) Use IC regulator as shown. (2) Check that spring force is correct.

Remove rotor and stator. (1) Use IC regulator as shown. (2) Check that spring force is correct.

IGNITION SYSTEM

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

DESCRIPTION

The ignition system has a dual function. First, it must produce a high voltage spark to ignite the fuel mixture in the engine. And second, it must deliver or "distribute" this spark to the appropriate cylinder at precisely the right moment.

To perform these functions, the ignition system is composed of two circuits: a primary circuit, which carries a low voltage of 9 to 16 volts, and a secondary circuit, which carries a higher voltage of approximately 10 to 20 thousand volts.

As illustrated in the diagram below, the primary circuit current flows from the battery, through a fusible link, ignition switch and several hundred loops of wire in the coil known as the primary windings. From the primary windings current flows through the IC (Integrated Circuit) Ignition Unit and

to ground.

The IC Ignition Unit is an electronic switching device which opens and closes the primary circuit based on pulses it receives from a pick-up coil and a rotating reluctor. These components, the IC Ignition Unit, pick-up coil and reluctor, actually perform the same purpose as the breaker points and condenser that were used in previous ignition systems but require less maintenance.

The secondary circuit of the ignition system begins at the secondary windings in the coil. These windings are composed of several thousand loops of very fine wire.

When current is flowing in the primary circuit a magnetic "field" is produced in the primary windings of the coil. When the current flow is stopped, such as when the IC Ignition Unit opens the circuit, the magnetic field collapses and induces a high

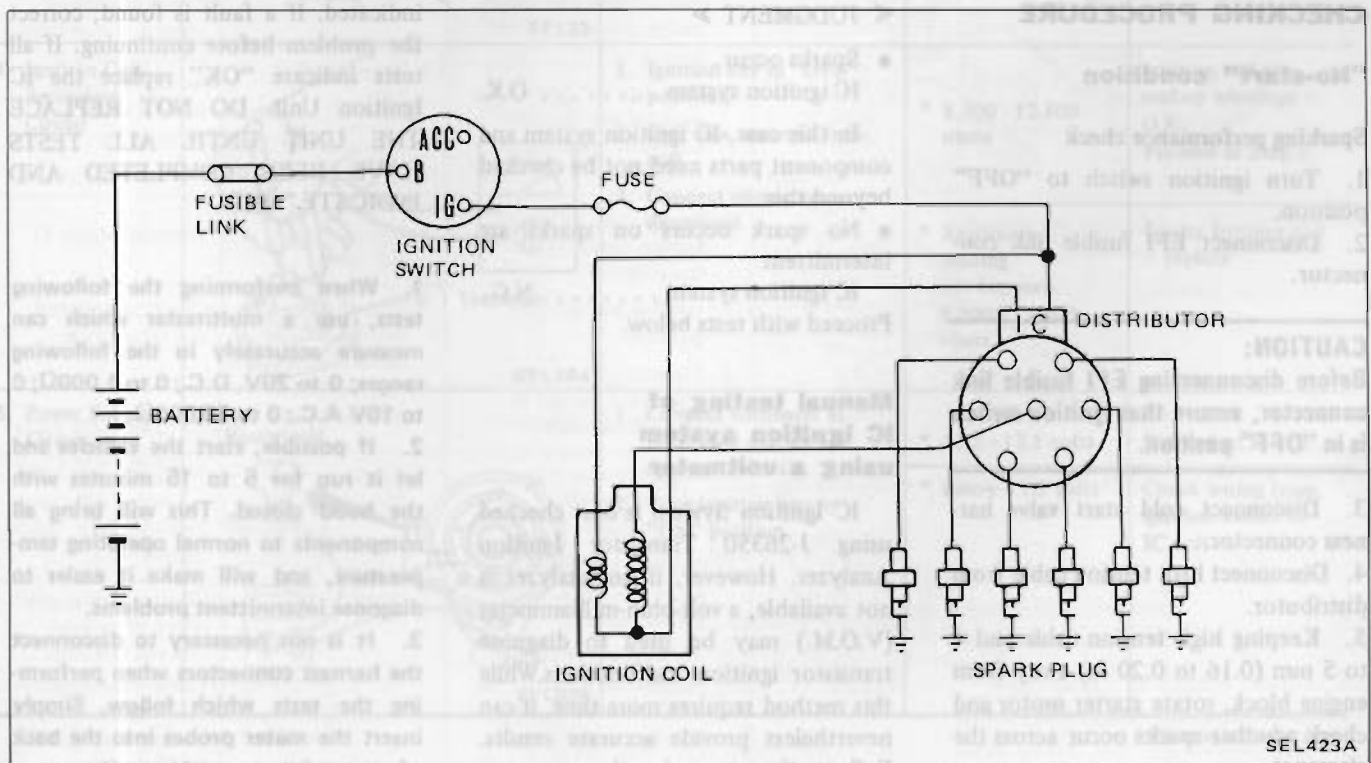
voltage in the secondary windings.

The secondary circuit current then flows through a high tension cable (coil wire) to the distributor cap, where the rotor distributes it to the appropriate spark plug cable. Upon arriving at the spark plug, the secondary circuit current jumps the gap between the center and side electrode and ignites the fuel mixture.

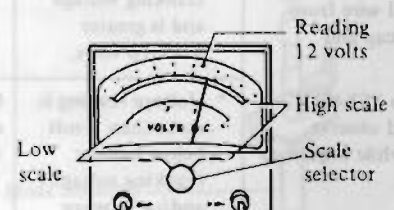
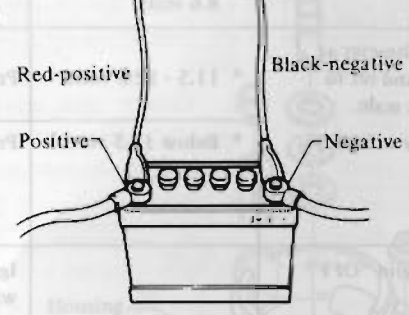
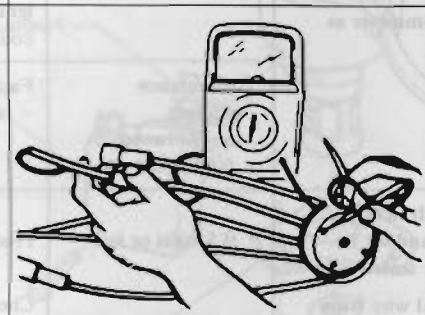
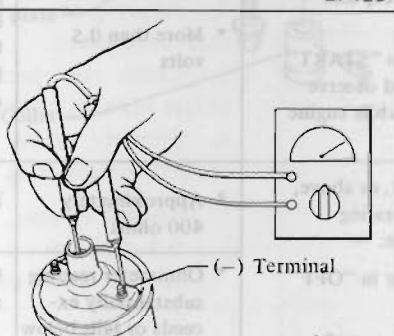
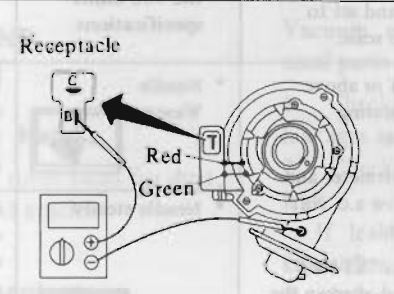
WARNING:

When current is flowing, never touch with bare hand high tension cables or any other parts with high voltage. If parts are moist, touching them could cause an electric shock, even if they are insulated. Always wear dry, well-insulated gloves or wrap affected parts with dry cloth before handling.

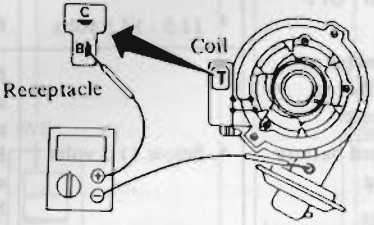
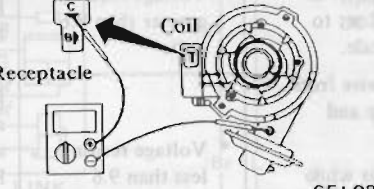
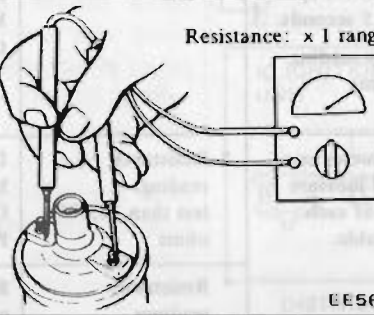
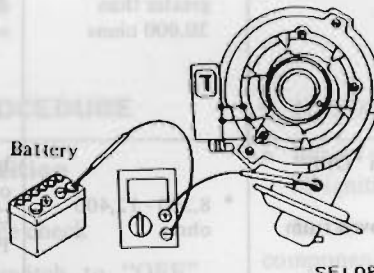
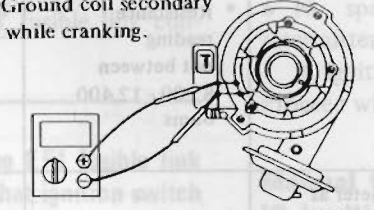
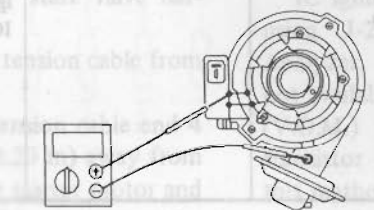


SCHEMATIC

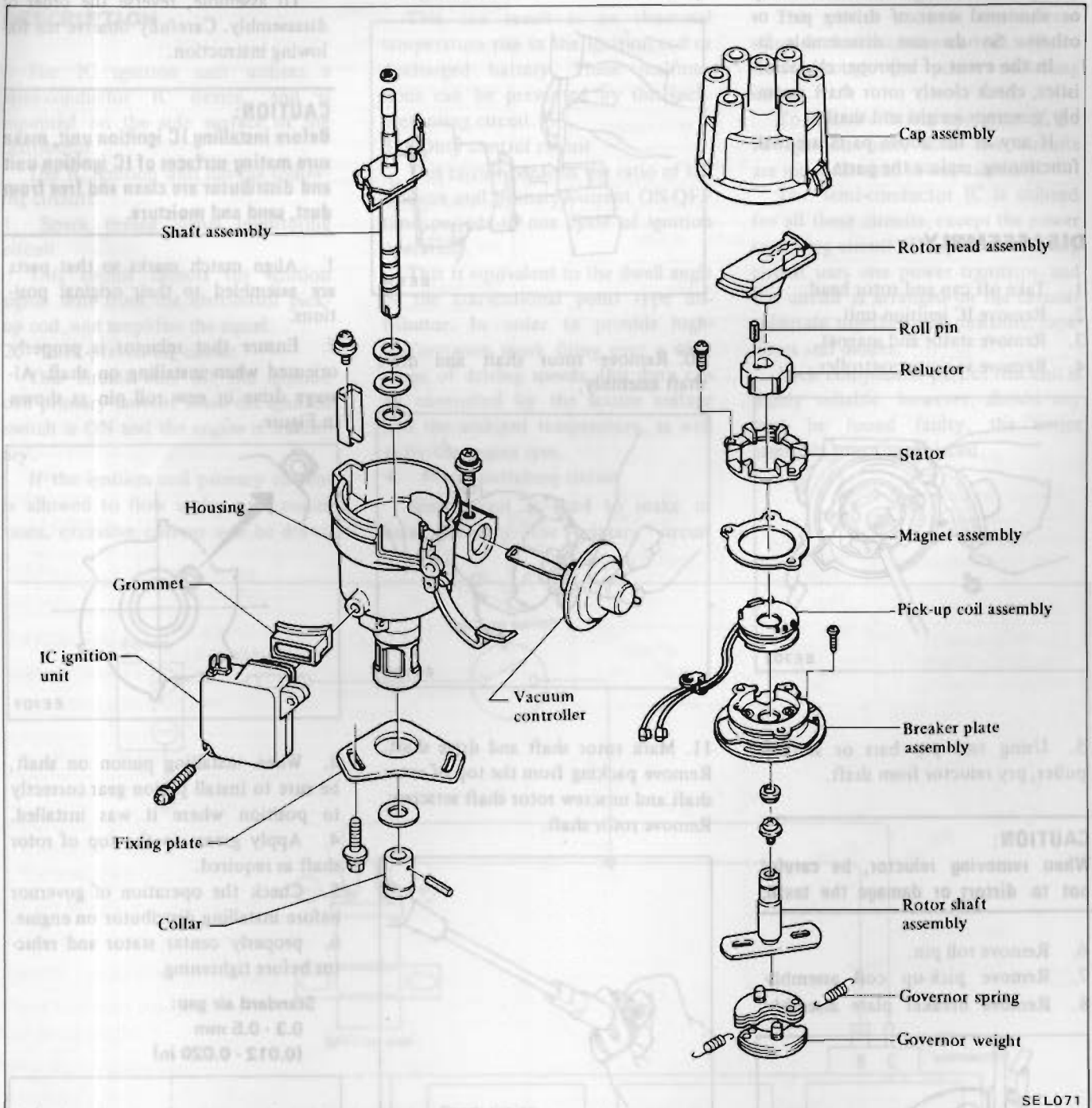


IC IGNITION SYSTEM TROUBLE-SHOOTING

TEST	TEST METHOD	CONDITIONS	RESULT	ACTION
1. Battery Voltage (no load)		<ol style="list-style-type: none"> 1. Ignition key in "OFF" position. 2. Connect voltmeter as illustrated and set to appropriate scale. 3. Read and record battery voltage reading. Battery voltage	* 11.5 - 12.5 volts * Below 11.5 volts	Proceed to Step 2. Battery, charging system or starting system – Faulty. Refer to applicable sections in Service Manual to correct the situation.
2. Battery Cranking Voltage	 <p style="text-align: center;">SEL103</p>	<ol style="list-style-type: none"> 1. Connect voltmeter as illustrated and set to appropriate scale. 2. Remove coil wire from distributor cap and ground it. 3. Read voltmeter while cranking engine for approximately 15 seconds. 4. Record voltage reading. Battery cranking voltage	* Voltage reading greater than 9.6 volts * Voltage reading less than 9.6 volts	Battery O.K. Proceed to Step 3. Battery, charging system or starting system – Faulty. Refer to applicable sections in Service Manual to correct the situation.
3. Secondary Wiring	 <p style="text-align: center;">EF125</p>	<ol style="list-style-type: none"> 1. Connect ohmmeter as illustrated and measure the resistance of each high tension cable. 	* Resistance readings less than 30,000 ohms * Resistance readings greater than 30,000 ohms	Distributor cap and high tension cables – O.K. Proceed to Step 4. Replace high tension cable(s) and/or distributor cap as required.
4. Ignition Coil Secondary Circuit	 <p style="text-align: center;">SFL104</p>	<ol style="list-style-type: none"> 1. Ignition key in "OFF" position. 2. Coil wire removed from coil. 3. Connect ohmmeter as illustrated. 	* 8,200 - 12,400 ohms * Resistance reading not between 8,200 - 12,400 ohms	Ignition coil secondary windings – O.K. Proceed to Step 5. Faulty ignition coil – replace
5. Power Supply Circuit	 <p style="text-align: center;">SEL078</p>	<ol style="list-style-type: none"> 1. Connect voltmeter as illustrated and set to appropriate scale. 2. Turn ignition key to "ON" position. 	* 11.5 - 12.5 volts * Below 11.5 volts	Proceed to Step 6. Check wiring from ignition switch to IC unit.

(Continued next page)

TEST	TEST METHOD	CONDITIONS	RESULT	ACTION
6. Power Supply Circuit (Cranking)	<p>Ground coil output wire while performing test.</p>  <p>SEL079</p>	<ol style="list-style-type: none"> 1. Connect voltmeter as illustrated and set to appropriate scale. 2. Pull out coil wire from distributor cap and ground it. 3. Turn key to "START" position and observe voltmeter while engine is cranking. 	* Voltage reading is less than 1 volt below battery cranking voltage and is greater than 8.6 volts.	Proceed to Step 7.
			* Voltage reading is more than 1 volt below battery cranking voltage and/or is below 8.6 volts.	Check ignition switch and wiring from switch to IC unit.
7. Ignition Primary Circuit	 <p>SEL080</p>	<ol style="list-style-type: none"> 1. Connect voltmeter as illustrated and set to appropriate scale. 2. Ignition key in "ON" position. 	* 11.5 - 12.5 volts	Proceed to Step 9.
			* Below 11.5 volts	Proceed to Step 8.
8. Ignition Coil Primary Circuit	<p>Resistance: x 1 range</p>  <p>EE567</p>	<ol style="list-style-type: none"> 1. Ignition key in "OFF" position. 2. Coil wire removed from coil. 3. Connect ohmmeter as illustrated. 	* 0.84 - 1.02 ohms	Ignition coil primary winding O.K. Check ignition switch and wiring from ignition switch to coil and IC unit.
			* Resistance reading not between 0.84 - 1.02 ohms.	Faulty ignition coil – replace.
9. I.C. Unit Ground Circuit	 <p>SEL081</p>	<ol style="list-style-type: none"> 1. Connect voltmeter as illustrated and set to appropriate scale. 2. Pull out coil wire from distributor cap and ground it. 3. Turn key to "START" position and observe voltmeter while engine is cranking. 	* 0.5 volts or less	Proceed to Step 10.
			* More than 0.5 volts	Check distributor ground, wiring from chassis ground to battery including battery cable connections.
10. Pick-up Coil Resistance	<p>Ground coil secondary while cranking.</p>  <p>SEL082</p>	<ol style="list-style-type: none"> 1. Engine is at, or above, normal operating temperature. 2. Ignition key in "OFF" position. 3. Connect ohmmeter as illustrated and set to appropriate scale. 	* Approximately 400 ohms	Proceed to Step 11.
			* Ohmmeter reading substantially exceeds or falls below the 400 ohms specifications.	Check pick-up coil and wiring to it.
11. Pick-up Coil Output	<p>Ground coil secondary while cranking.</p>  <p>SEL083</p>	<ol style="list-style-type: none"> 1. Engine is at or above normal operating temperature. 2. Connect voltmeter and set to the low a.c. volt scale (0 - 5). 3. Turn key to "START" position and observe the needle movement while the engine is cranking. 	* Needle Wavers 	If "No Spark" condition still exists – replace IC ignition unit.
			* Needle steady 	Check physical condition of pick-up coil and reluctor. Check wiring and connections between pick-up coil and IC ignition unit.

DISTRIBUTOR (IC type)**CHECKING AND ADJUSTMENT****Cap and rotor head**

Check cap and rotor head for dust, carbon deposits and cracks.

Advance mechanisms**Specifications**

Refer to S.D.S.

Vacuum advance mechanism mechanical parts

1. Check vacuum inlet for signs of leakages at its connection.
2. Check vacuum diaphragm for air leak.

If leak is found, replace vacuum controller assembly.

3. Inspect breaker plate for smooth moving.

If plate does not move smoothly, this condition could be due to sticky

steel balls or pivot. Apply grease to steel balls or, if necessary, replace breaker plate as an assembly.

Centrifugal advance mechanical parts

When cause of engine malfunction is traced to centrifugal advance mechanical parts, use distributor tester to check its characteristics.

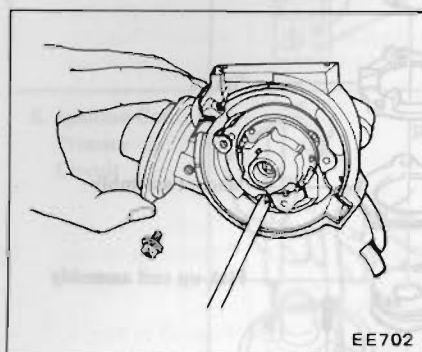
If nothing is wrong with its characteristics, conceivable causes are faulty or abnormal wear of driving part or others. So do not disassemble it.

In the event of improper characteristics, check closely rotor shaft assembly, governor weight and shaft.

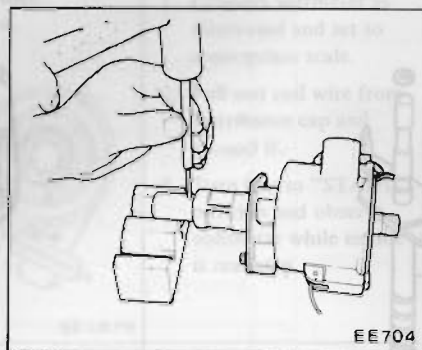
If any of the above parts are malfunctioning, replace the parts.

DISASSEMBLY

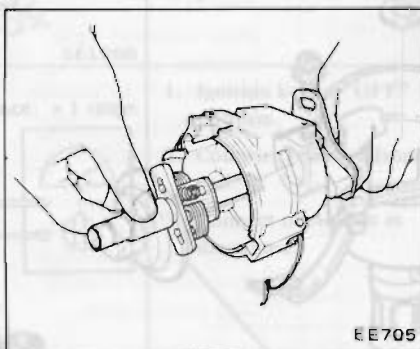
1. Take off cap and rotor head.
2. Remove IC ignition unit.
3. Remove stator and magnet.
4. Remove vacuum controller.



9. Punch knock pin out and remove pinion.



10. Remove rotor shaft and drive shaft assembly.

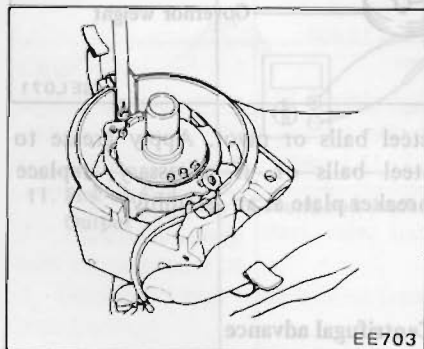


5. Using two pry bars or suitable puller, pry reluctor from shaft.

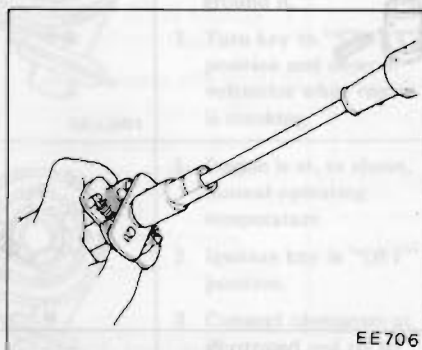
CAUTION:

When removing reluctor, be careful not to distort or damage the teeth.

6. Remove roll pin.
7. Remove pick-up coil assembly.
8. Remove breaker plate assembly.



11. Mark rotor shaft and drive shaft. Remove packing from the top of rotor shaft and unscrew rotor shaft setscrew. Remove rotor shaft.



12. Mark one of the governor springs and its bracket. Also mark one of the governor weights and its pivot pins.

13. Carefully unhook and remove governor springs.

14. Remove governor weights. Apply grease to governor weights, after disassembling.

ASSEMBLY

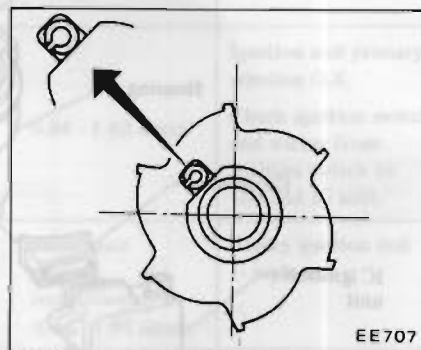
To assemble, reverse the order of disassembly. Carefully observe the following instruction.

CAUTION:

Before installing IC ignition unit, make sure mating surfaces of IC ignition unit and distributor are clean and free from dust, sand and moisture.

1. Align match marks so that parts are assembled to their original positions.

2. Ensure that reluctor is properly oriented when installing on shaft. Always drive in new roll pin as shown in Figure.



3. When installing pinion on shaft, be sure to install pinion gear correctly to position where it was installed.

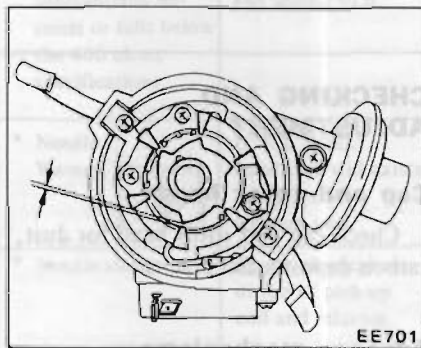
4. Apply grease to the top of rotor shaft as required.

5. Check the operation of governor before installing distributor on engine.

6. properly center stator and reluctor before tightening.

Standard air gap:

0.3 - 0.5 mm
(0.012 - 0.020 in)



7. Adjust ignition timing after distributor is installed on engine.

IC IGNITION UNIT

DESCRIPTION

The IC ignition unit utilizes a semi-conductor IC device, and is mounted on the side surface of the distributor.

The IC ignition unit has the following circuits:

1. Spark timing signal monitoring circuit

This circuit detects the ignition signal sent from the distributor pick-up coil, and amplifies the signal.

2. Lock-preventing circuit

This circuit cuts off the ignition coil primary current when the ignition switch is ON and the engine is stationary.

If the ignition coil primary current is allowed to flow under such conditions, excessive current will be drawn

because of low internal resistance of the ignition coil.

This can result in an abnormal temperature rise in the ignition coil or discharged battery. These malfunctions can be prevented by this lock-preventing circuit.

3. Duty control circuit

This circuit controls the ratio of the ignition coil primary current ON-OFF time periods in one cycle of ignition operation.

This is equivalent to the dwell angle of the conventional point type distributor. In order to provide high-performance spark firing over a wide range of driving speeds, this duty can be controlled by the source voltage and the ambient temperature, as well as by the engine rpm.

4. Power switching circuit

This circuit is used to make or break directly the primary circuit

current of the ignition coil.

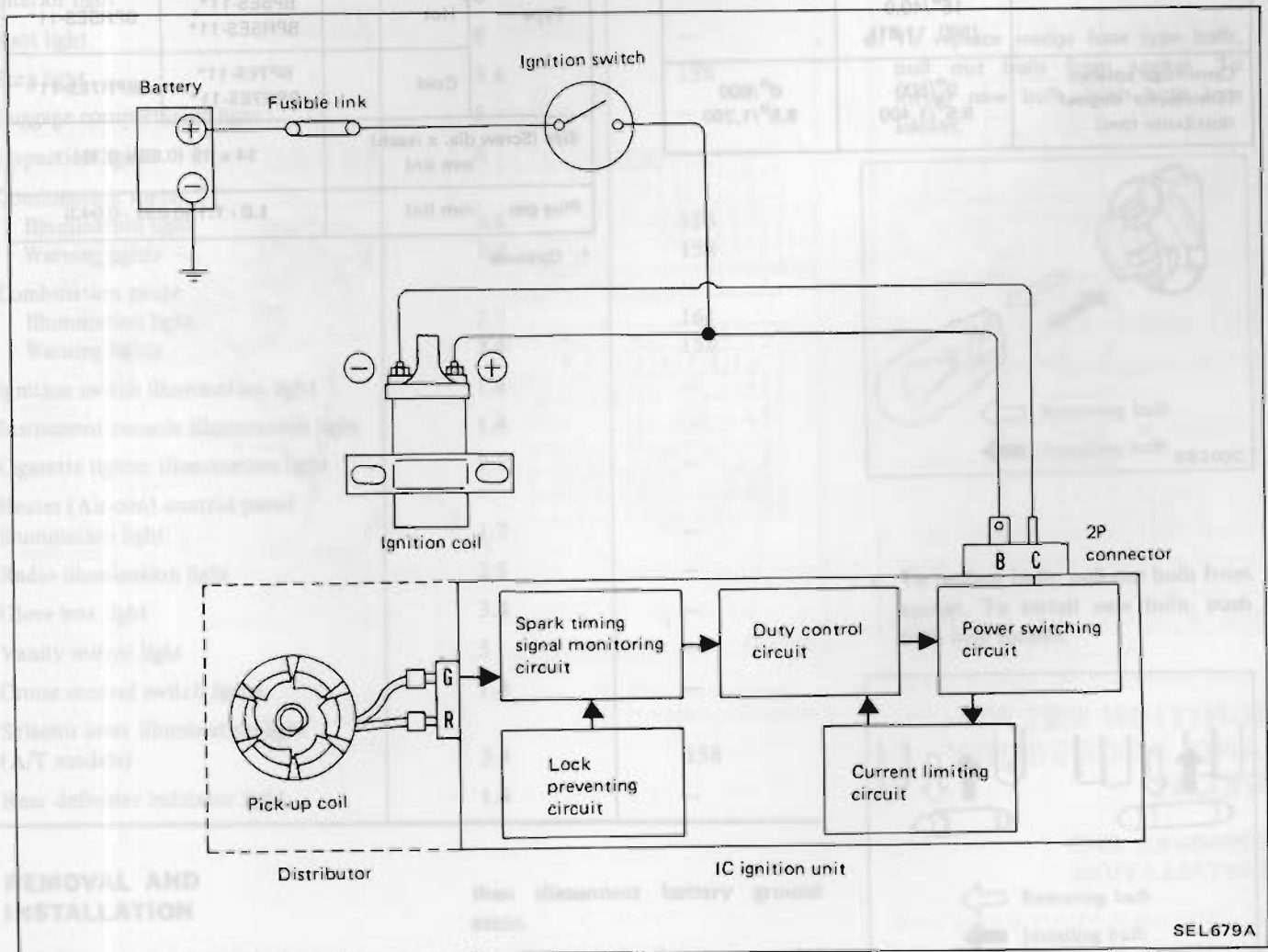
5. Current limiting circuit

This circuit controls the current value so that excessive current will not flow through the power switching circuit.

To ensure efficient operation of the IC ignition unit, these five circuits are manufactured in one assembly.

The semi-conductor IC is utilized for all these circuits, except the power switching circuit. The power switching circuit uses one power transistor, and the circuit is arranged on the ceramic substrate together with resistors, capacitors and diodes.

Each component part of this unit is highly reliable, however, should any part be found faulty, the entire assembly must be replaced.



SEL679A

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

DISTRIBUTOR

Type	D6K80-03	D6K9-02
Applied model	U.S.A. models	Canada models
Rotor head type	Without resistor	With resistor
Firing order	1-5-3-6-2-4	
Rotating direction	Counterclockwise	
Air gap mm (in)	0.3 - 0.5 (0.012 - 0.020)	
Cap insulation resistance MΩ	More than 50	
Rotor head insulation resistance MΩ	More than 50	
Cap carbon point length mm (in)	12 (0.47)	
Vacuum advance [Distributor degree/ distributor kPa (mmHg, inHg)]	0°/16.0 (120, 4.72) 5°/22.7 (170, 6.69) 5°/26.7 (200, 7.87) 15°/40.0 (300, 11.81)	0°/20.0 (150, 5.91) 12.5°/46.7 (350, 13.78)
Centrifugal advance [Distributor degree/ distributor rpm]	0°/500 8.5°/1,400	0°/600 8.5°/1,250

IGNITION COIL

Type	CIT 43	
Applied model	U.S.A. & Canada	
Primary voltage V	12	
Spark gap mm (in)	More than 7 (0.28)	
Primary resistance [at 20°C (68°F)] Ω	0.84 - 1.02	
Secondary resistance [at 20°C (68°F)] KΩ	8.2 - 12.4	

SPARK PLUG

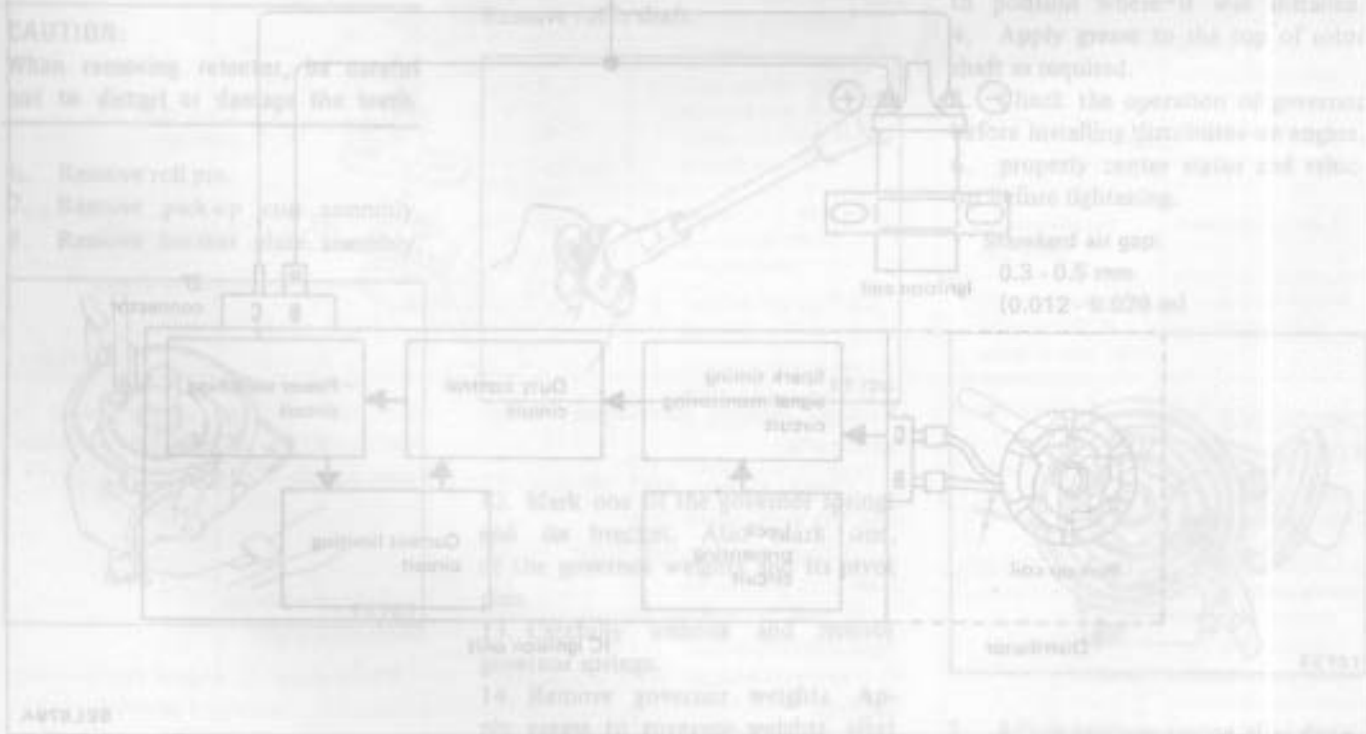
Destination		U.S.A.	Canada
Type	Standard	BP6ES-11, BPR6ES-11*	BPR6ES-11
	Hot	BP5ES-11*, BPR5ES-11*	BPR5ES-11*
	Cold	BP7ES-11*, BPR7ES-11*	BPR7ES-11*
Size (Screw dia. x reach) mm (in)		14 x 19 (0.55 x 0.75)	
Plug gap mm (in)		1.0 - 1.1 (0.039 - 0.043)	

*: Optional

CAUTION:

When removing rotor, be careful not to detach or damage the teeth.

- Remove roll pin.
- Remove plug cap (inner) (outer).
- Remove rotor head assembly.



ELECTRICAL UNIT OF LIGHTING SYSTEM

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

BULBS**SPECIFICATIONS**

Item	Wattage (W)	SAE trade number
Halogen headlight	60/50	—
Front combination light		
Turn signal/Clearance	27/8	1157
Side marker light		
Front	3.4	158
Rear	3.4	158
Rear combination light		
Stop/Tail	27/8	1157
Turn	27	1156
Back-up	27	1156
License plate light	7.5	89
Interior light	10	—
Spot light	8	—
Step light	3.4	158
Luggage compartment light	5	—
Inspection light	8	—
Combination meter		
Illumination light	3.4	158
Warning lights	3.4	158
Combination gauge		
Illumination light	2.7	161
Warning lights	3.4	158
Ignition switch illumination light	1.4	—
Instrument console illumination light	1.4	—
Cigarette lighter illumination light	1.7	—
Heater (Air-con) control panel illumination light	1.7	—
Radio illumination light	2.5	—
Glove box light	3.4	—
Vanity mirror light	5	—
Cruise control switch lights	1.4	—
Selector lever illumination light (A/T models)	3.4	158
Rear defroster indicator light	1.4	—

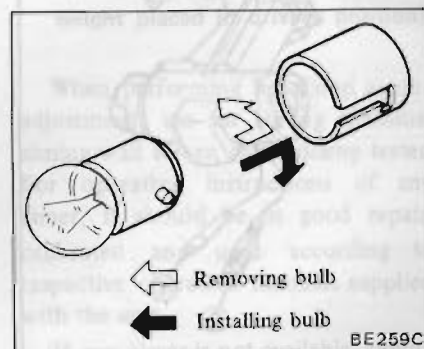
REMOVAL AND INSTALLATION

a. Before starting to work, be sure to turn ignition switch "OFF" and

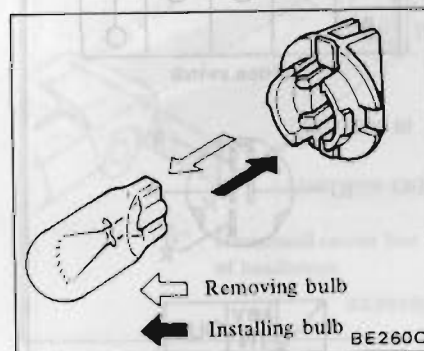
then disconnect battery ground cable.

b. Installation is in the reverse order of removal.

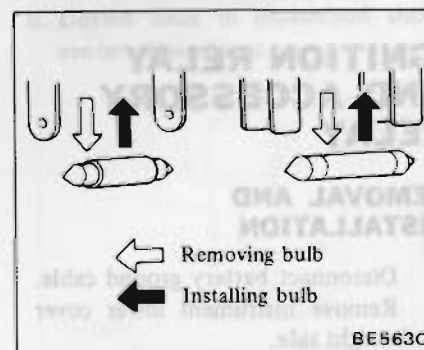
c. To replace bulb, push in on bulb, turn it counterclockwise and remove it from socket. Install new bulb in the reverse order of removal.



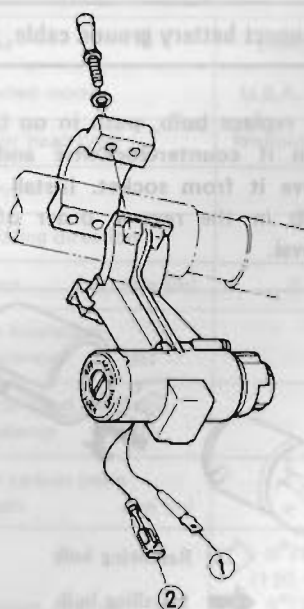
d. To replace wedge base type bulb, pull out bulb from socket. To install new bulb, push bulb into socket.



e. To replace bulb, pull out bulb from socket. To install new bulb, push bulb into socket.

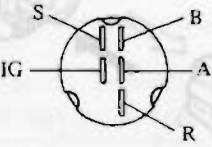


IGNITION SWITCH



	OFF	ACC	ON	START
B		○	○	○
IG			○	○
S				○
A		○	○	
R				○

Ignition switch



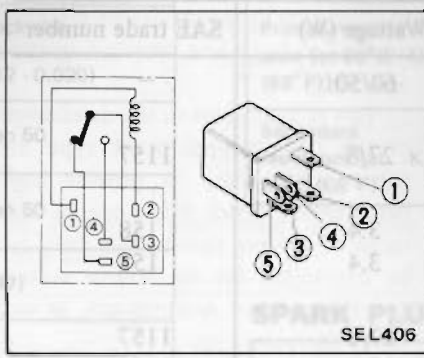
	key IN	OUT
①	○	
②	○	

Steering lock switch

BE786D

3. Disconnect harness connector.
4. Remove relay on dash side.
5. Install relay in the reverse order of removal.

INSPECTION



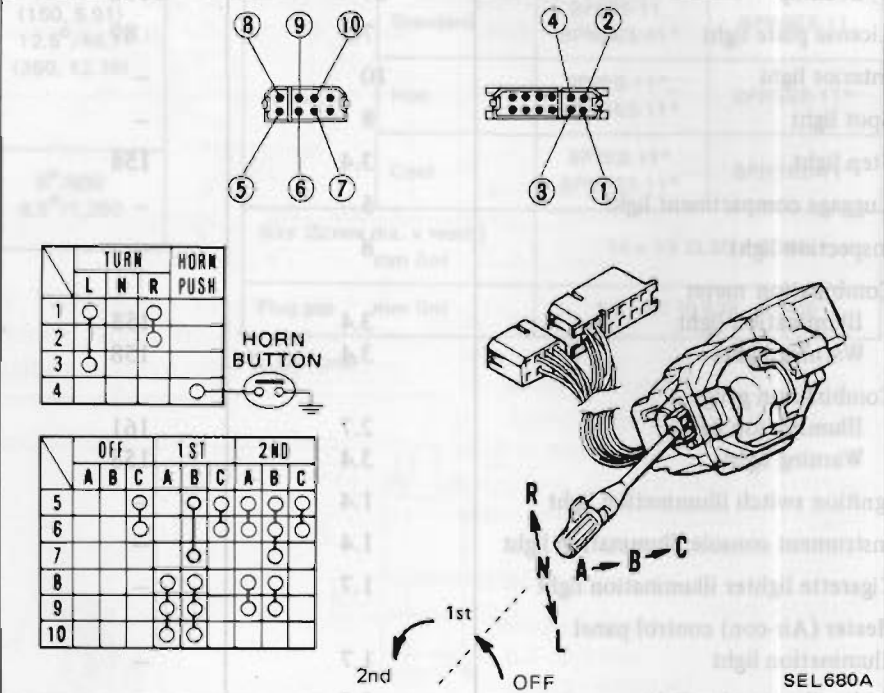
COMBINATION SWITCH

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove horn pad.
3. Remove steering wheel.
4. Remove steering column cover.
5. Disconnect combination switch wires at connector.
6. Loosen retaining screw and remove combination switch assembly.
7. Install combination switch in the reverse order of removal.

INSPECTION

Test continuity through switch with a test lamp or ohmmeter.



	TURN			HORN
	L	N	R	PUSH
1	○			
2			○	
3				○
4				○

HORN BUTTON

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

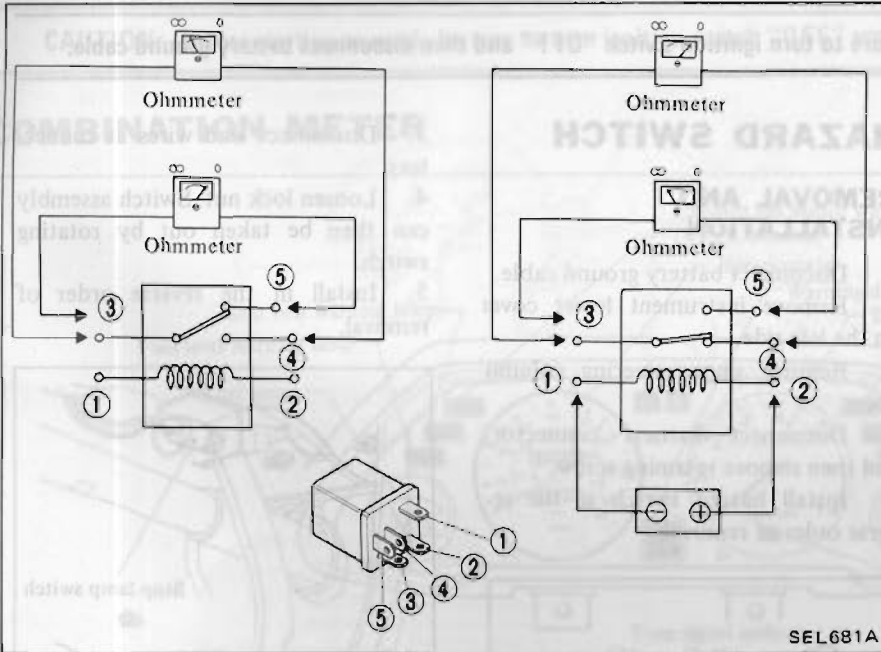
SEL680A

IGNITION RELAY AND ACCESSORY RELAY

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove instrument lower cover on the right side.

LIGHTING RELAY



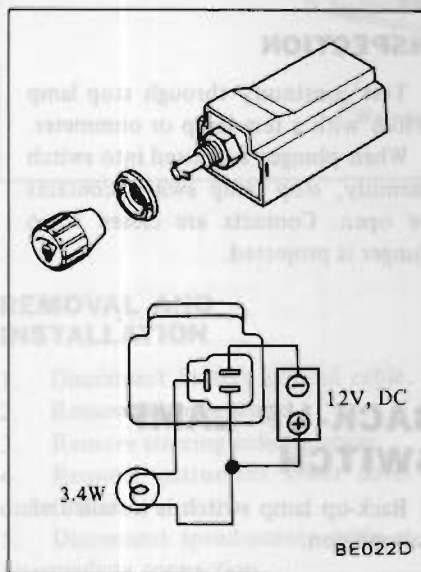
Before making headlamp aiming adjustment, observe the following instructions.

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

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.

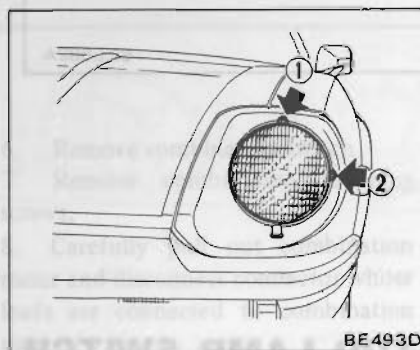
If any aimer is not available, aiming adjustment can be done as follows: Turn headlamp low beam on.

ILLUMINATION CONTROL RHEOSTAT

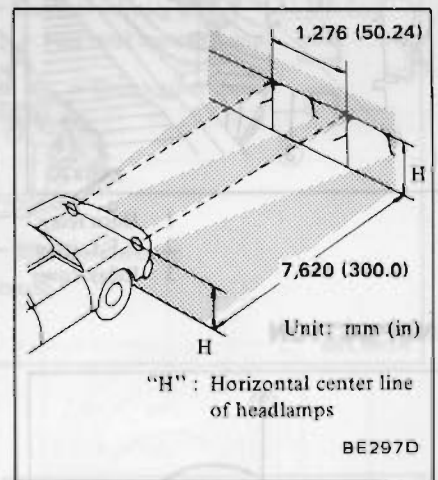


AIMING ADJUSTMENT

To adjust vertical aim, use adjusting screw on upper side of headlamp; and to adjust horizontal aim, use adjusting screw on side of headlamp.



- Vertical adjustment
- Horizontal adjustment



- Adjust headlamps so that upper edge of hot spot is equal in height to headlamp height and left edge of hot spot is equal in height to each center line of headlamps.
- Dotted lines in illustration show center of headlamp.

ELECTRICAL UNIT OF SIGNAL SYSTEM

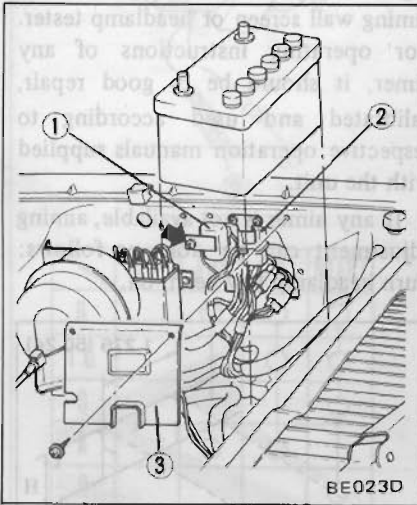
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

TURN SIGNAL SWITCH

Refer to Combination Switch.

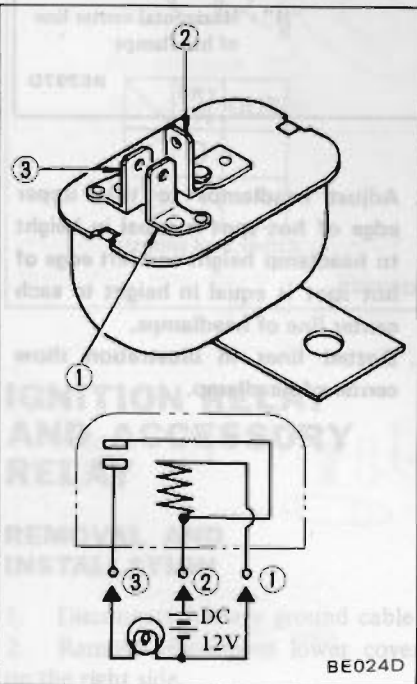
HORN RELAY

REMOVAL AND INSTALLATION



- 1 Horn relay
- 2 E.F.I. relay
- 3 Relay cover

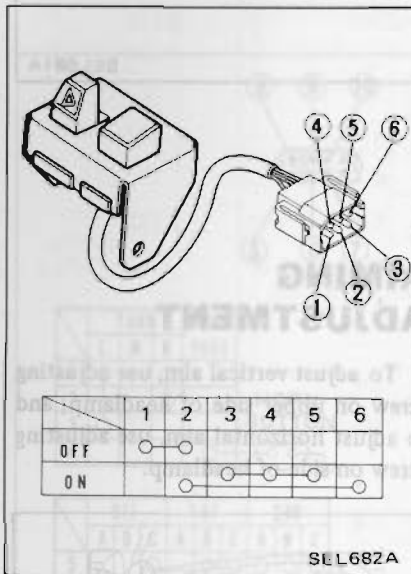
INSPECTION



HAZARD SWITCH

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove instrument lower cover on the left side.
3. Remove upper steering column cover.
4. Disconnect harness connector, and then remove retaining screw.
5. Install hazard switch in the reverse order of removal.



	1	2	3	4	5	6
OFF	○	○				
ON	○	○	○	○		○

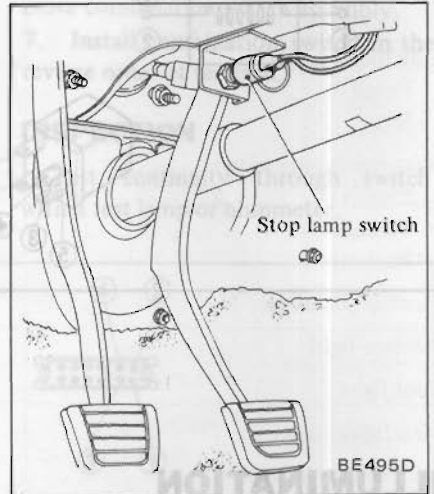
SEL682A

STOP LAMP SWITCH

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove instrument lower cover and assist floor nozzle.

3. Disconnect lead wires at connectors.
4. Loosen lock nut. Switch assembly can then be taken out by rotating switch.
5. Install in the reverse order of removal.



BE495D

INSPECTION

Test continuity through stop lamp switch with a test lamp or ohmmeter. When plunger is pressed into switch assembly, stop lamp switch contacts are open. Contacts are closed when plunger is projected.

BACK-UP LAMP SWITCH

Back-up lamp switch is installed on transmission.

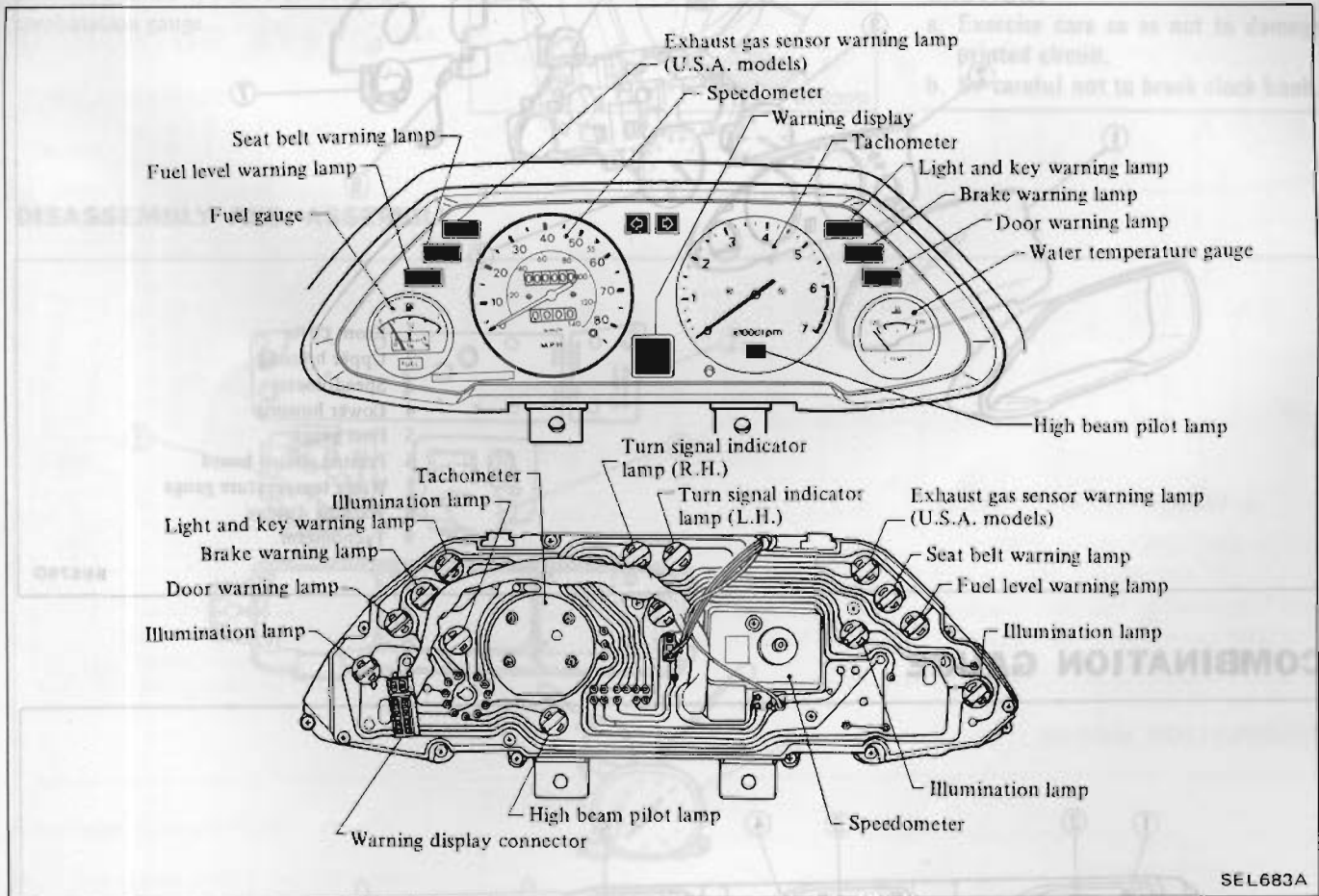
INSPECTION

When transmission lever is in "R" position, there should be continuity between two terminals.

METERS AND GAUGES

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

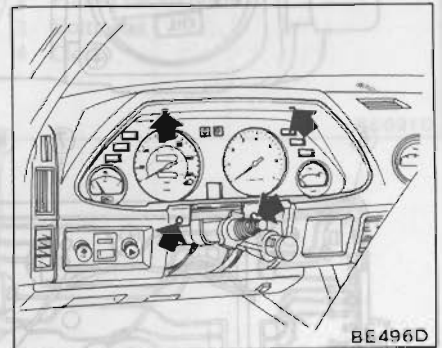
COMBINATION METER



SEL683A

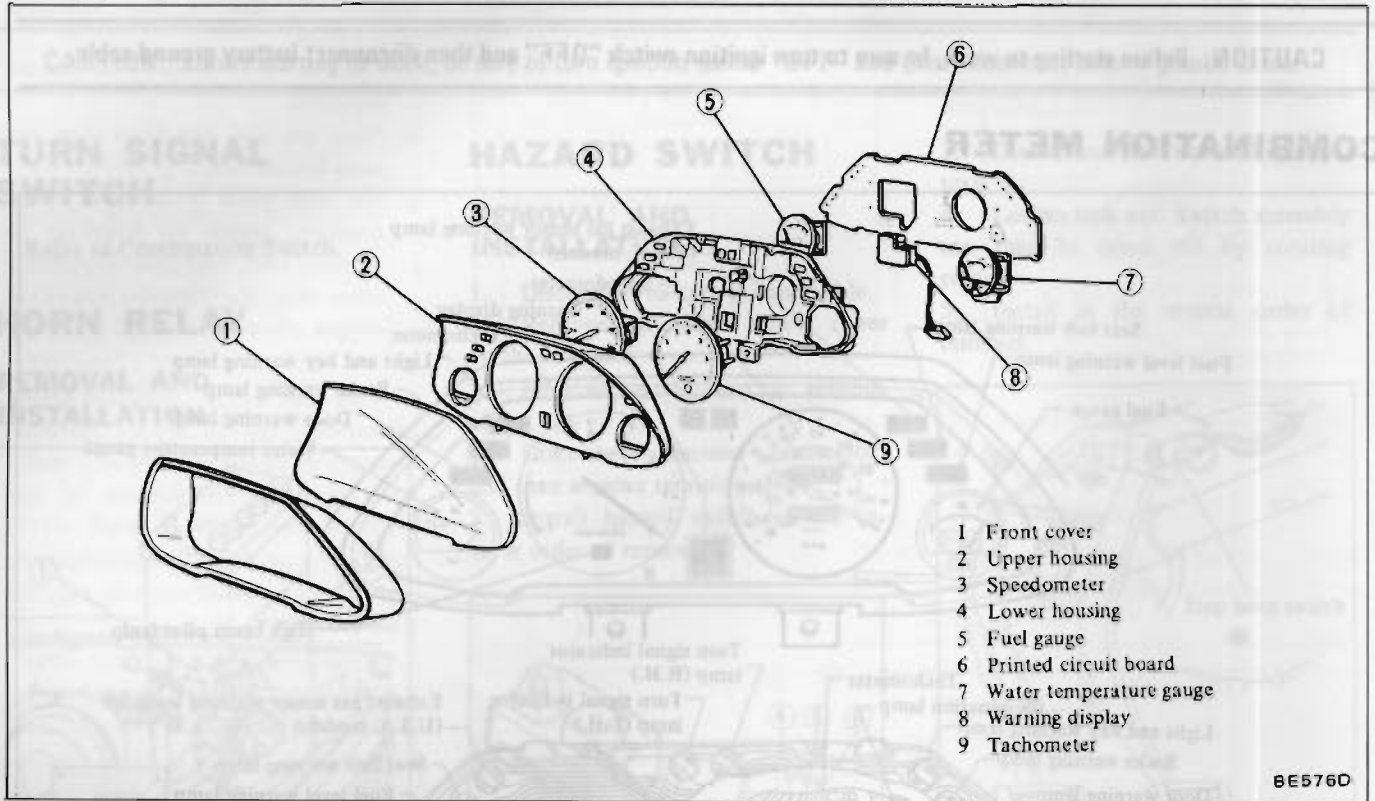
REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove steering wheel.
3. Remove steering column cover.
4. Remove instrument lower cover on left side.
5. Disconnect speedometer cable at intermediate connection.
6. Remove combination switch.
7. Remove combination retaining screws.
8. Carefully pull out combination meter and disconnect connector whose leads are connected to combination meter.
9. Install combination meter in the reverse order of removal.

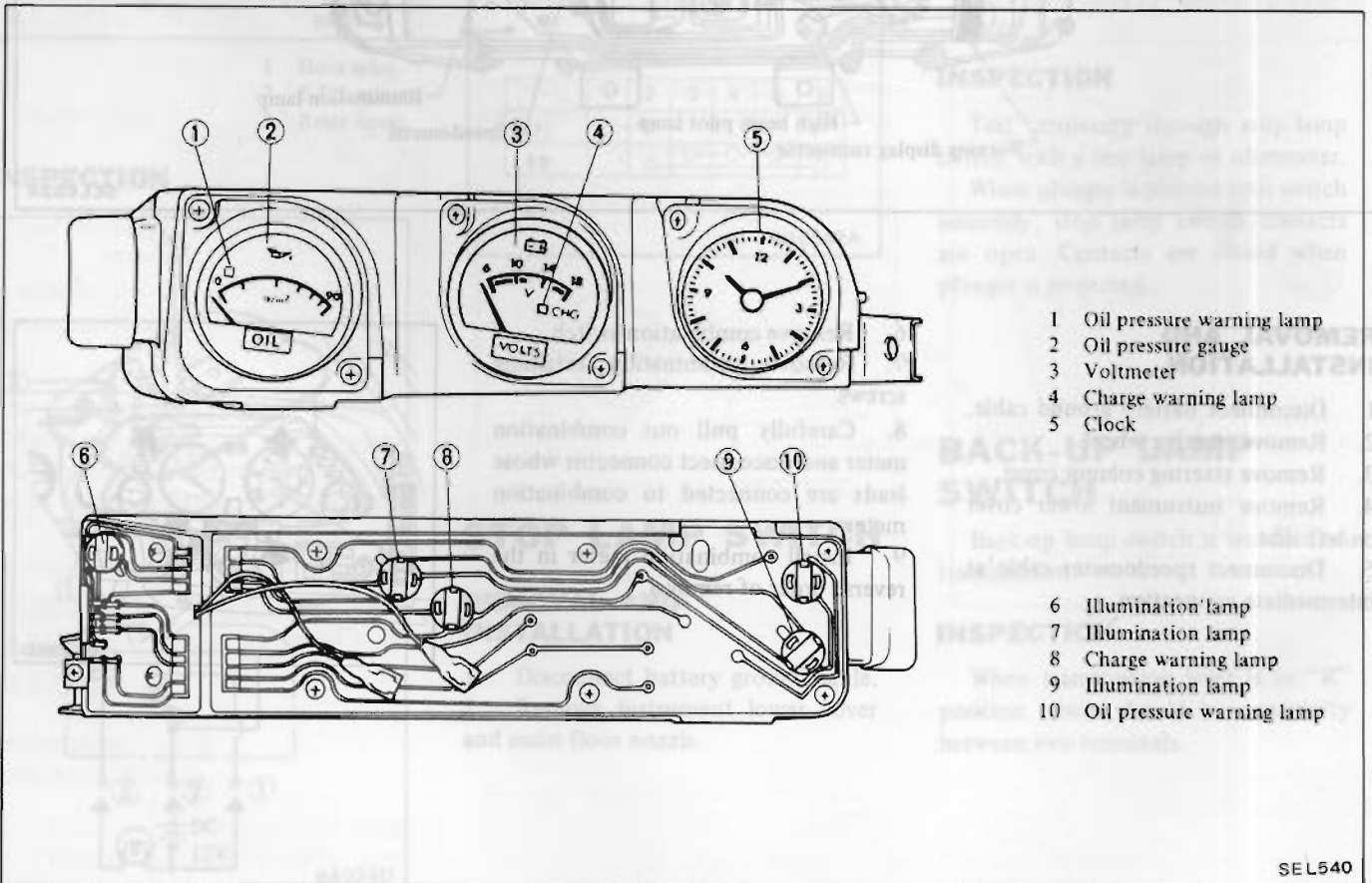


BE496D

DISASSEMBLY AND ASSEMBLY

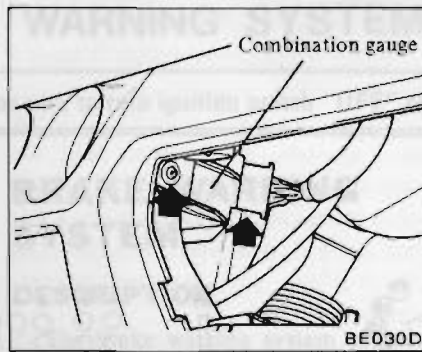


COMBINATION GAUGE



REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove glove box. Refer to Glove Box (Section BF) for removal.
3. Disconnect instrument harness connector and remove screw retaining combination gauge.

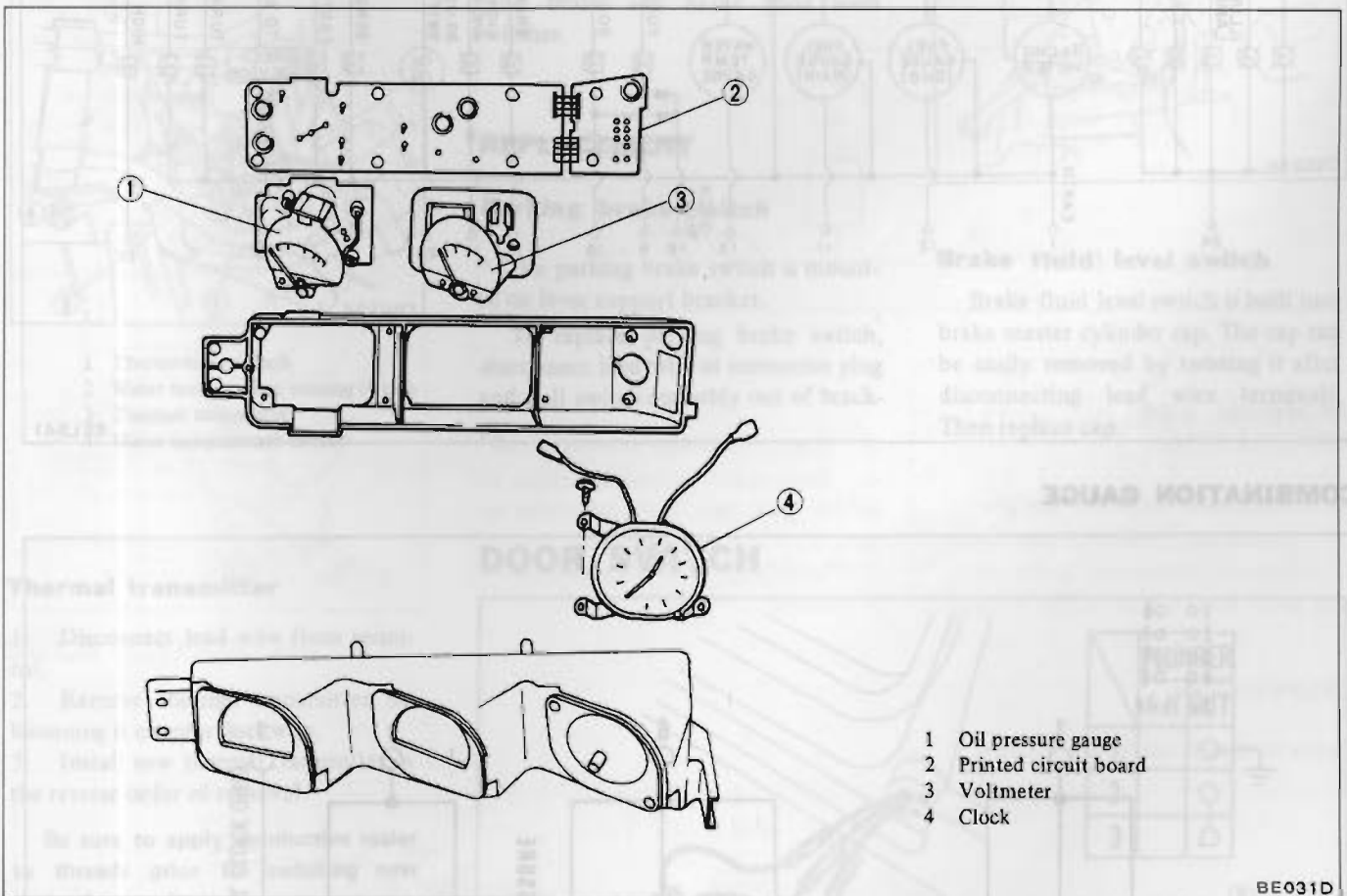


4. Pull out on combination gauge toward glove box while pushing out toward front of car.
5. Install combination gauge in the reverse order of removal.

CAUTION:

- a. Exercise care so as not to damage printed circuit.
- b. Be careful not to break clock knob.

DISASSEMBLY AND ASSEMBLY

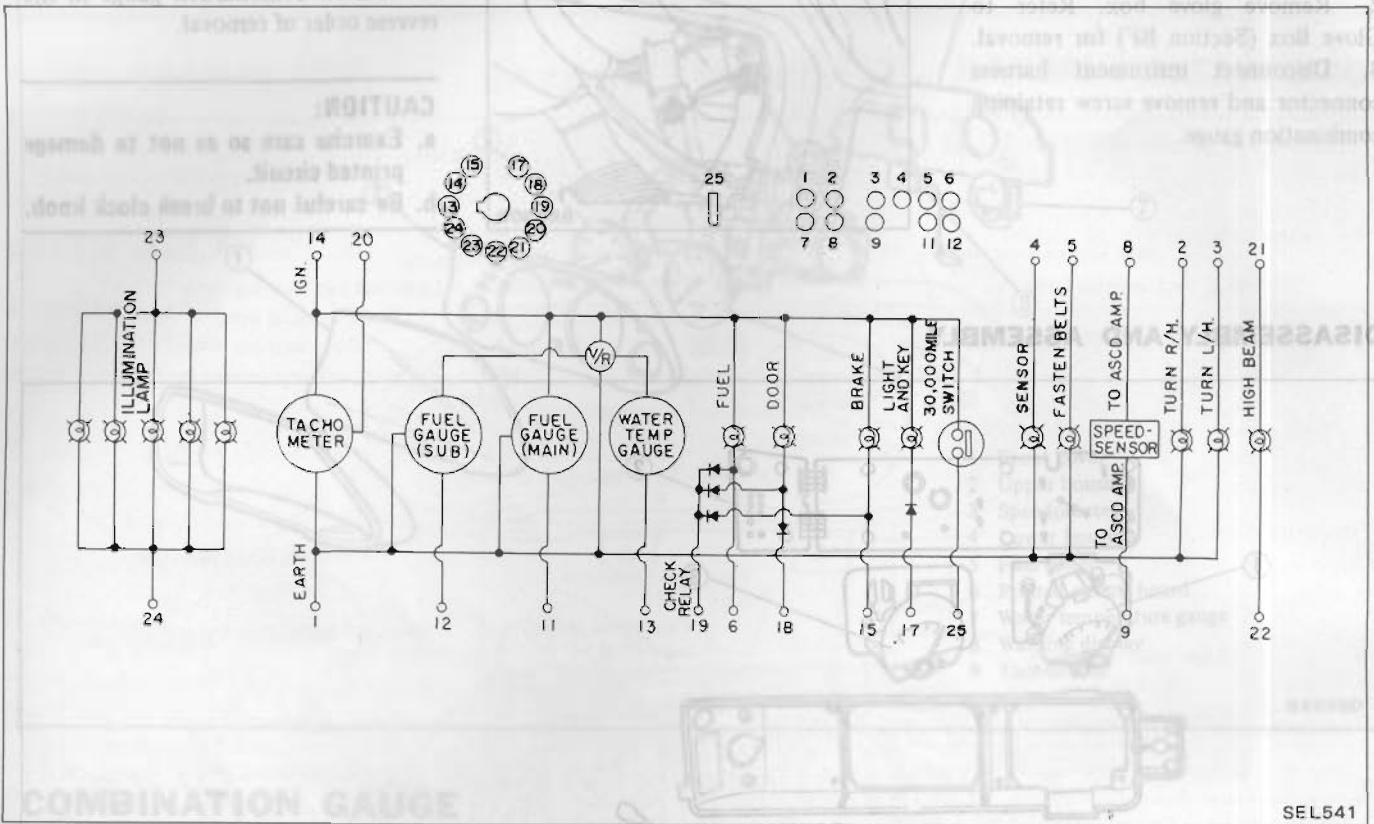


- 1 Oil pressure gauge
- 2 Printed circuit board
- 3 Voltmeter
- 4 Clock

BE031D

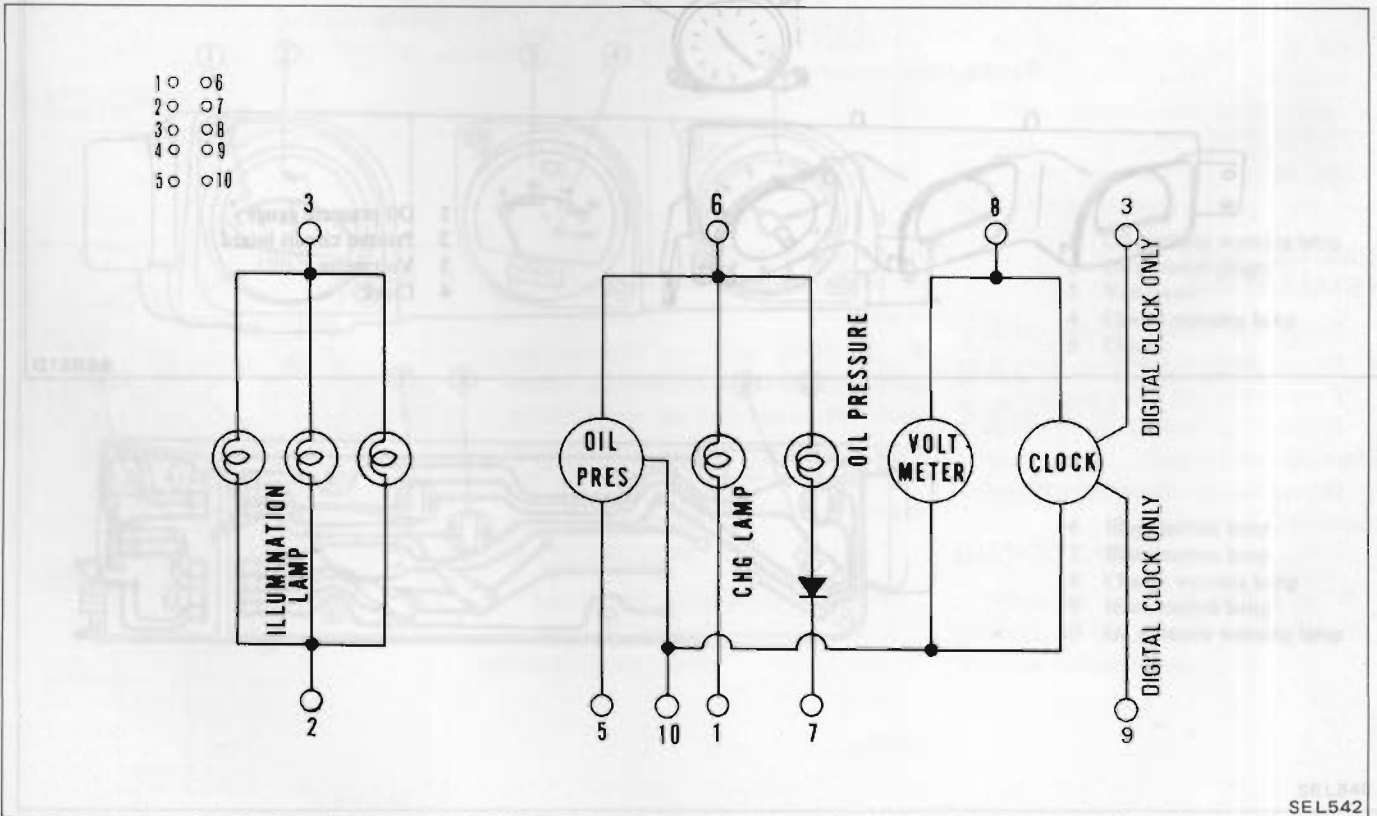
SCHEMATIC

COMBINATION METER



SEL541

COMBINATION GAUGE



SEL542

WARNING SYSTEM

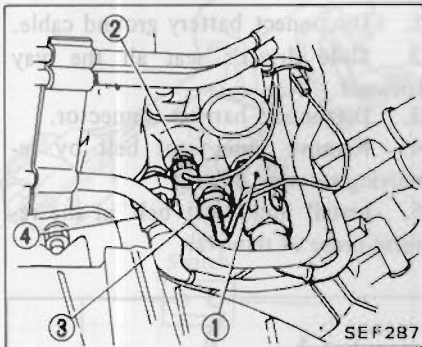
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

WATER TEMPERATURE INDICATOR SYSTEM

REPLACEMENT

Gauge

Refer to Combination Gauge.



- 1 Thermotime switch
- 2 Water temperature sensing switch
- 3 Thermal transmitter
- 4 Water temperature sensor

Thermal transmitter

1. Disconnect lead wire from terminal.
2. Remove thermal transmitter by loosening it counterclockwise.
3. Install new thermal transmitter in the reverse order of removal.

Be sure to apply conductive sealer to threads prior to installing new thermal transmitter.

FUEL LEVEL WARNING SYSTEM

Fuel tank gauge unit

Fuel tank gauge unit is located on fuel tank. Refer to Fuel Tank Gauge Unit (Section FE) for removal and installation.

BRAKE WARNING SYSTEM

DESCRIPTION

The brake warning system consists of a warning light, parking brake switch and brake fluid level warning switch.

The warning light is used for both hand brake and brake fluid level switches.

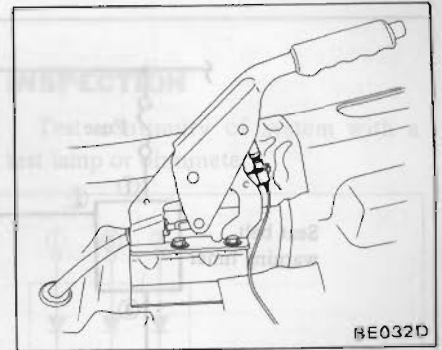
REPLACEMENT

Parking brake switch

The parking brake switch is mounted on lever support bracket.

To replace parking brake switch, disconnect lead wire at connector plug and pull switch assembly out of bracket.

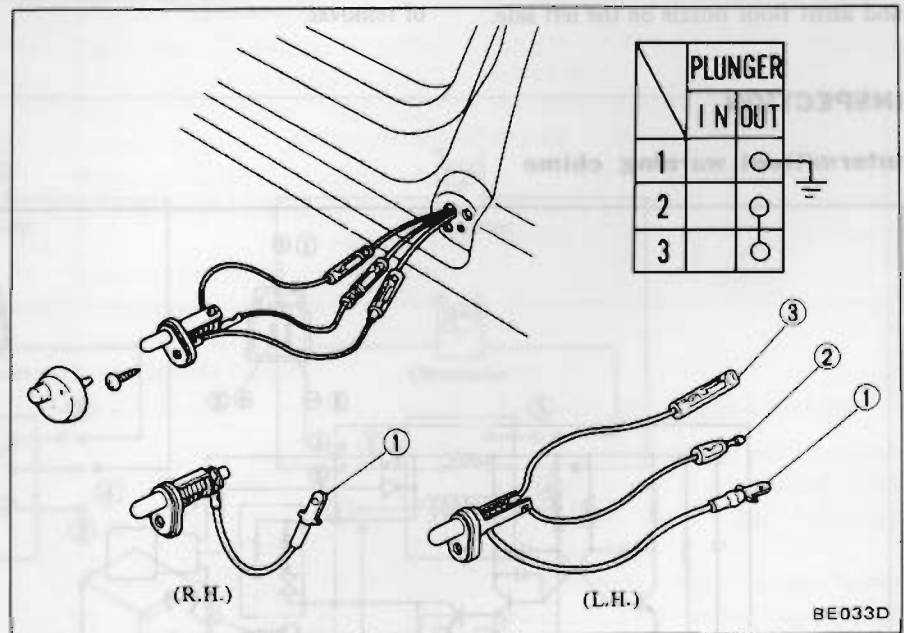
When plunger is pressed into switch assembly, parking brake switch contacts are open. Contacts are closed when plunger is projected.



Brake fluid level switch

Brake fluid level switch is built into brake master cylinder cap. The cap can be easily removed by twisting it after disconnecting lead wire terminals. Then replace cap.

DOOR SWITCH



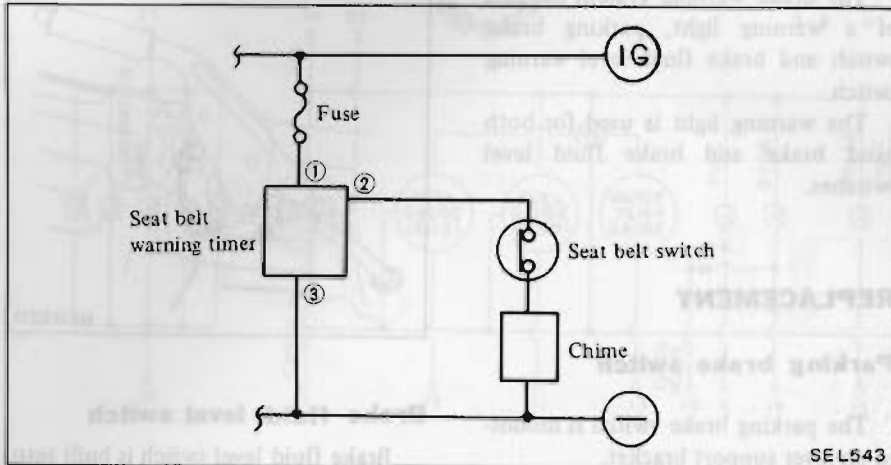
SEAT BELT WARNING SYSTEM

DESCRIPTION

This system consists of an ignition switch, a timer unit, a warning light, a driver's seat belt switch and a warning chime, and is designed to remind the

driver to buckle his seat belt.

When the ignition switch is turned to the "ON" position, the warning light comes on and remains on for 4 to 8 seconds. At the same time, the warning chime sounds for 4 to 8 seconds intermittently if the driver's seat belt is not fastened properly. The chime is also used as a theft warning chime.



Seat belt warning timer

1. Disconnect battery ground cable.
2. Remove instrument lower cover and driver floor nozzle on the right side.
3. Remove glove box.
4. Disconnect wire connector.
5. Loosen screw retaining timer unit on dash side and then take out timer unit.
6. Installation is in the reverse order of removal.

Seat belt switch

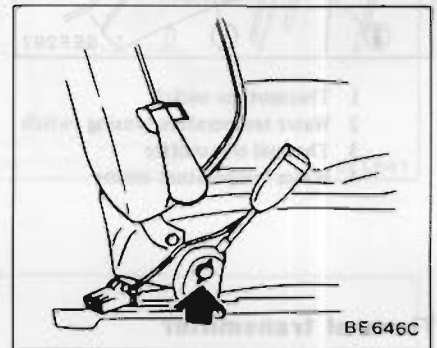
1. Disconnect battery ground cable.
2. Slide driver's seat all the way forward.
3. Disconnect harness connector.
4. Remove inner seat belt by removing securing bolt.
5. Install inner seat belt in the reverse order of removal.

REMOVAL AND INSTALLATION

Intermittent warning chime

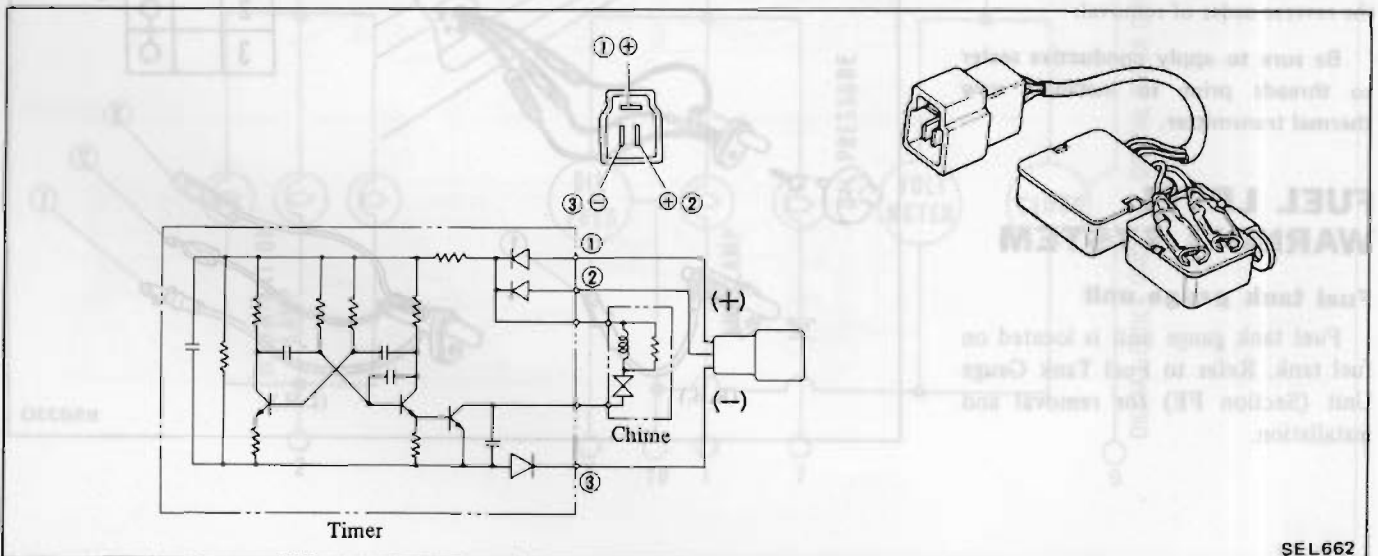
1. Disconnect battery ground cable.
2. Remove instrument lower cover and assist floor nozzle on the left side.

3. Disconnect chime wire connector.
4. Remove screws retaining chime assembly and then take out chime assembly.
5. Installation is in the reverse order of removal.



INSPECTION

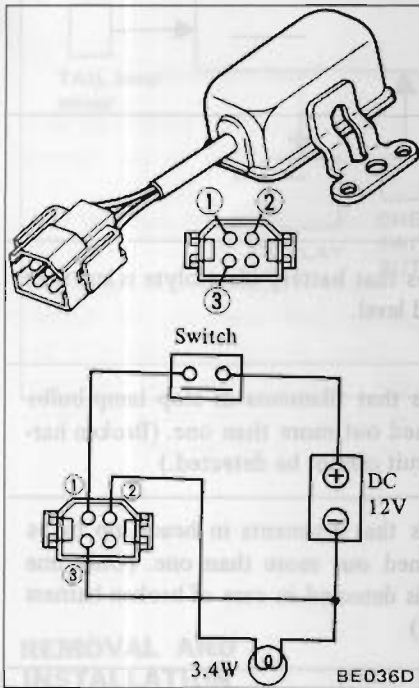
Intermittent warning chime



Apply 12V direct current between ①–③ or ②–③ and check whether chime sounds or not. The chime must sound when ①–③ and ②–③ are connected to power circuit.

Make sure that (–) negative terminal of power circuit is always connected to (3) terminal.

Seat belt warning timer



Seat belt switch

Test continuity through driver's seat belt switch with a test lamp or ohmmeter.

There should be continuity between two terminals when the seat belt is unfastened. Conversely there should not be continuity when fastened.

2. Remove kicking plate on the right side.
3. Disconnect harness connector.
4. Remove diode box.
5. Install diode box in the reverse order of removal.

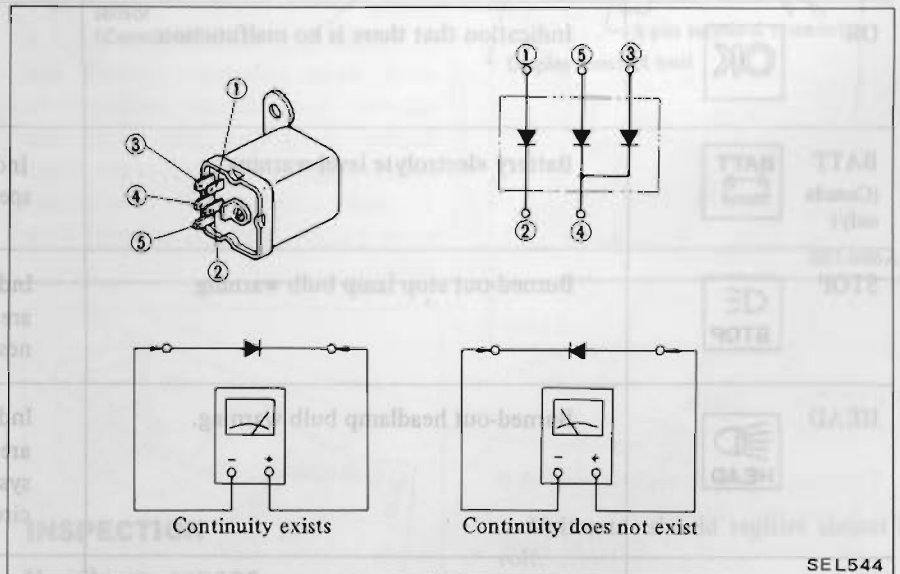
DIODE BOX

REMOVAL AND INSTALLATION

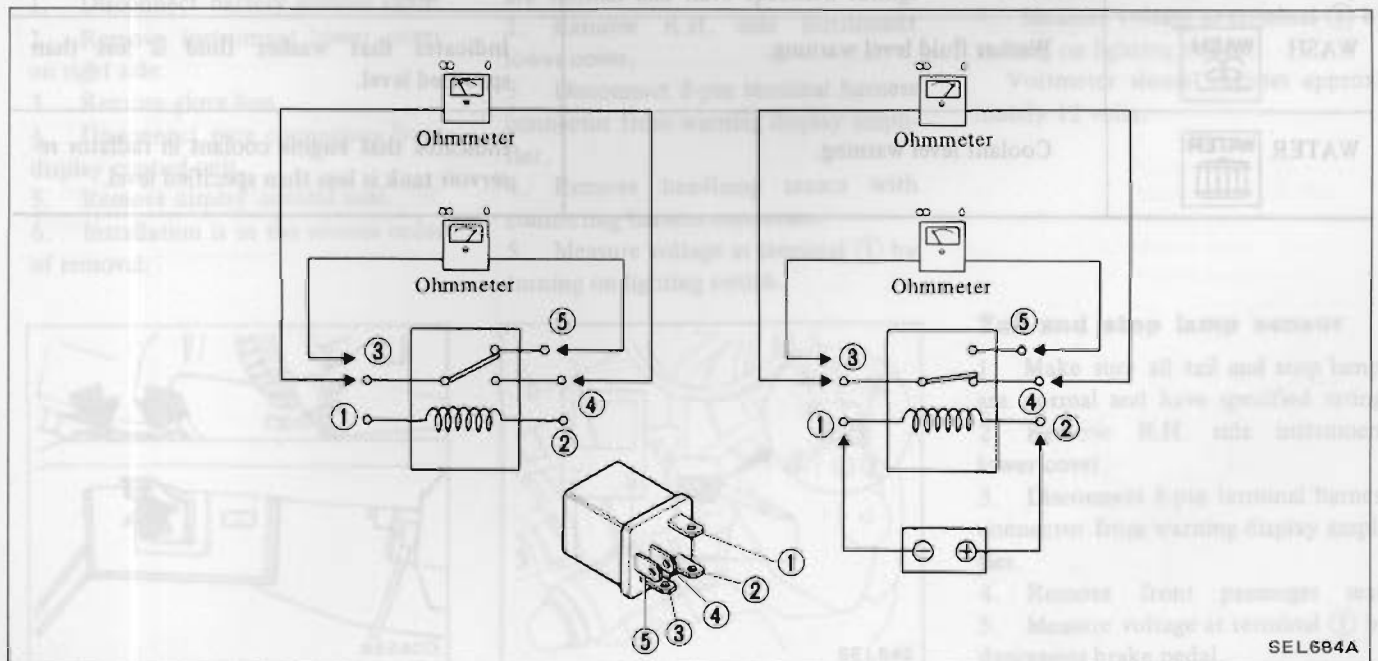
1. Disconnect battery ground cable.

INSPECTION

Test continuity of system with a test lamp or ohmmeter.



BULB CHECK RELAY



WARNING DISPLAY









DESCRIPTION

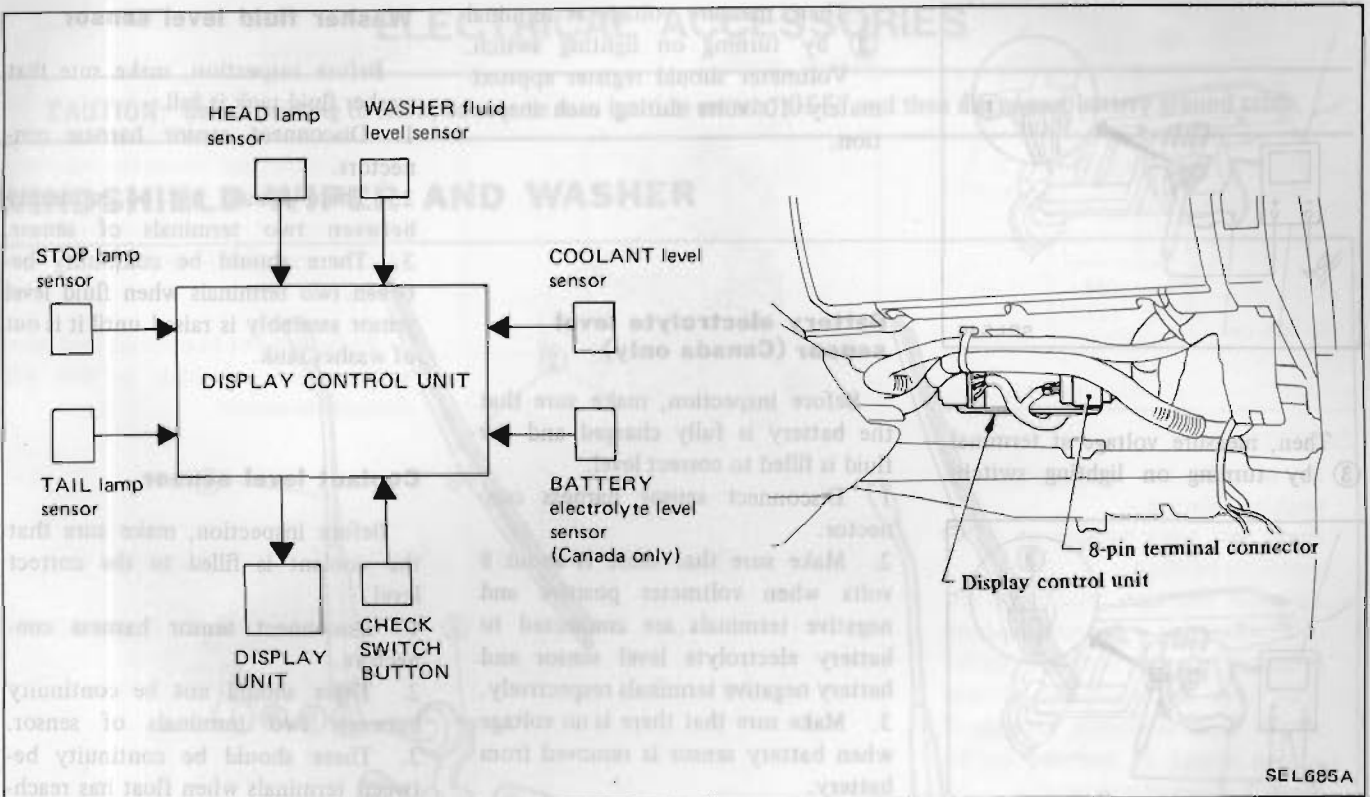
The warning display system consists of a warning indicator, a check switch,

a warning display control amplifier, and sensors which are arranged at each part of the car.

Pushing the check switch on the combination meter will indicate the following on the indicators.

Warning

Indication	Item	Warning
Red all over the surface 	Indication that there is a malfunction.	
OK 	Indication that there is no malfunction.	
BATT (Canada only) 	Battery electrolyte level warning.	Indicates that battery electrolyte is less than specified level.
STOP 	Burned-out stop lamp bulb warning.	Indicates that filaments in stop lamp bulbs are burned out more than one. (Broken harness circuit cannot be detected.)
HEAD 	Burned-out headlamp bulb warning.	Indicates that filaments in headlamp bulbs are burned out more than one. (Only one system is detected in case of broken harness circuits.)
TAIL 	Burned-out tail lamp bulb warning.	Indicates that filaments in tail lamp bulbs are burned out more than one. (Broken harness circuit cannot be detected.)
WASH 	Washer fluid level warning.	Indicates that washer fluid is less than specified level.
WATER 	Coolant level warning.	Indicates that engine coolant in radiator reservoir tank is less than specified level.

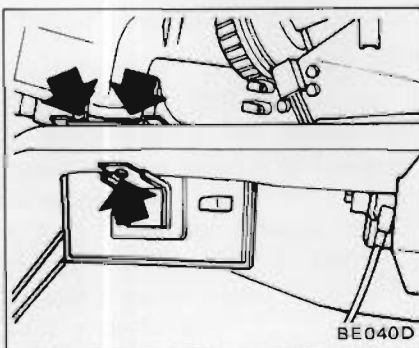


SEL685A

REMOVAL AND INSTALLATION

Display control unit

1. Disconnect battery ground cable.
2. Remove instrument lower cover on right side.
3. Remove glove box.
4. Disconnect wire connectors from display control unit.
5. Remove display control unit.
6. Installation is in the reverse order of removal.

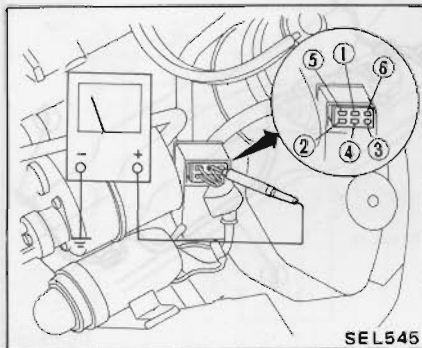


BE040D

INSPECTION

Headlamp sensor

1. Make sure all headlamp bulbs are normal and have specified rating.
2. Remove R.H. side instrument lower cover.
3. Disconnect 8-pin terminal harness connector from warning display amplifier.
4. Remove headlamp sensor with connecting harness connector.
5. Measure voltage at terminal ① by turning on lighting switch.



SEL545

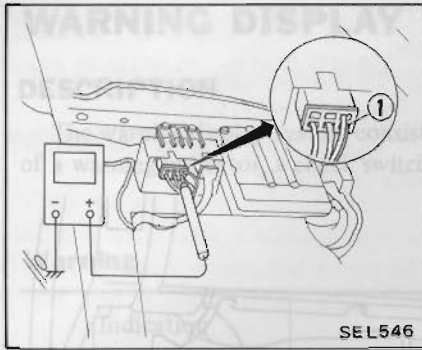
Voltmeter should register almost 0 volt.

6. Disconnect one of headlamp connectors or remove one of headlamp circuit fuses.
7. Measure voltage at terminal ① by turning on lighting switch.

Voltmeter should register approximately 12 volts.

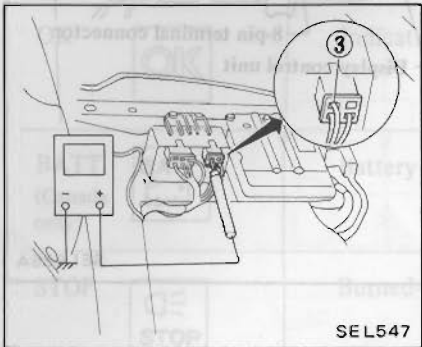
Tail and stop lamp sensor

1. Make sure all tail and stop lamps are normal and have specified rating.
2. Remove R.H. side instrument lower cover.
3. Disconnect 8-pin terminal harness connector from warning display amplifier.
4. Remove front passenger seat.
5. Measure voltage at terminal ① by depressing brake pedal.



SEL546

Then, measure voltage at terminal ③ by turning on lighting switch.



SEL547

Voltmeter should register almost 0 volt during each inspection.

6. Disconnect one of stop/tail lamp bulbs.

Measure voltage at terminal ① by depressing brake pedal.

Tail and stop lamp sensor

1. Make sure all tail and stop lamps are correct and have specified rating.
2. Remove R.H. side instrument lower cover.
3. Disconnect 8-pin terminal between connector from warning display assembly.
4. Remove front instrument panel.
5. Measure voltage at terminal ① by depressing brake pedal.

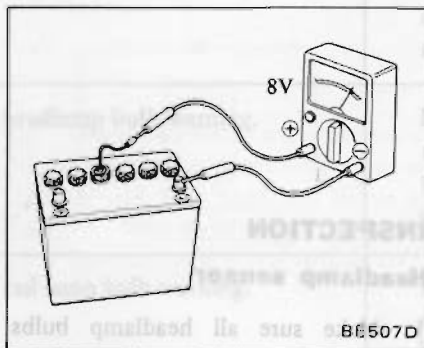
Then, measure voltage at terminal ③ by turning on lighting switch.

Voltmeter should register approximately 10 volts during each inspection.

Battery electrolyte level sensor (Canada only)

Before inspection, make sure that the battery is fully charged and the fluid is filled to correct level.

1. Disconnect sensor harness connector.
2. Make sure that there is about 8 volts when voltmeter positive and negative terminals are connected to battery electrolyte level sensor and battery negative terminals respectively.
3. Make sure that there is no voltage when battery sensor is removed from battery.



BE507D

Washer fluid level sensor

Before inspection, make sure that washer fluid tank is full.

1. Disconnect sensor harness connectors.
2. There should not be continuity between two terminals of sensor.
3. There should be continuity between two terminals when fluid level sensor assembly is raised until it is out of washer tank.

Coolant level sensor

Before inspection, make sure that the coolant is filled to the correct level.

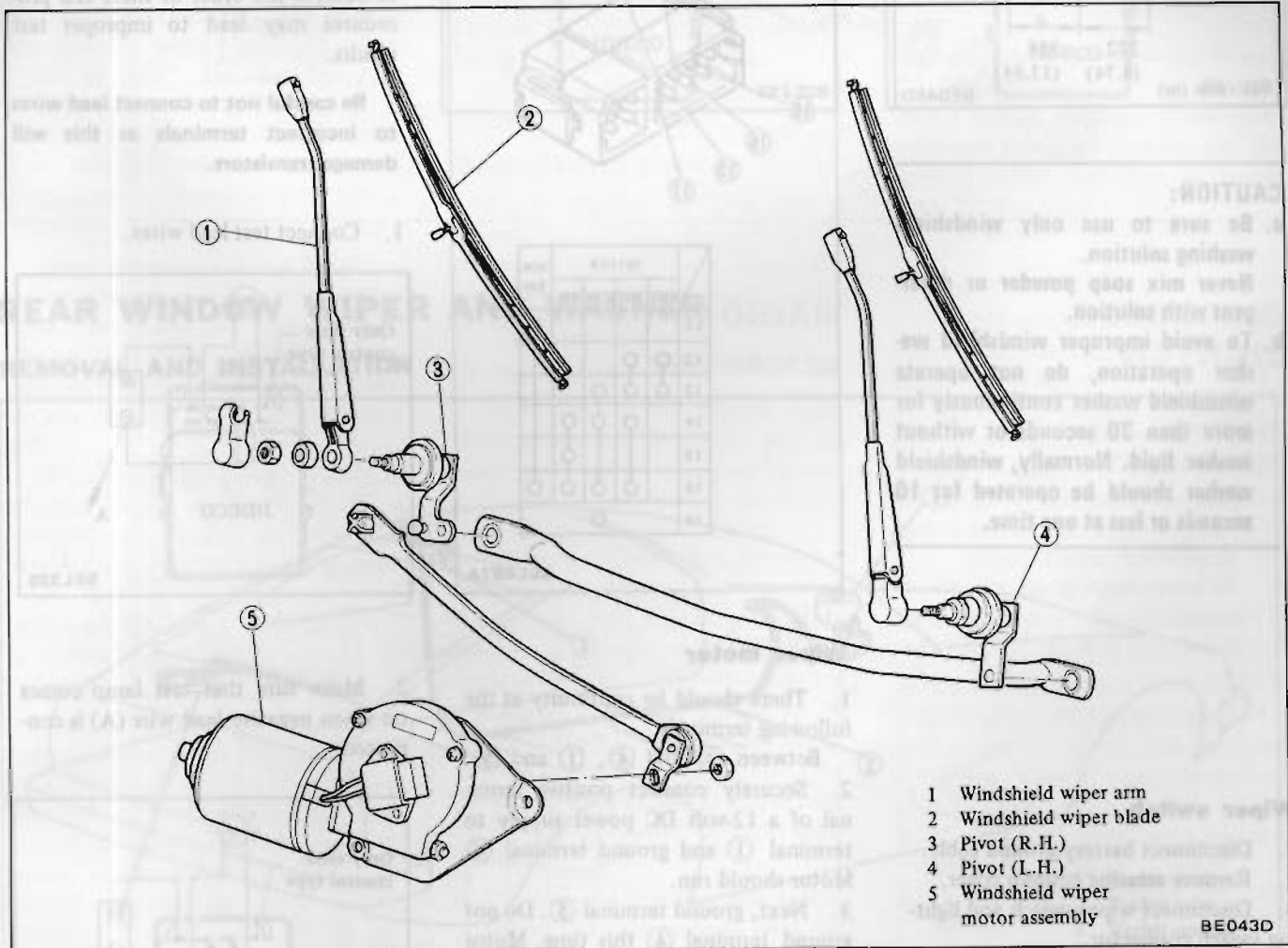
1. Disconnect sensor harness connectors.
2. There should not be continuity between two terminals of sensor.
3. There should be continuity between terminals when float has reached below low level by gradually lowering float with a suitable tool.



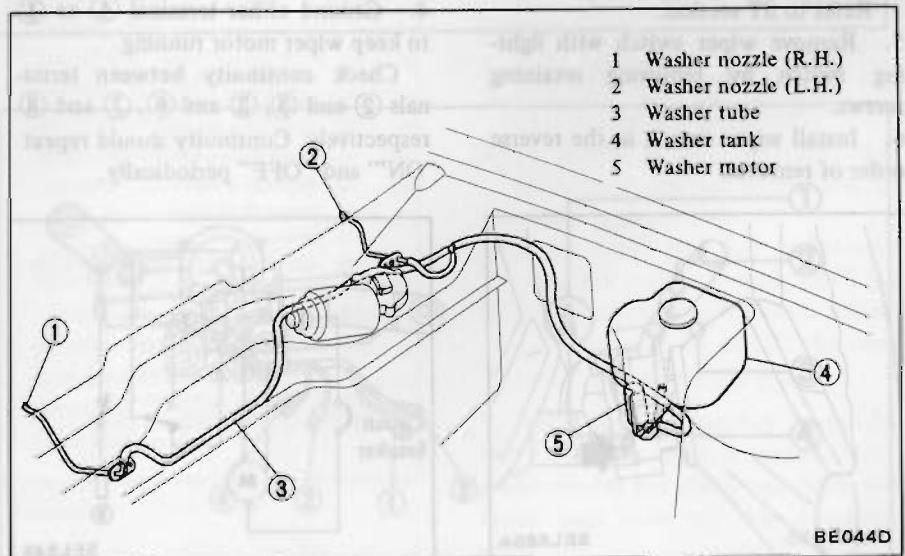
ELECTRICAL ACCESSORIES

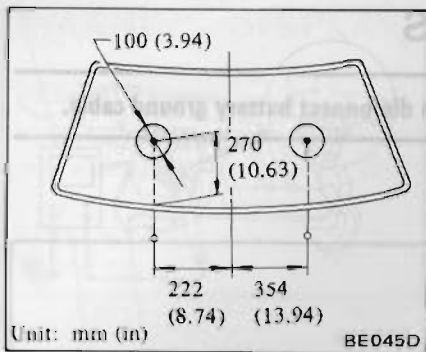
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

WINDSHIELD WIPER AND WASHER



CAUTION:
 Be careful not to bend linkage during removal.



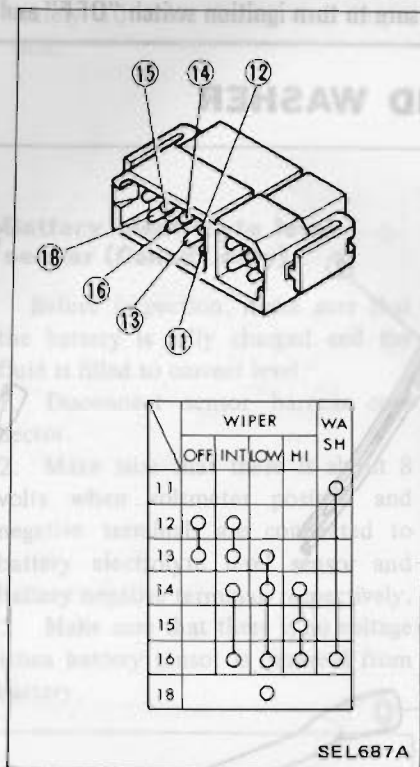


CAUTION:

- a. Be sure to use only windshield washing solution. Never mix soap powder or detergent with solution.
- b. To avoid improper windshield washer operation, do not operate windshield washer continuously for more than 30 seconds or without washer fluid. Normally, windshield washer should be operated for 10 seconds or less at one time.

INSPECTION

Wiper switch

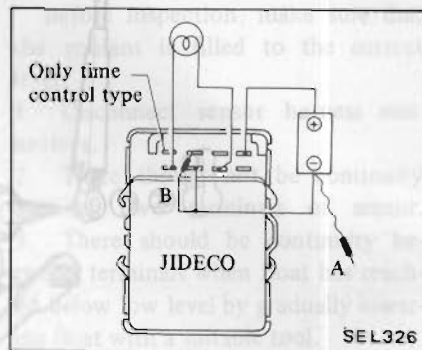


Intermittent amplifier (IC built-in)

To check intermittent amplifier for proper operation, fabricate adapters shown below, and utilize the following procedures in the order listed. Failure to observe the order of these test procedures may lead to improper test results.

Be careful not to connect lead wires to incorrect terminals as this will damage transistors.

1. Connect test lead wires.



Wiper motor

1. There should be continuity at the following terminals:

Between ① and ④, ① and ⑤.

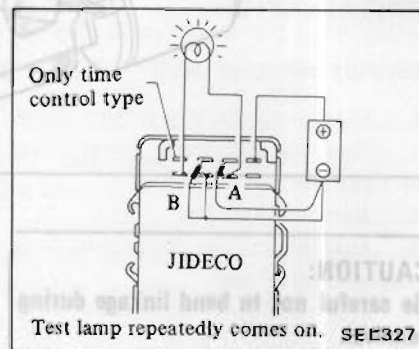
2. Securely connect positive terminal of a 12-volt DC power supply to terminal ① and ground terminal ④. Motor should run.

3. Next, ground terminal ⑤. Do not ground terminal ④ this time. Motor should run.

4. Ground either terminal ④ or ⑤ to keep wiper motor running.

Check continuity between terminals ② and ③, ② and ⑥, ⑦ and ⑧ respectively. Continuity should repeat "ON" and "OFF" periodically.

2. Make sure that test lamp comes on when negative lead wire (A) is connected.

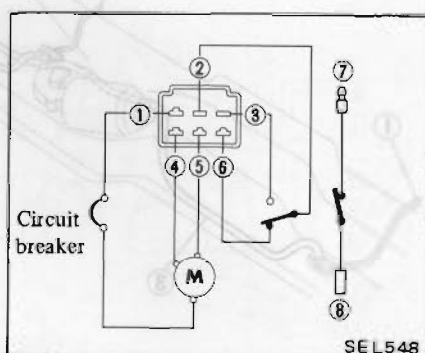
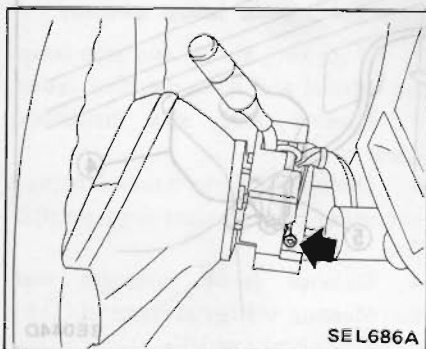


Wiper switch

1. Disconnect battery ground cable.
2. Remove steering column cover.
3. Disconnect wiper switch and lighting switch connector.
4. Remove steering wheel.

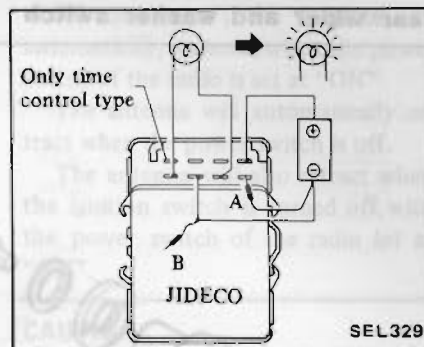
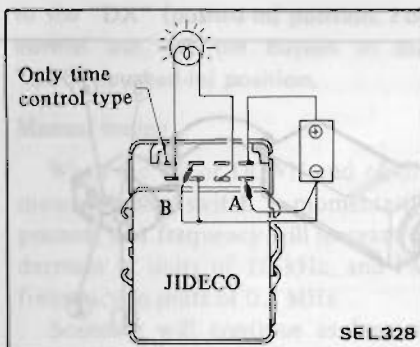
Refer to ST section.

5. Remove wiper switch with lighting switch by removing retaining screws.
6. Install wiper switch in the reverse order of removal.



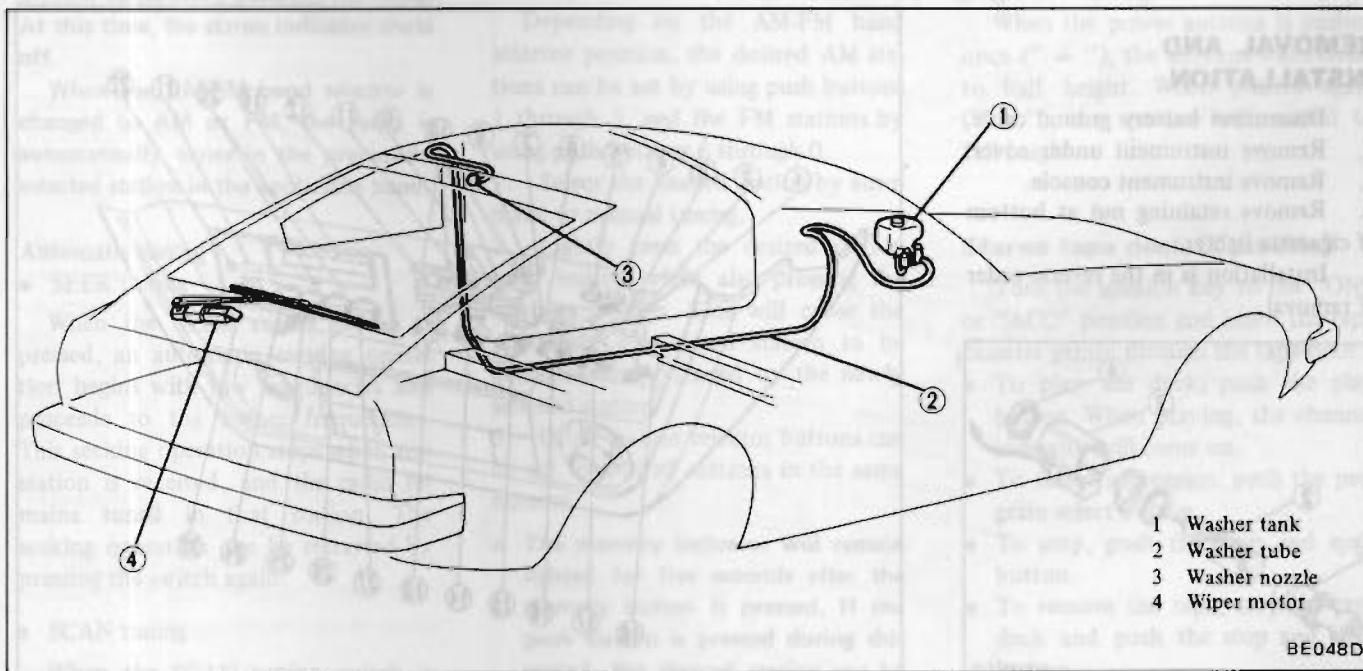
3. Disconnect lead wire (B).

Test lamp should go out and come back on in a few seconds.



REAR WINDOW WIPER AND WASHER

REMOVAL AND INSTALLATION



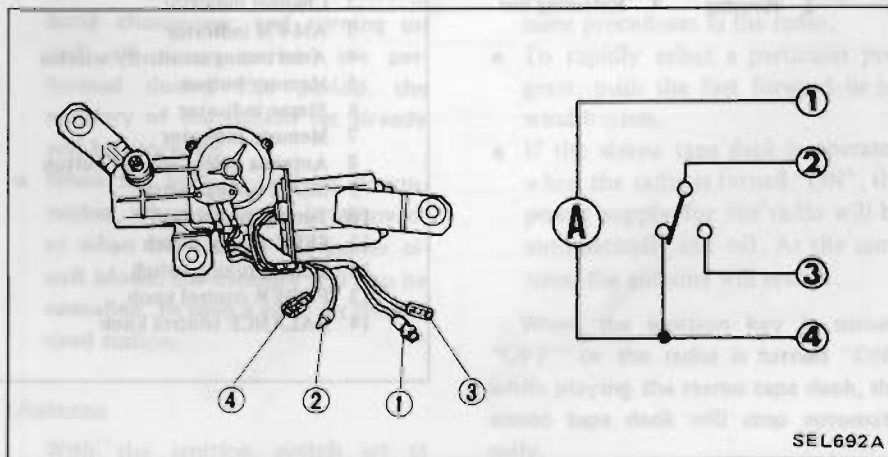
INSPECTION

Wiper motor

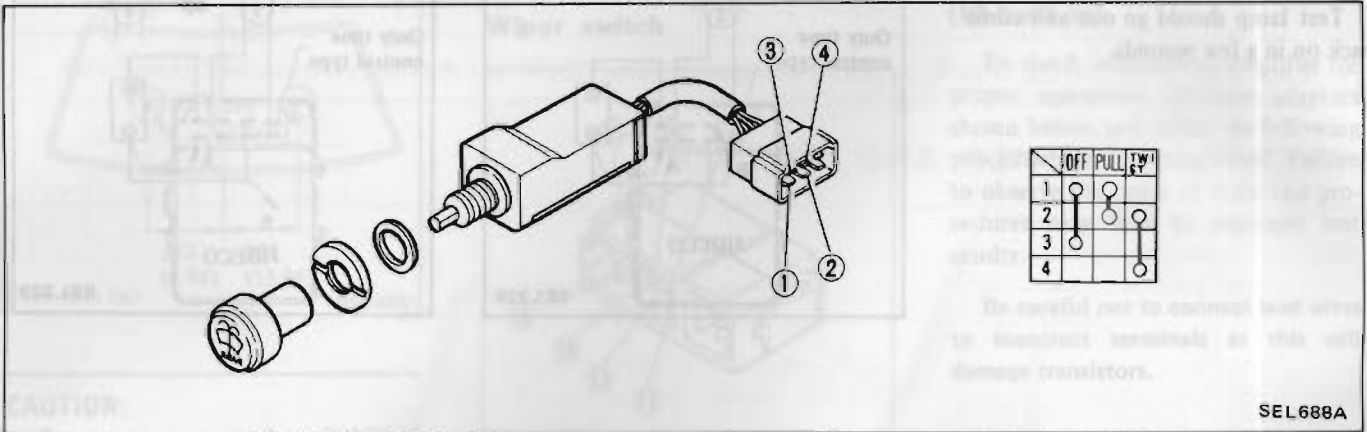
Inspect wiper motor as follows:

1. There should be continuity between terminals ① and ④.
2. Apply positive DC 12 volt to terminal ① and negative to terminal ④, and motor will rotate.

Check continuity between terminals ② and ③, and ② and ④. Continuity should repeat "ON" and "OFF" periodically.



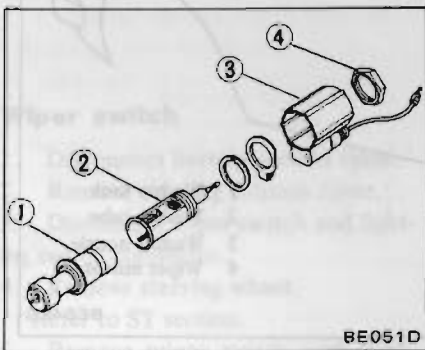
Rear wiper and washer switch



CIGARETTE LIGHTER

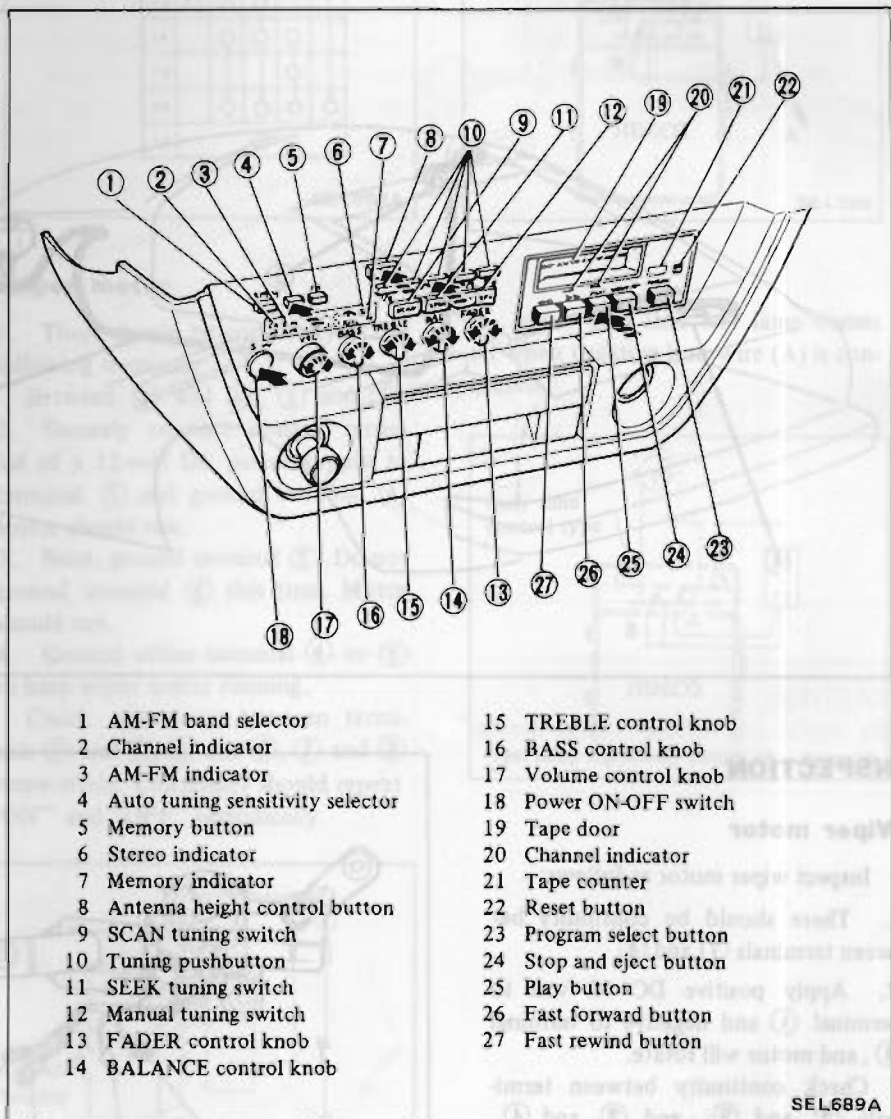
REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove instrument under cover.
3. Remove instrument console.
4. Remove retaining nut at bottom of cigarette lighter.
5. Installation is in the reverse order of removal.



- | | |
|-----------|-----------------|
| 1 Lighter | 3 Housing cover |
| 2 Housing | 4 Retaining nut |

RADIO DESCRIPTION



Audio radio

The radio features an automatic tuning system and five push buttons for station selection. Using the push buttons, it is possible to preset five FM stations and five AM stations. Other stations may be selected using the automatic or manual tuning switch. The ignition switch must be set at "ON", or "ACC". The stereo indicator remains lighted during FM stereo reception. The channel indicator indicates channel number of tuning push button and continues to glow during reception.

When receiving a stereo broadcast in mountainous areas, etc. where FM is weak, the radio will automatically change from stereo to monaural to prevent static from entering the radio. At this time, the stereo indicator shuts off.

When the AM-FM band selector is changed to AM or FM, the radio is automatically tunes in the previously selected station in the applicable band.

Automatic tuning● **SEEK tuning**

When the SEEK tuning switch is pressed, an automatic seeking operation begins with low frequencies and proceeds to the higher frequencies. This seeking operation stops when any station is received, and the radio remains tuned in that station. The seeking operation can be restarted by pressing the switch again.

● **SCAN tuning**

When the SCAN tuning switch is pressed, scanning begins from low to high frequencies. When any station is received, the scan stops for five seconds. If nothing is done by the listener during this period, scanning starts again.

If the switch is again pressed during this five second period, the radio remains tuned to that station even after the switch is released. This scanning motion can be restarted by pressing the switch again.

All automatic tuning will continue if the broadcasting station is exceptionally weak. In such a case, set the auto tuning sensitivity selector button

to the "DX" (pushed-in) position. For normal use, set the button in the "LOC" (pushed-in) position.

Manual tuning

When the UP or DOWN end of the manual tuning switch is momentarily pressed, AM frequency will increase or decrease in units of 10 kHz, and FM frequency in units of 0.2 MHz.

Scanning will continue as long as the switch is being pressed.

4-speaker balance control

Adjust the right and left speaker volume by turning the BALANCE control knob. Adjust the volume for the front and rear speakers by turning the FADER control knob.

Setting the push buttons

Depending on the AM-FM band selector position, the desired AM stations can be set by using push buttons 1 through 5, and the FM stations by using push buttons 6 through 0.

1. Select the desired station by automatic or manual tuning.
2. Lightly press the desired station push button while also pressing the memory button. This will cause the previously memorized station to be cancelled and replaced by the newly selected station.
3. Other station selector buttons can be set to desired stations in the same manner.

- The memory indicator will remain lighted for five seconds after the memory button is pressed. If the push button is pressed during this period, the desired station can be set. If any other operations (such as manual tuning, seeking, scanning, band changeover and turning on and off power switch) are performed during this period, the memory of the station set already will be cancelled.
- When the battery cable is disconnected, when the radio is removed, or when the fuse in the power circuit blows, the memory will also be cancelled. In such a case, set the desired station.

Antenna

With the ignition switch set at

"ON" or "ACC", the antenna will automatically extend, when the power switch of the radio is set at "ON".

The antenna will automatically retract when the power switch is off.

The antenna will also retract when the ignition switch is turned off with the power switch of the radio set at "ON".

CAUTION:

Before turning on power to the radio, make sure that there is no one near the antenna outlet and there is enough space for it to extend.

Setting antenna height

The antenna switch located on the radio permits the selection of antenna height in two stages.

When the power antenna is pushed once ("▲"), the antenna will extend to half height. When pushed again ("▲"), the antenna will extend to full height.

Stereo tape deck (Cassette)

Turn the ignition key to the "ON" or "ACC" position and insert the tape cassette gently through the tape door.

- To play the deck, push the play button. When playing, the channel indicator will come on.
- To select a program, push the program select button.
- To stop, push the stop and eject button.
- To remove the tape, stop the tape deck and push the stop and eject button.
- Make volume, tone and speaker balance adjustments, following the same procedures as the radio.
- To rapidly select a particular program, push the fast forward or rewind button.
- If the stereo tape deck is operated when the radio is turned "ON", the power supply for the radio will be automatically cut off. At the same time, the antenna will retract.

When the ignition key is turned "OFF" or the radio is turned "ON" while playing the stereo tape deck, the stereo tape deck will stop automatically.

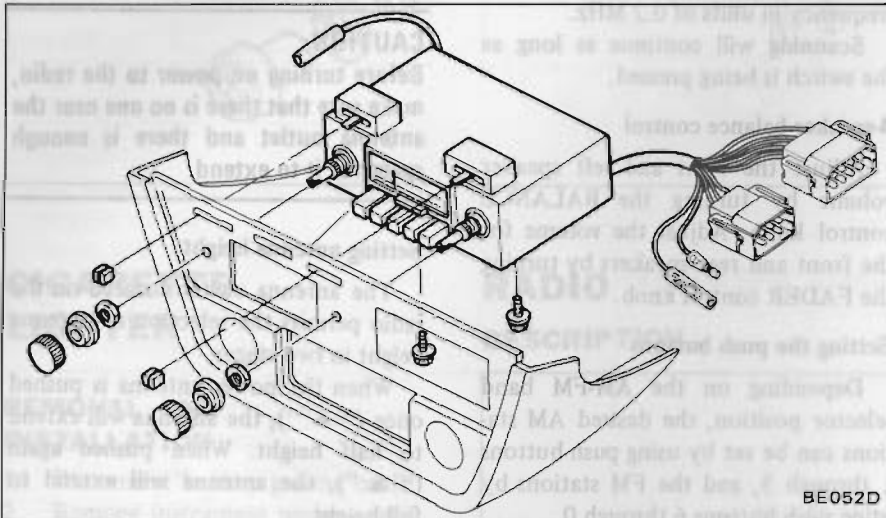
REMOVAL AND INSTALLATION

Radio receiver

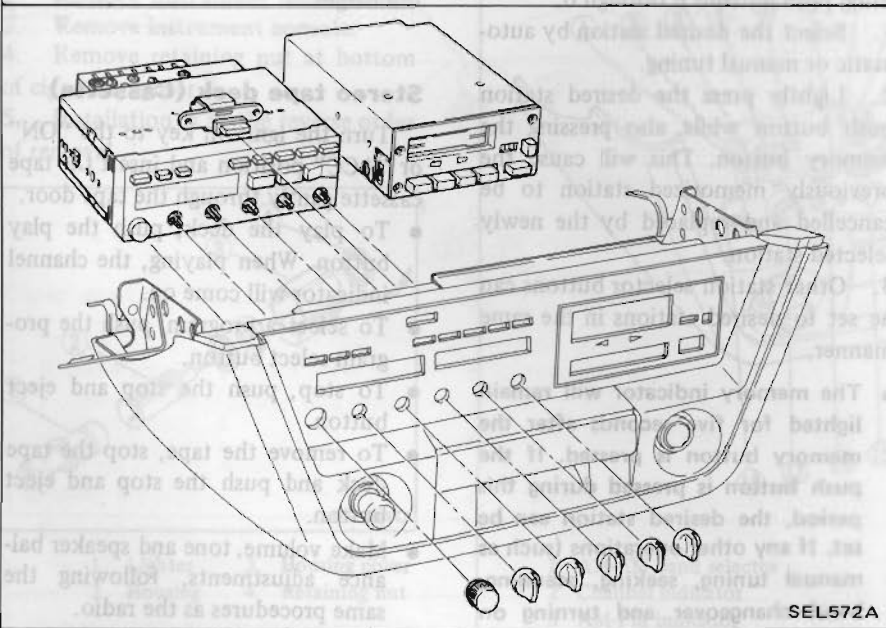
1. Disconnect battery ground cable.
2. Remove instrument under cover.
3. Remove instrument console.
4. Pull out knob and dials on radio

receiver and remove nuts retaining escutcheon to radio receiver.

5. Loosen screws retaining radio receiver. Radio receiver can then be taken out.
6. Installation is in the reverse order of removal.

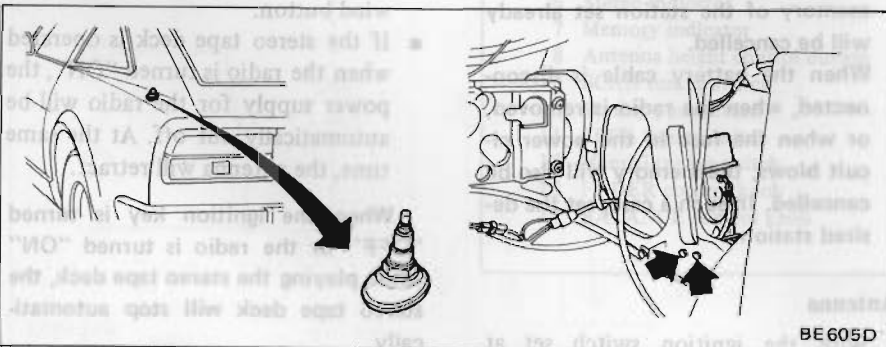


BE052D

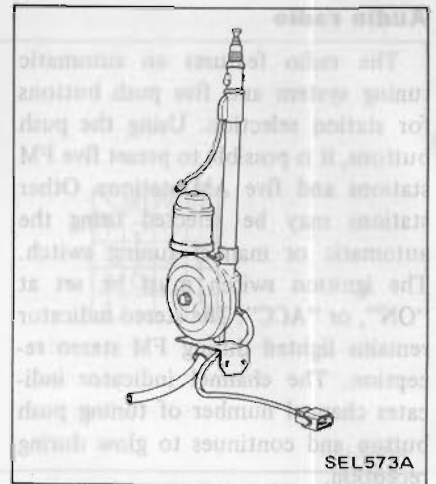


SEL572A

Antenna



BE 605D



SEL573A

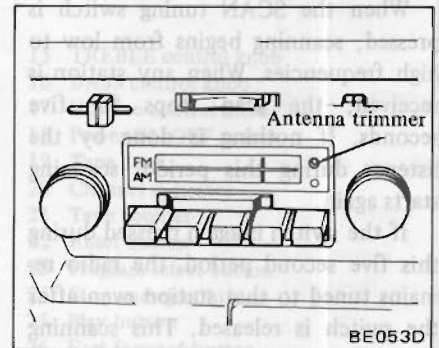
ADJUSTING ANTENNA TRIMMER

The antenna trimmer should be adjusted in the following cases:

- Fading and weak AM reception.
- After installation of new antenna, feeder cable or radio receiver.

Before adjusting, be sure to check harness and antenna feeder cable connectors for proper connection.

1. Extend antenna completely.
2. Turn radio on, and turn volume control to increase speaker volume.
3. Tune in the weakest station (barely audible) on dial at the range around 14 (1,400 kHz).
4. Turn antenna trimmer to left or right slowly, and set it in the position where reception strongest.



BE053D

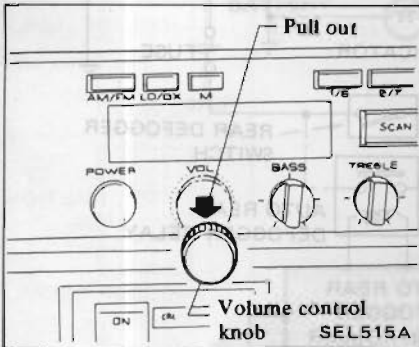
CAUTION:

Do not turn antenna trimmer more than one-half turn.

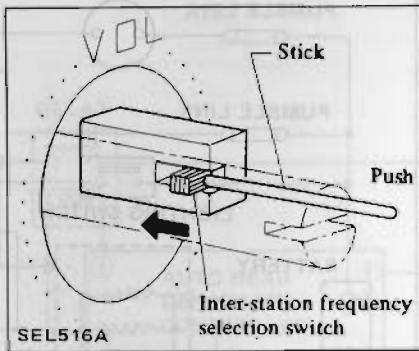
Changing inter-station frequency interval setting

Radio is preset at 10 kHz inter-station frequency intervals for AM reception. To set it at 9 kHz intervals, proceed as follows:

1. Remove volume control knob from radio.



2. Flip inter-station frequency selection switch to "9 kHz".

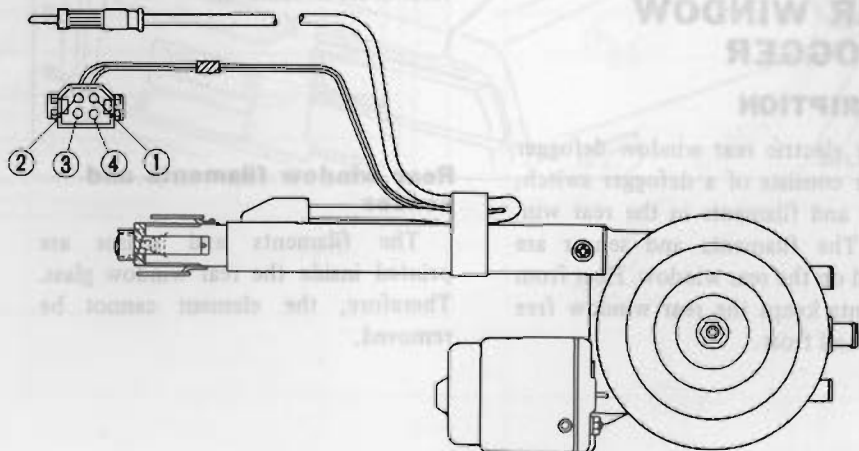
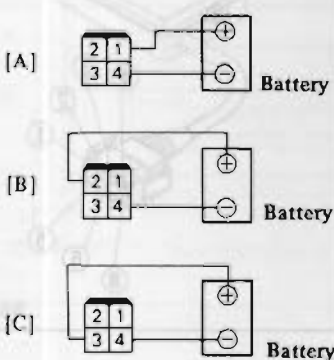


This switch is a depress-only type and once it is depressed, it does not retract. Do not depress unless it is for change-over use.

3. Replace volume control knob in its original position.

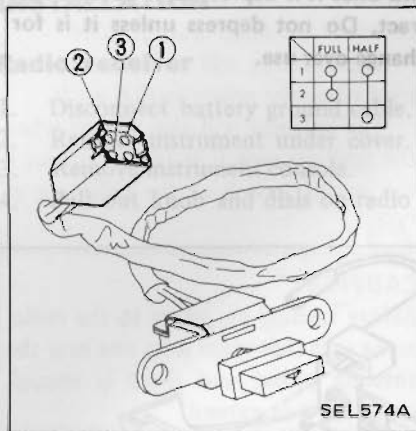
INSPECTION

Antenna operation	Fully extended height	↑	↑	↓	↑	↓	
	Half extended height	↑	↑	↓	↑	↓	
	Fully retracted height	↑	↑	↓	↑	↓	
Checking measures		B	A	B	C	A	C



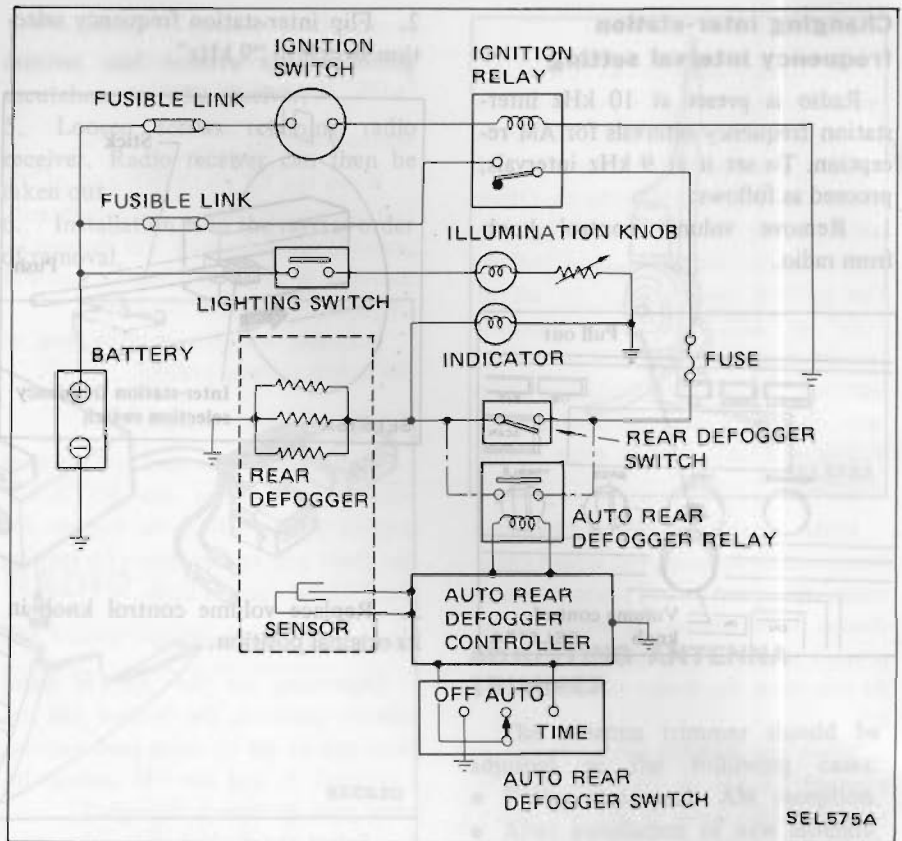
SEL645A

Power antenna switch



Power antenna timer

The inspection of the power antenna timer as a unit is difficult, so that it should be inspected as a power antenna system when it is installed on the car.



STEREO

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove instrument lower cover.
3. Remove instrument center console.
4. Remove radio receiver.
5. Remove screws securing stereo and remove stereo.
6. Installation is in the reverse order of removal.

REMOVAL AND INSTALLATION

Defogger switch

1. Disconnect battery ground cable.
2. Remove defogger switch by prying it off with a screwdriver and pull it out.
3. Disconnect harness connector.
4. Install defogger switch in the reverse order of removal.

INSPECTION

Auto rear defogger unit

Location

Auto rear defogger unit is located under the left seat.

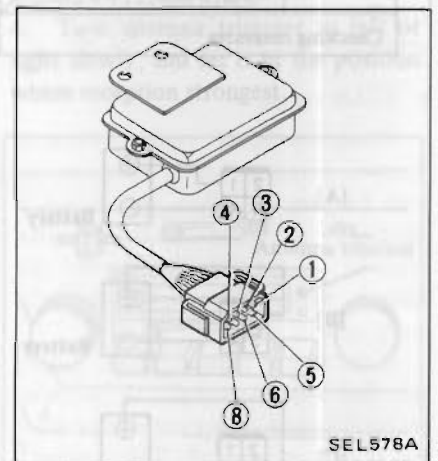
REAR WINDOW DEFOGGER

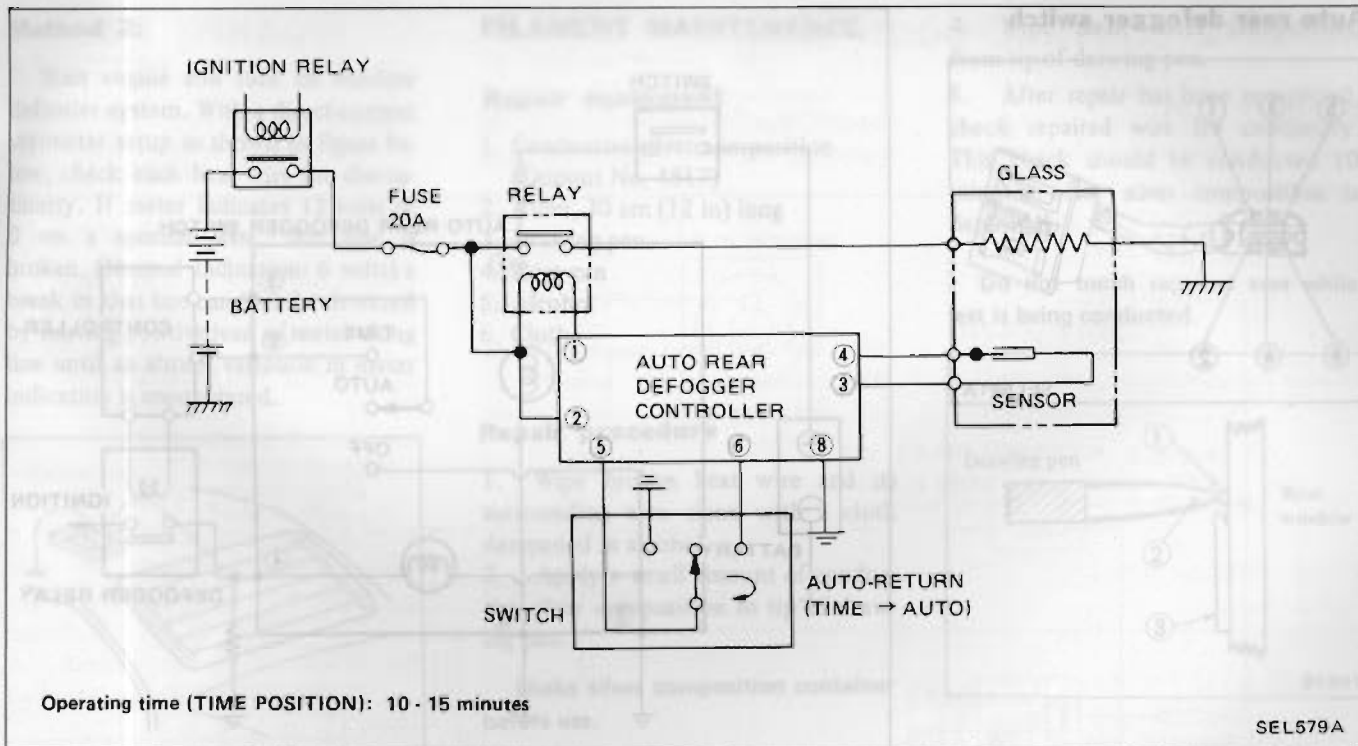
DESCRIPTION

The electric rear window defogger system consists of a defogger switch, sensor and filaments in the rear window. The filaments and sensor are printed on the rear window. Heat from filaments keeps the rear window free of fog and frost.

Rear window filaments and sensor

The filaments and sensor are printed inside the rear window glass. Therefore, the element cannot be removed.

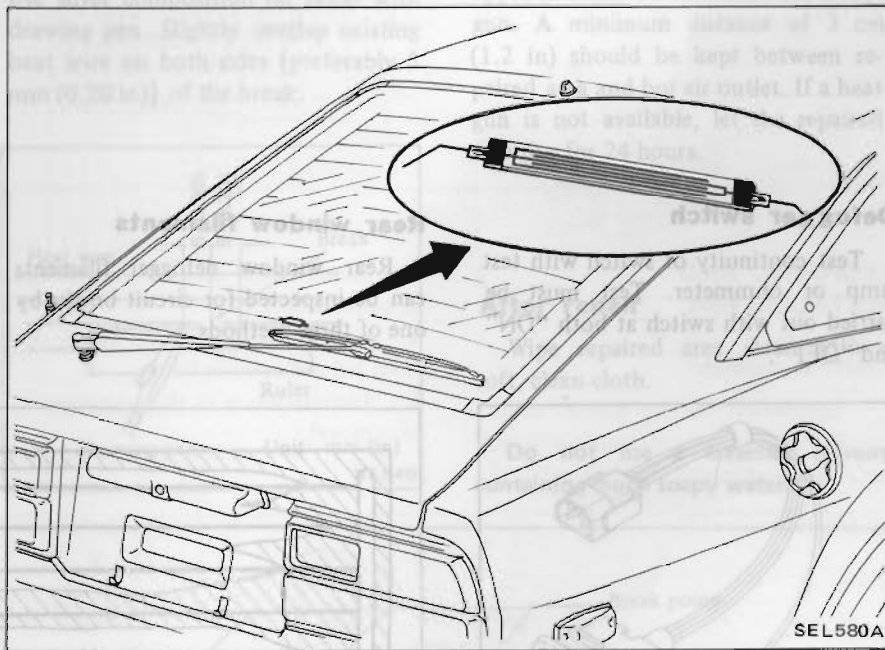




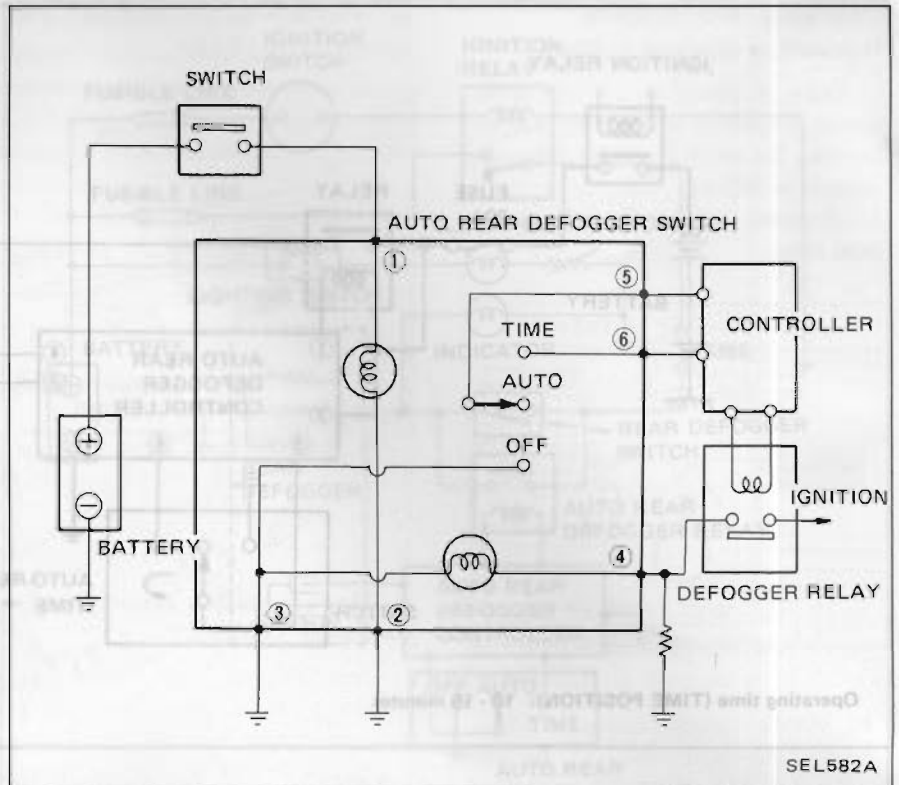
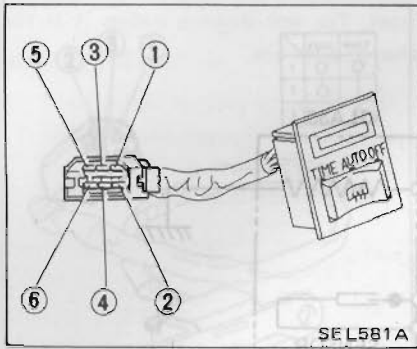
Auto rear defogger sensor

Location

Auto rear defogger sensor is located on the inside of the back window.



Auto rear defogger switch

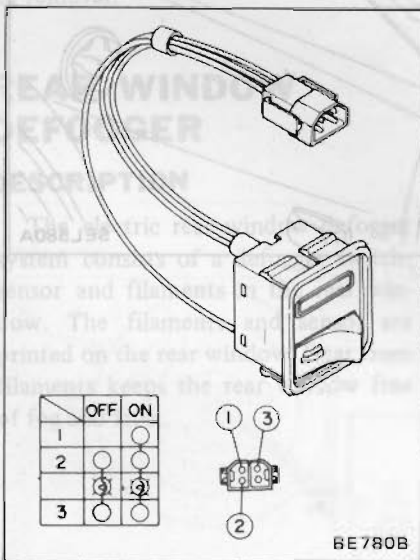


STEREO

REMOVAL AND INSTALLATION

Defogger switch

Test continuity of switch with test lamp or ohmmeter. Test must be carried out with switch at both "ON" and "OFF".

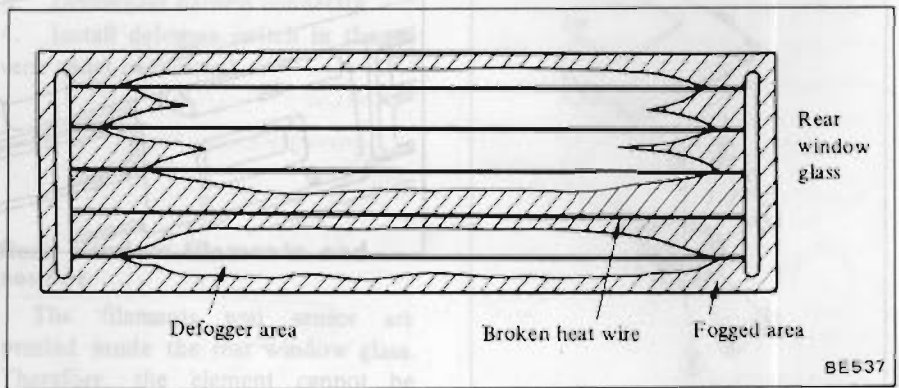


Rear window filaments

Rear window defogger filaments can be inspected for circuit breaks by one of three methods.

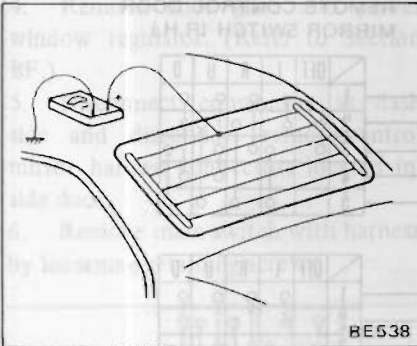
Method 1:

Start engine and turn on window defroster system. If area around a specified filament is not defogged, that line is broken.



Method 2:

Start engine and turn on window defroster system. With a direct-current voltmeter setup as shown in figure below, check each heat wire for discontinuity. If meter indicates 12 volts or 0 on a specific wire, that line is broken. (Normal indication: 6 volts) a break in that line can then be detected by moving positive lead of meter along line until an abrupt variation in meter indication is encountered.

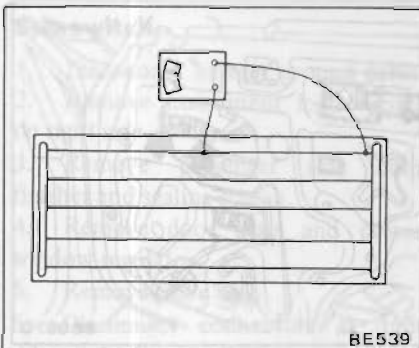


BE538

Method 3:

With an ohmmeter setup as shown in figure below, place one lead at one end of a heat wire and the other in the middle section of that wire. If meter registers, on a specific grid line, a value twice as much as on any other line, that line is broken.

A break in that line can then be located by an abrupt variation in meter indication as test lead moves along broken heat wire.



BE539

FILAMENT MAINTENANCE**Repair equipment**

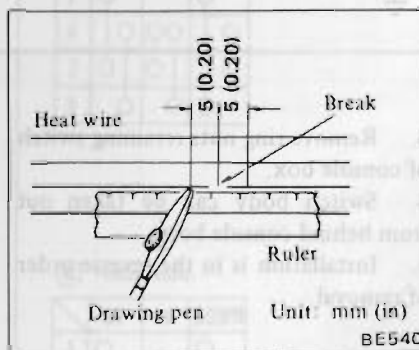
1. Conductive silver composition (Dupont No. 4817)
2. Ruler, 30 cm (12 in) long
3. Drawing pen
4. Heat gun
5. Alcohol
6. Cloth

Repair procedure

1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol.
2. Apply a small amount of conductive silver composition to tip of drawing pen.

Shake silver composition container before use.

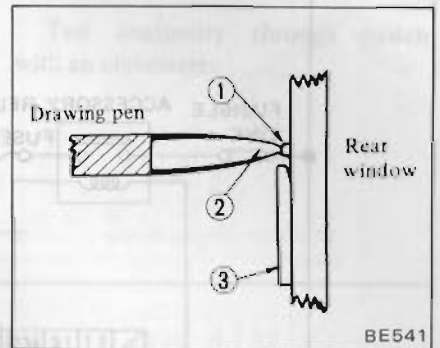
3. Place ruler on glass along broken line to be repaired. Deposit conductive silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.20 in)] of the break.



BE540

4. Wipe clean silver composition from tip of drawing pen.
5. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.

Do not touch repaired area while test is being conducted.



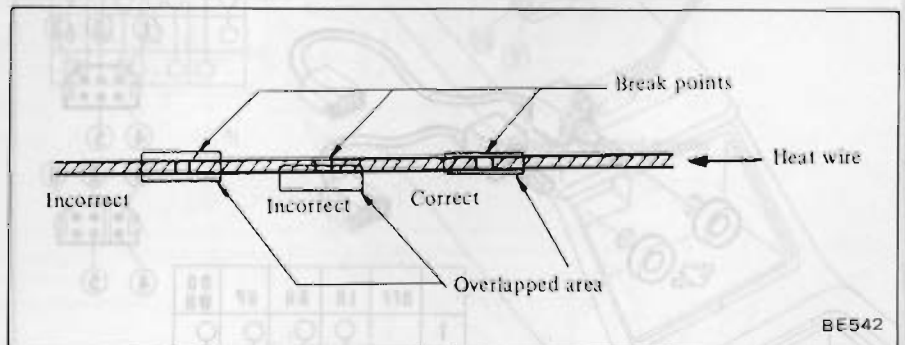
BE541

6. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours.

After repair

Wipe repaired area clean with a soft, clean cloth.

Do not use a cleaning solvent containing much soapy water.



BE542

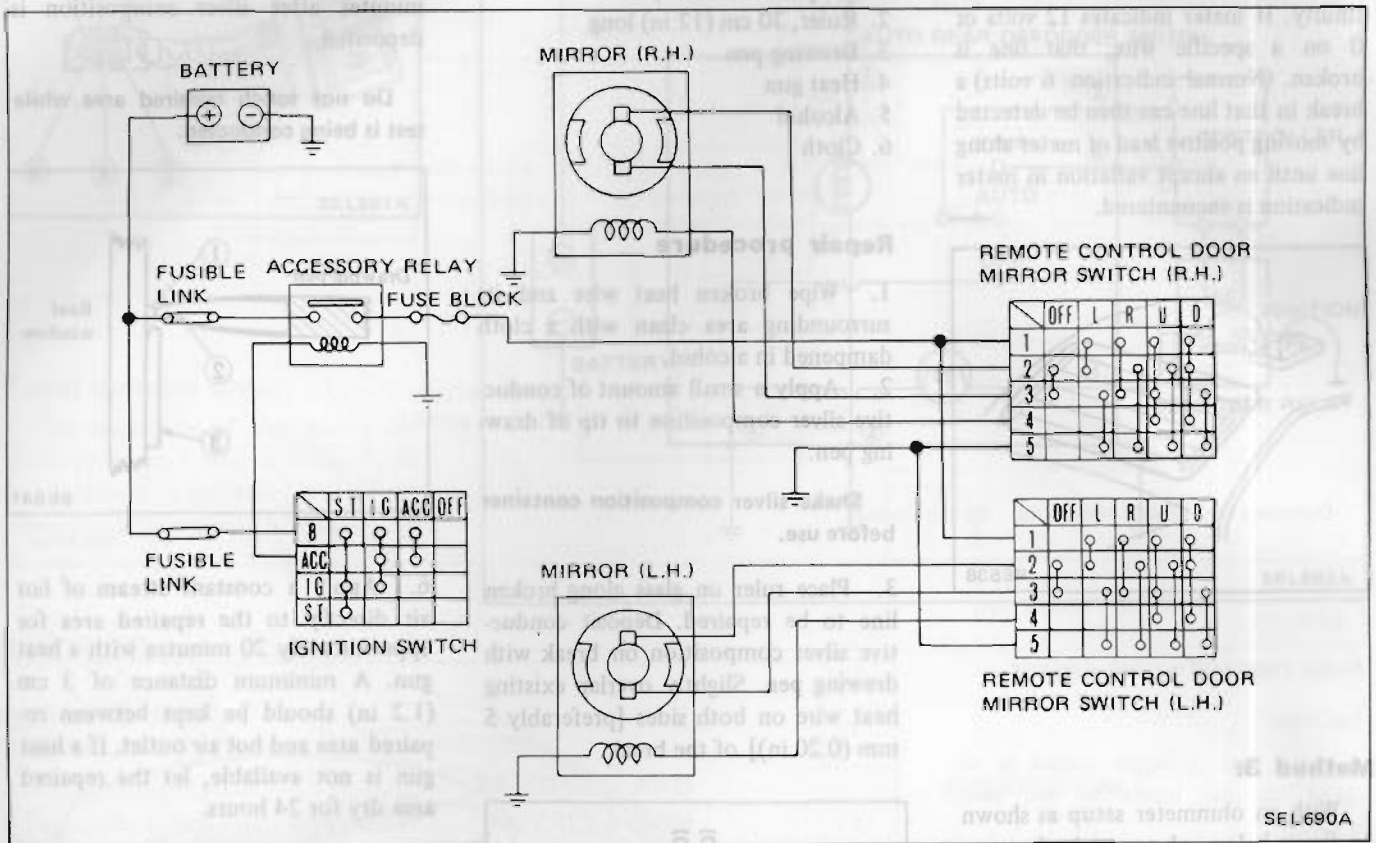
REMOTE-CONTROL DOOR MIRROR

DESCRIPTION

The remote-control door mirror

consists of a door mirror assembly and a control switch. The door mirror is

mounted on the door. The control switch is installed on the console box.



REMOVAL AND INSTALLATION

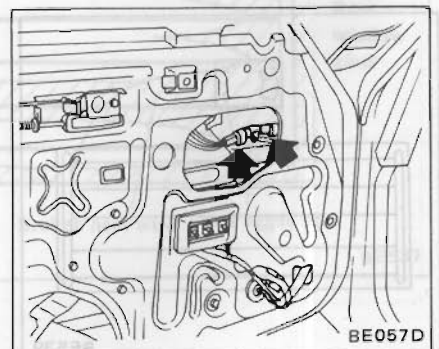
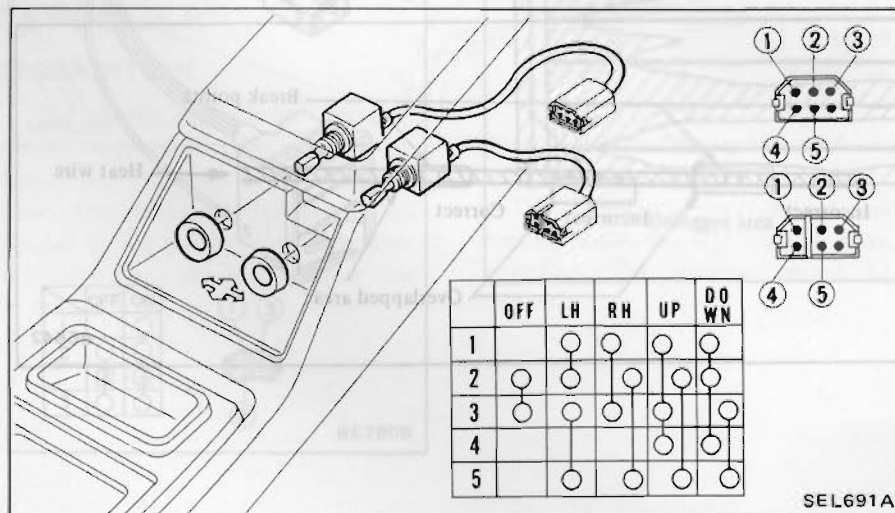
Control switch

1. Disconnect battery ground cable.
2. Loosen screws retaining console box, and disconnect wire connectors.

3. Remove ring nuts retaining switch of console box.
4. Switch body can be taken out from behind console box.
5. Installation is in the reverse order of removal.

Door mirror assembly

1. Disconnect battery ground cable.
2. Remove door finisher and sealing screen.
3. Disconnect harness connectors.
4. Remove nuts retaining mirror, and remove mirror with harness.



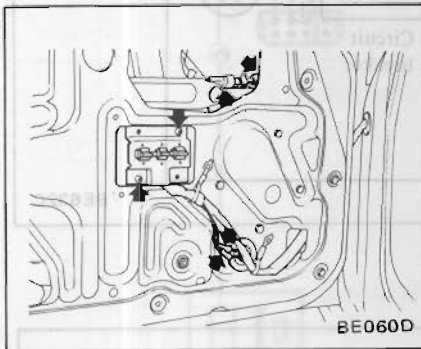
5. Installation is in the reverse order of removal.

POWER WINDOW SYSTEM

REMOVAL AND INSTALLATION

Power window main switch

1. Disconnect battery ground cable.
2. Remove instrument lower cover on left side.
3. Remove driver side door finisher and sealing screen.
4. Remove door glass and power window regulator. (Refer to Section BF.)
5. Disconnect connectors at dash side and disconnect remote-control mirror harness connectors located inside door.
6. Remove main switch with harness by loosening retaining screws.



7. Installation is in the reverse order of removal. After installation, adjust door glass. Refer to Door (Section BF) for adjustment.

Sub-switch

1. Disconnect battery ground cable.
2. Remove instrument lower cover on right side.
3. Remove passenger side door finisher and sealing screen.
4. Remove door glass and power window regulator.
5. Remove glove box.
6. Disconnect connectors at dash side and disconnect remote-control mirror harness connectors located inside door.

7. Remove sub-switch with harness by loosening retaining screws.
8. Installation is in the reverse order of removal. After installation, adjust door glass. Refer to Door Glass (Section BF) for adjustment.

Motor

1. Disconnect battery ground cable.
2. Remove regulator assembly with motor. Refer to Door Glass and

Regulator (Section BF) for removal and installation.

3. Separate motor from regulator.
4. Installation is in the reverse order of removal. After installation, adjust door glass. Refer to Door Glass (Section BF) for adjustment.

INSPECTION

Test continuity through switch with an ohmmeter.

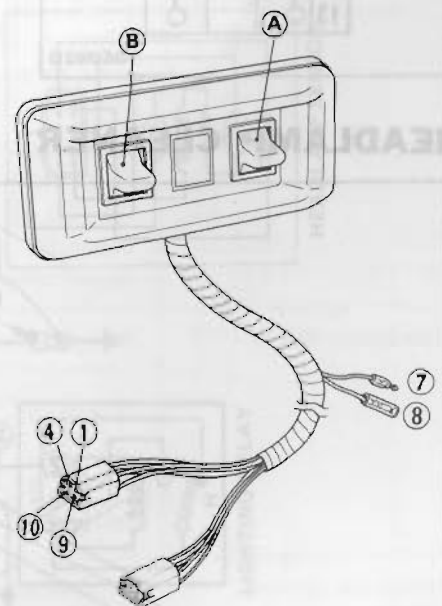
Main switch

(A) Driver side

	UP	N	DOWN
1	○		○
4	○	○	○
7	○		○
8	○	○	○

(B) Assist side

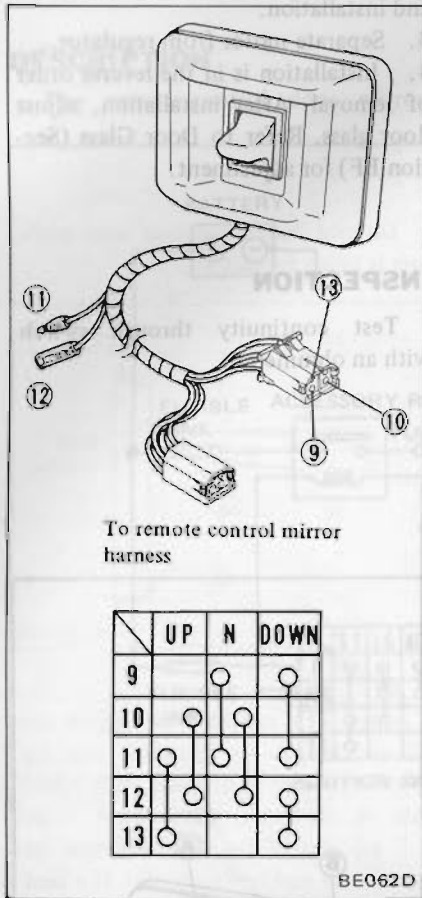
	UP	N	DOWN
1	○		○
4	○	○	○
9	○		○
10	○	○	○



To remote control mirror

SEL549

Sub-switch



Power window motor

- Test as follows:
1. Apply DC 12 volt to motor terminal and make sure that motor rotates.
 2. Then reverse polarity of DC 12 volt power supply and make sure that motor rotates reversely.

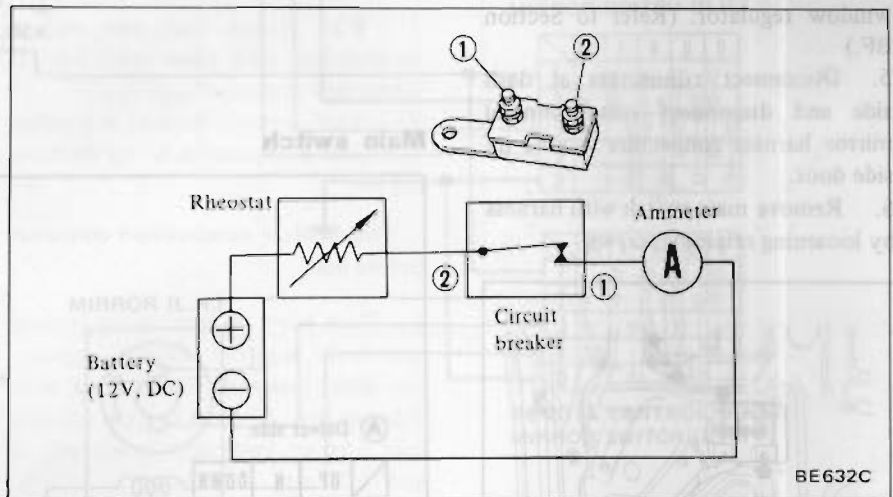
Circuit breaker

- Test as follows:
1. Set up a circuit as shown in figure

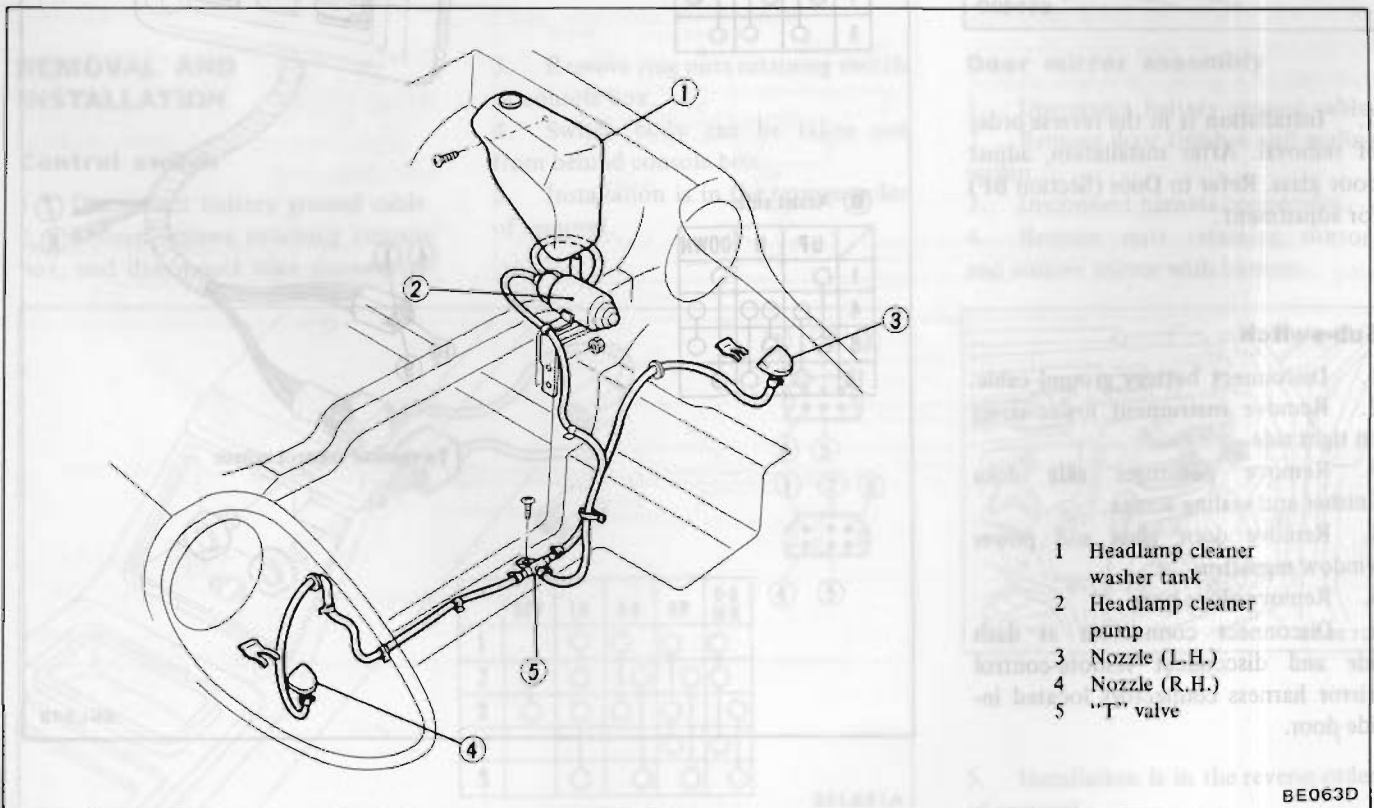
2. Gradually decrease rheostat resistance until ammeter indicates 30 amperes.
3. At this point connector reading should decrease to 0 ampere within between 13 and 35 seconds.

CAUTION:

Use rheostat of below 1 ohm and over 400 watt ratings.



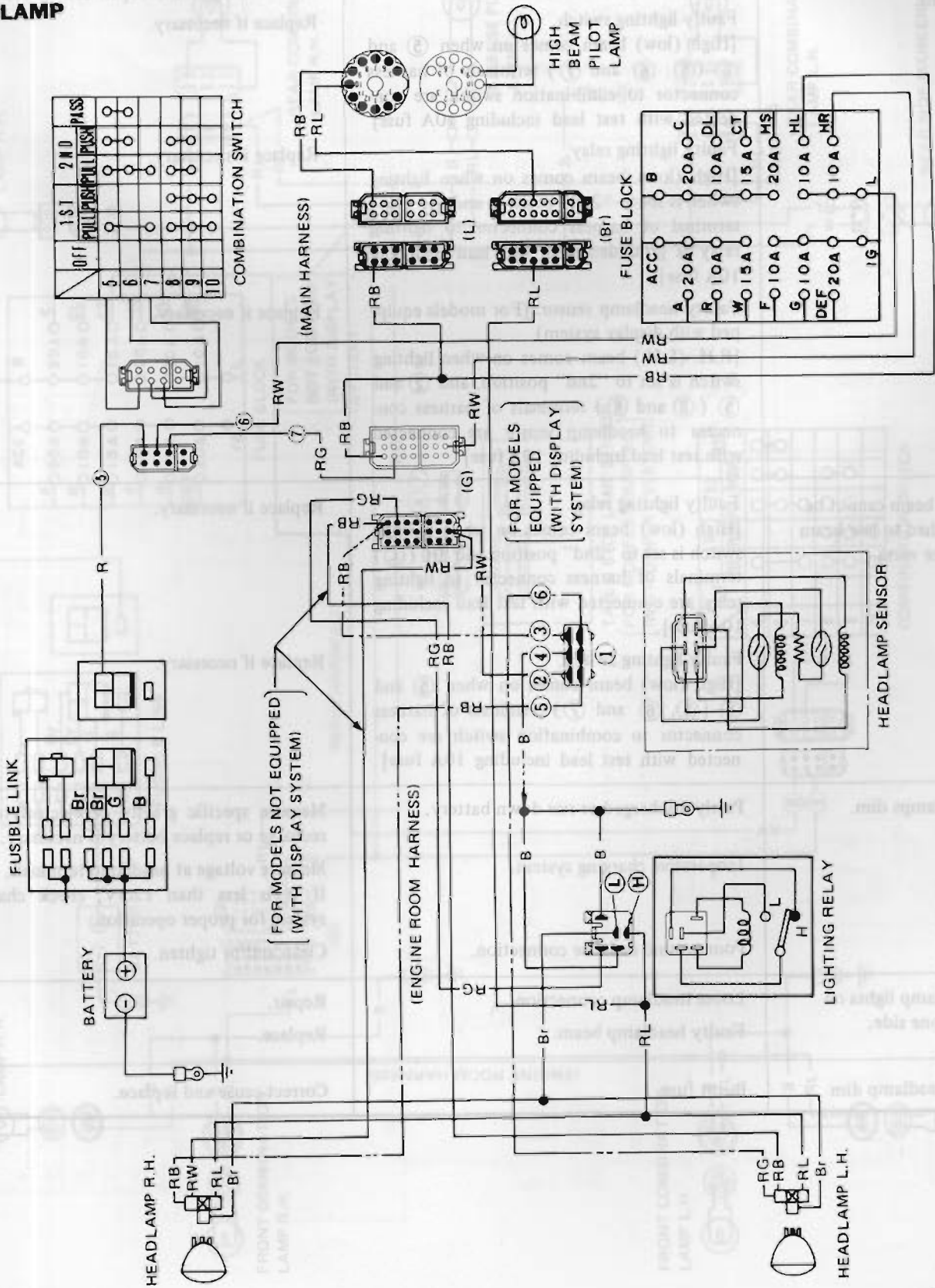
HEADLAMP CLEANER



CIRCUIT DIAGRAMS AND TROUBLE DIAGNOSES

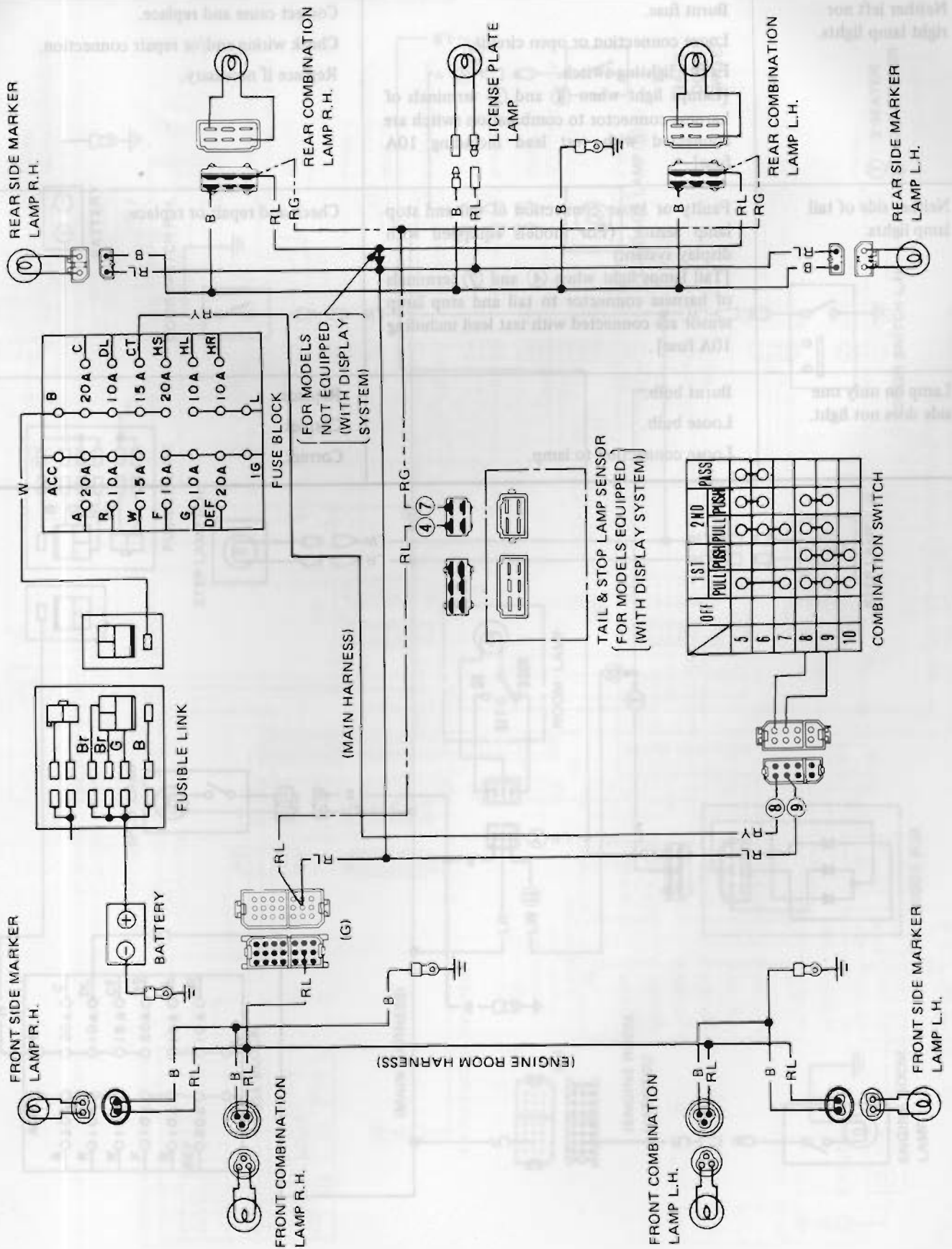
LIGHTING SYSTEM

HEADLAMP

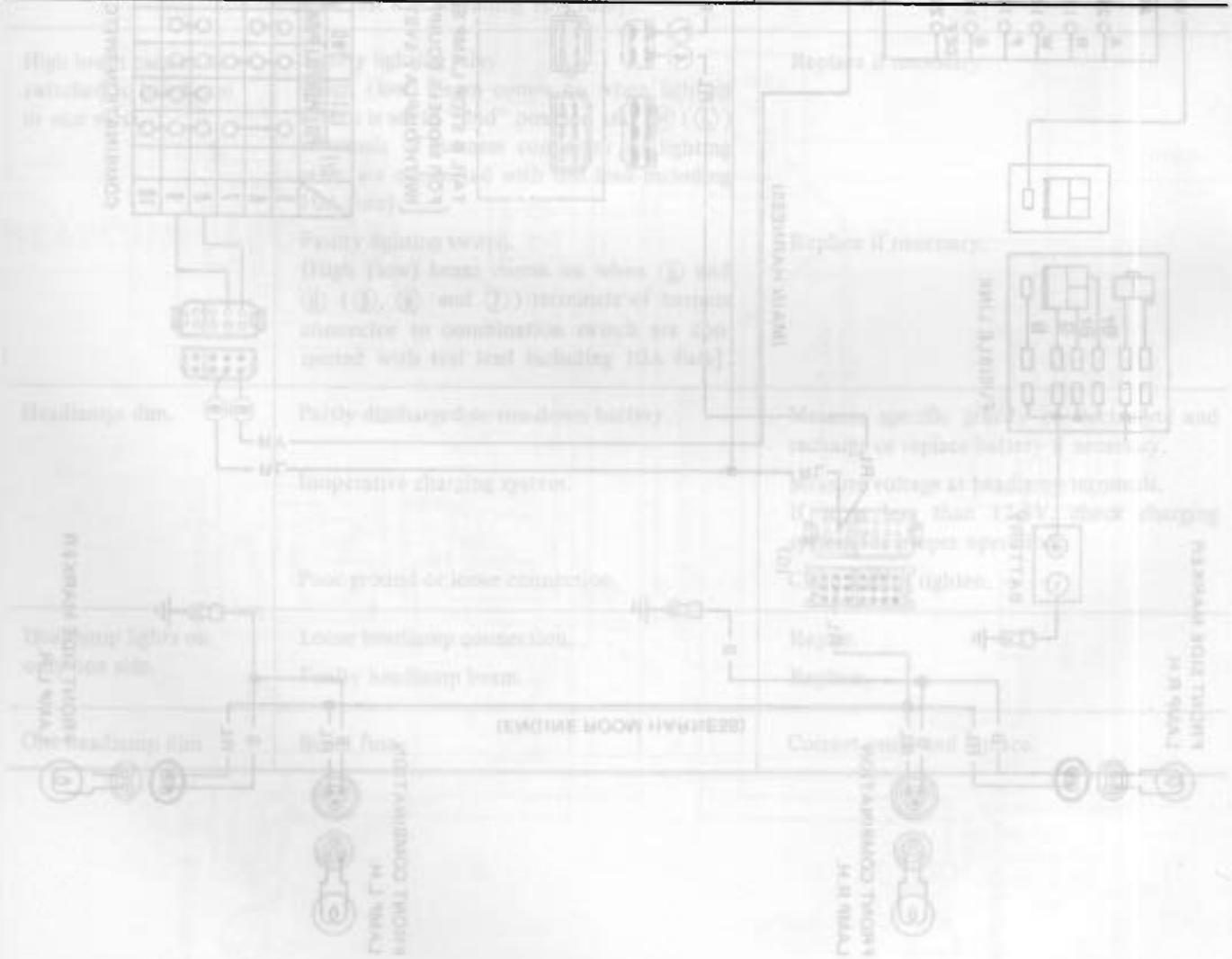


Condition	Probable cause	Corrective action
<p>Headlamps do not come on either high or low beams.</p>	<p>Burnt fusible link. Loose connection or open circuit. Faulty lighting switch. [High (low) beam comes on when ⑤ and ⑥ (⑤, ⑥ and ⑦) terminals of harness connector to combination switch are connected with test lead including 10A fuse] Faulty lighting relay. [High (low) beam comes on when lighting switch is set to "2nd" position and H (L) terminal of harness connector to lighting relay is grounded with test lead including 10A fuse]. Faulty headlamp sensor. (For models equipped with display system) [R.H. (L.H.) beam comes on when lighting switch is set to "2nd" position, and ② and ⑤ (③ and ⑥) terminals of harness connector to headlamp sensor are connected with test lead including 10A fuse].</p>	<p>Correct cause and replace fusible link. Check wiring and/or repair connection. Replace if necessary. Replace if necessary. Replace if necessary.</p>
<p>High beam cannot be switched to low beam or vice versa.</p>	<p>Faulty lighting relay. [High (low) beam comes on when lighting switch is set to "2nd" position and H (L) terminals of harness connector to lighting relay are connected with test lead including 10A fuse]. Faulty lighting switch. [High (low) beam comes on when ⑤ and ⑥ (⑤, ⑥ and ⑦) terminals of harness connector to combination switch are connected with test lead including 10A fuse].</p>	<p>Replace if necessary. Replace if necessary.</p>
<p>Headlamps dim.</p>	<p>Partly discharged or run-down battery. Inoperative charging system. Poor ground or loose connection.</p>	<p>Measure specific gravity of electrolyte and recharge or replace battery if necessary. Measure voltage at headlamp terminals. If it is less than 12.8V, check charging system for proper operation. Clean and/or tighten.</p>
<p>Headlamp lights on only one side.</p>	<p>Loose headlamp connection. Faulty headlamp beam.</p>	<p>Repair. Replace.</p>
<p>One headlamp dim</p>	<p>Burnt fuse.</p>	<p>Correct cause and replace.</p>

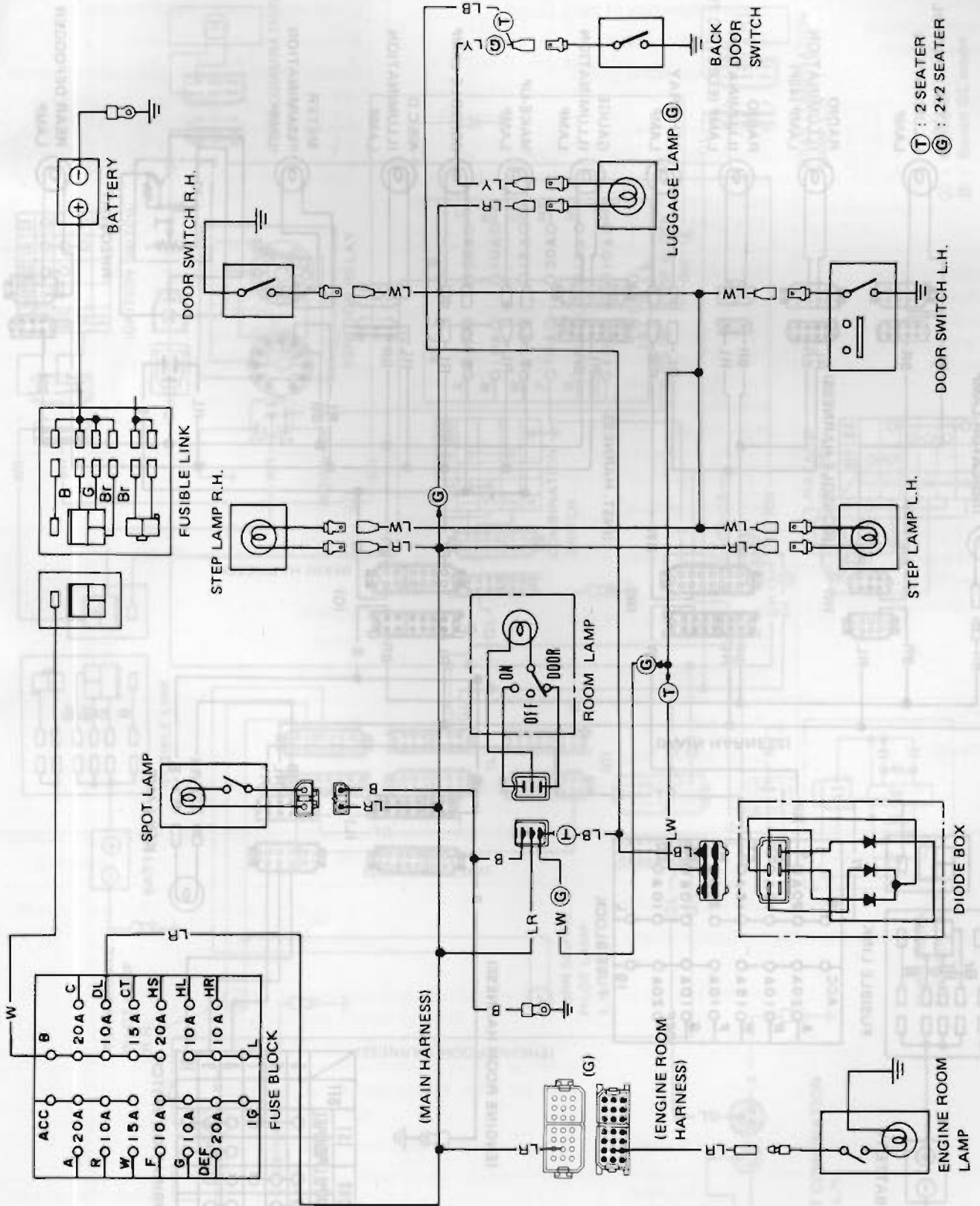
TAIL, CLEARANCE, SIDE MARKER AND LICENSE PLATE LAMP



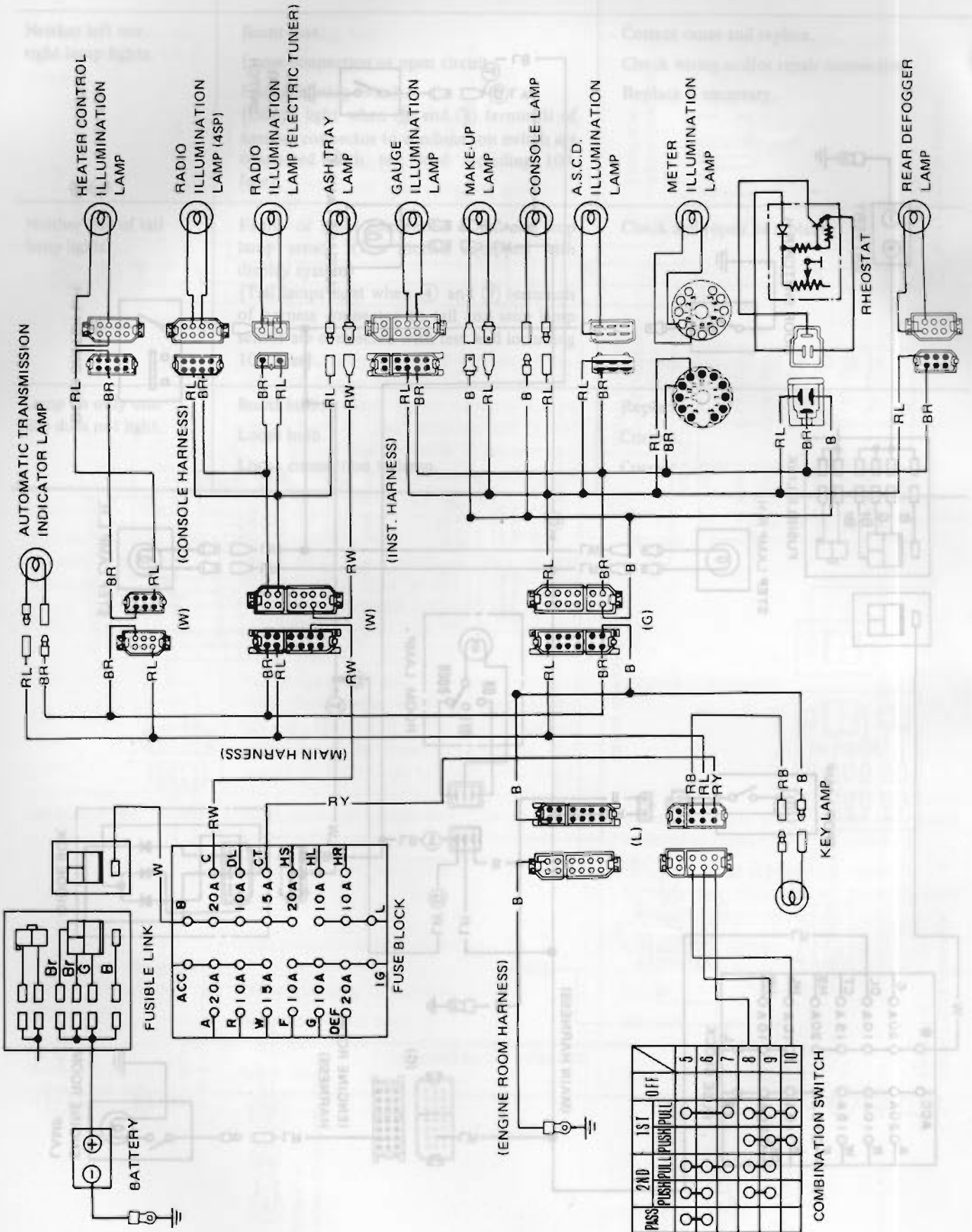
Condition	Probable cause	Corrective action
Neither left nor right lamp lights.	Burnt fuse. Loose connection or open circuit. Faulty lighting switch. [Lamps light when ⑧ and ⑨ terminals of harness connector to combination switch are connected with test lead including 10A fuse].	Correct cause and replace. Check wiring and/or repair connection. Replace if necessary.
Neither side of tail lamp lights.	Faulty or loose connection of tail and stop lamp sensor. (For models equipped with display system) [Tail lamps light when ④ and ⑦ terminals of harness connector to tail and stop lamp sensor are connected with test lead including 10A fuse].	Check and repair or replace.
Lamp on only one side does not light.	Burnt bulb. Loose bulb. Loose connection to lamp.	Replace. Correct. Correct.



ROOM, LUGGAGE ROOM, STEP, SPOT AND INSPECTION LAMP

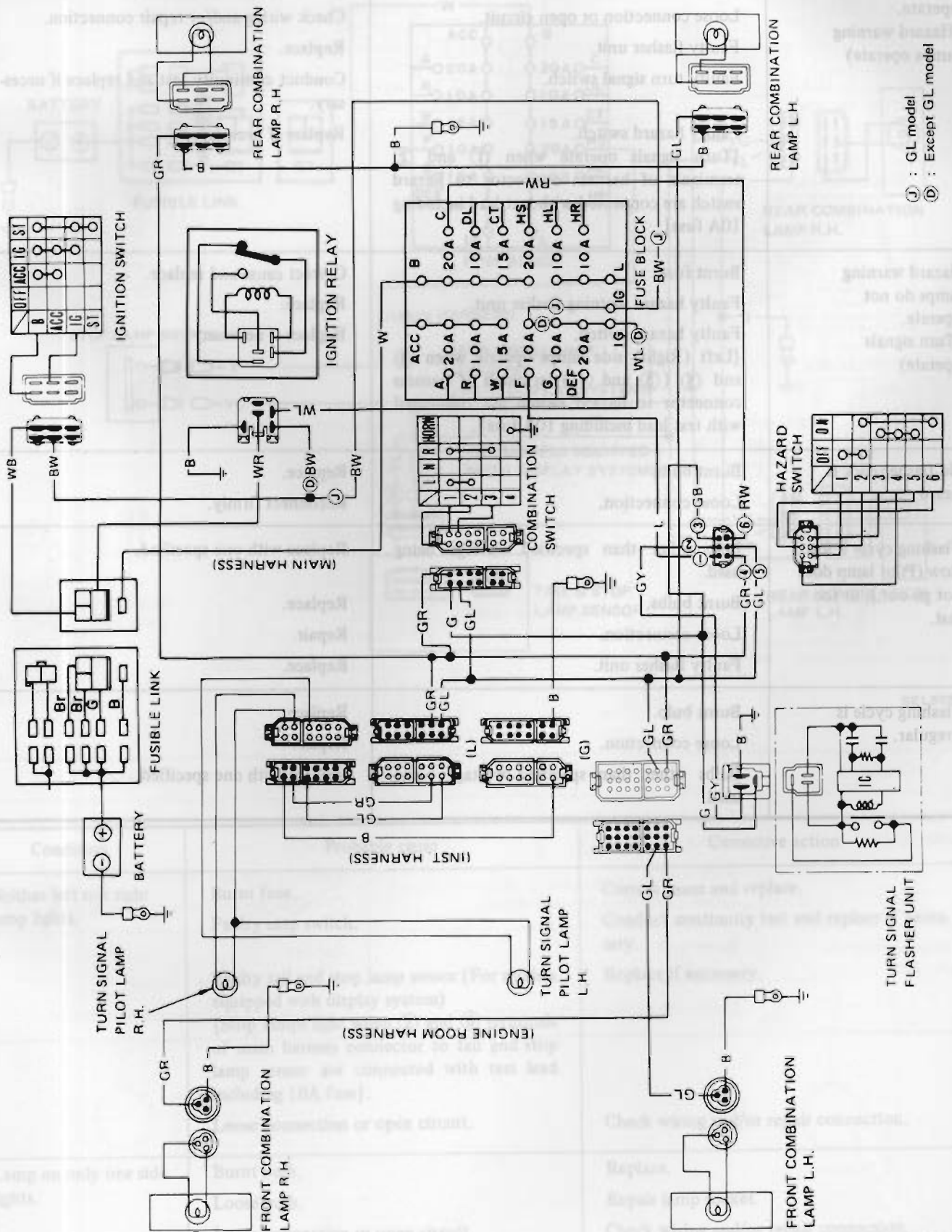


ILLUMINATION LAMP



SIGNAL SYSTEM

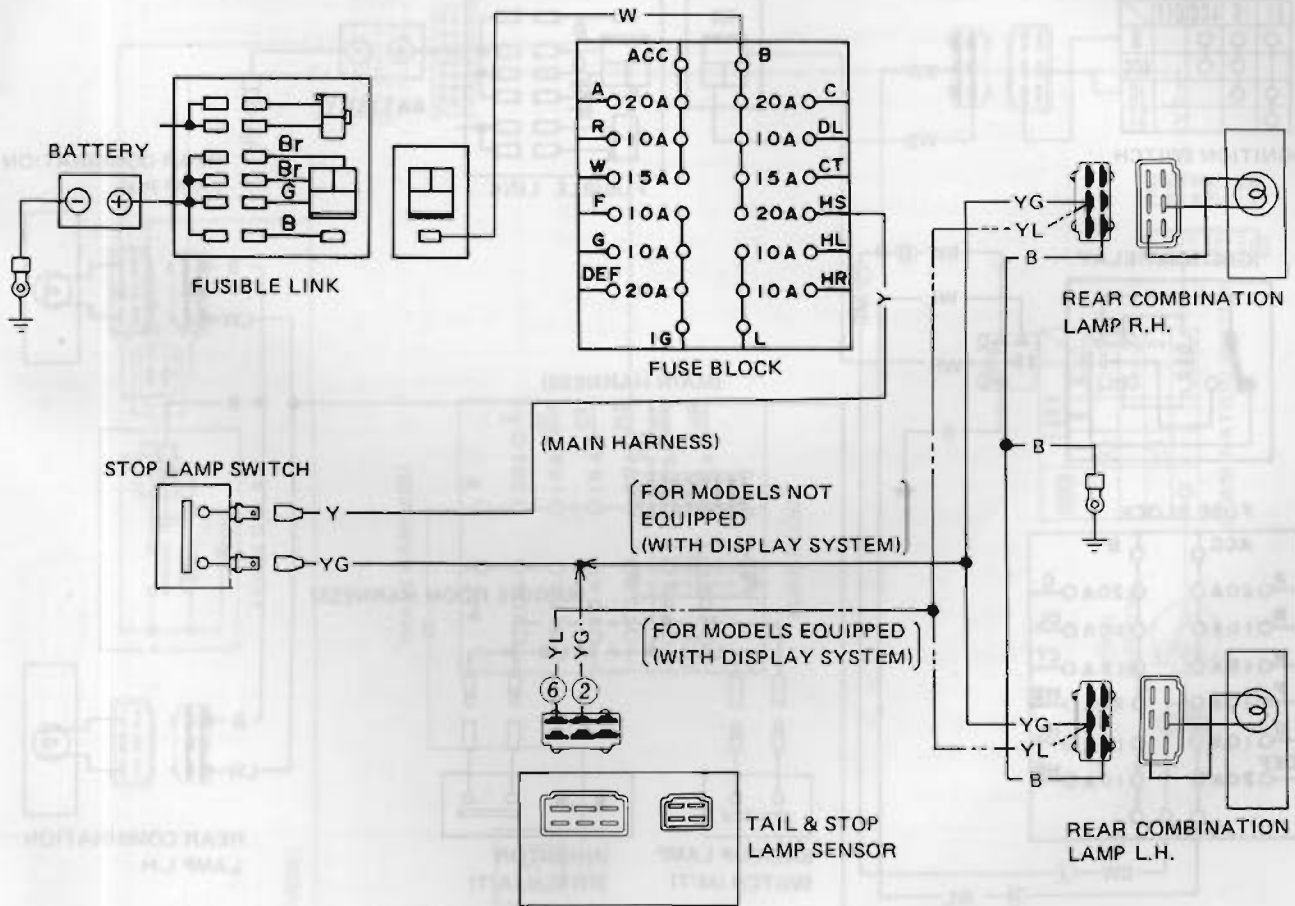
TURN SIGNAL AND HAZARD WARNING LAMP



Ⓝ : GL model
Ⓞ : Except GL model

Condition	Probable cause	Corrective action
Turn signals do not operate. (Hazard warning lamps operate)	Burnt fuse. Loose connection or open circuit. Faulty flasher unit. Faulty turn signal switch. Faulty hazard switch. [Turn signals operate when ① and ② terminals of harness connector to hazard switch are connected with test lead including 10A fuse].	Correct cause and replace. Check wiring and/or repair connection. Replace. Conduct continuity test and replace if necessary. Replace if necessary.
Hazard warning lamps do not operate. (Turn signals operate)	Burnt fuse. Faulty hazard warning flasher unit. Faulty hazard switch. [Left (Right) side lamps operate when ③ and ⑤ (③ and ④) terminals of harness connector to hazard switch are connected with test lead including 10A fuse].	Correct cause and replace. Replace. Replace if necessary.
No flasher click is heard.	Burnt bulb. Loose connection.	Replace. Reconnect firmly.
Flashing cycle is too slow (Pilot lamp does not go out.), or too fast.	Bulb other than specified wattage being used. Burnt bulbs. Loose connection. Faulty flasher unit.	Replace with one specified. Replace. Repair. Replace.
Flashing cycle is irregular.	Burnt bulb. Loose connection. Bulbs other than specified wattage being used.	Replace. Repair. Replace with one specified.

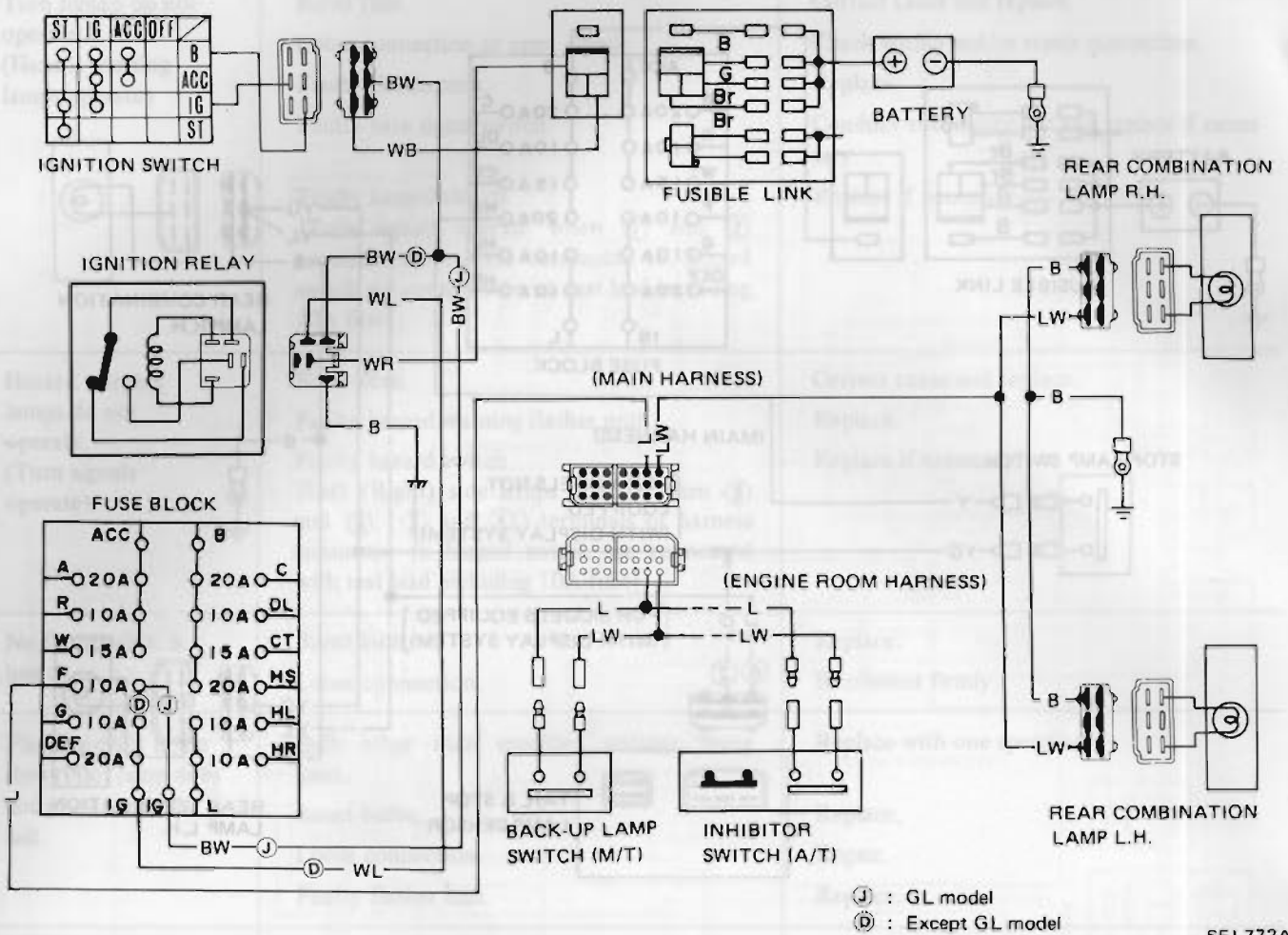
STOP LAMP



SEL555

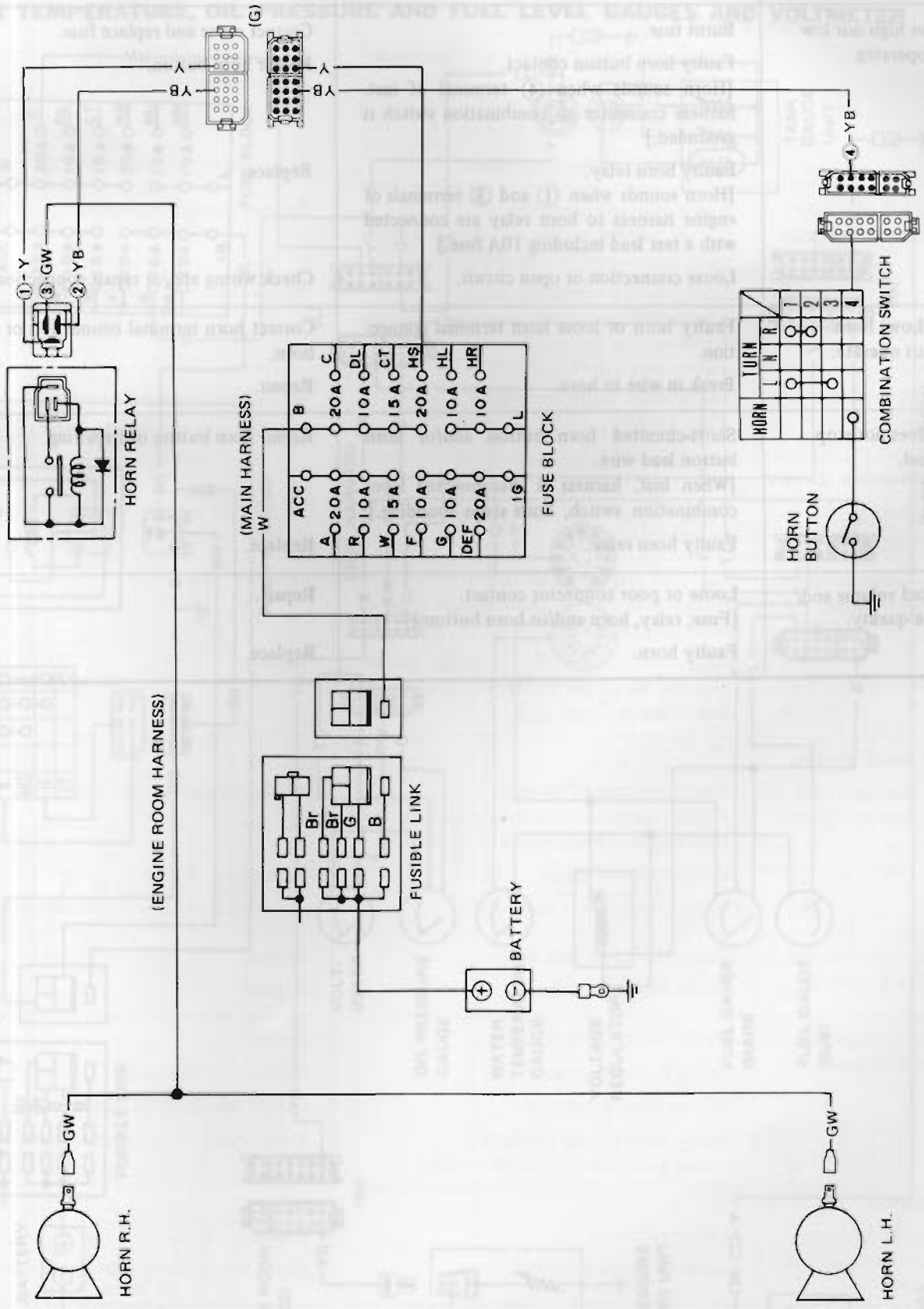
Condition	Probable cause	Corrective action
Neither left nor right lamp lights.	Burnt fuse. Faulty stop switch. Faulty tail and stop lamp sensor (For models equipped with display system) [Stop lamps light when ② and ⑥ terminals of main harness connector to tail and stop lamp sensor are connected with test lead including 10A fuse]. Loose connection or open circuit.	Correct cause and replace. Conduct continuity test and replace if necessary. Replace if necessary. Check wiring and/or repair connection.
Lamp on only one side lights.	Burnt bulb. Loose bulb. Loose connection or open circuit.	Replace. Repair lamp socket. Check wiring and/or repair connection.

BACK-UP LAMP



Condition	Probable cause	Corrective action
Neither left nor right lamp lights.	Faulty back-up lamp switch (M/T) or inhibitor switch (A/T). Burnt fuse. Loose connection or open circuit.	Conduct continuity test and replace if necessary. Correct cause and replace. Check wiring and/or repair connection.
Lamp on only one side lights.	Burnt bulb. Loose bulb. Loose connection or open circuit.	Replace. Repair lamp socket. Check wiring and/or repair connection.

HORN

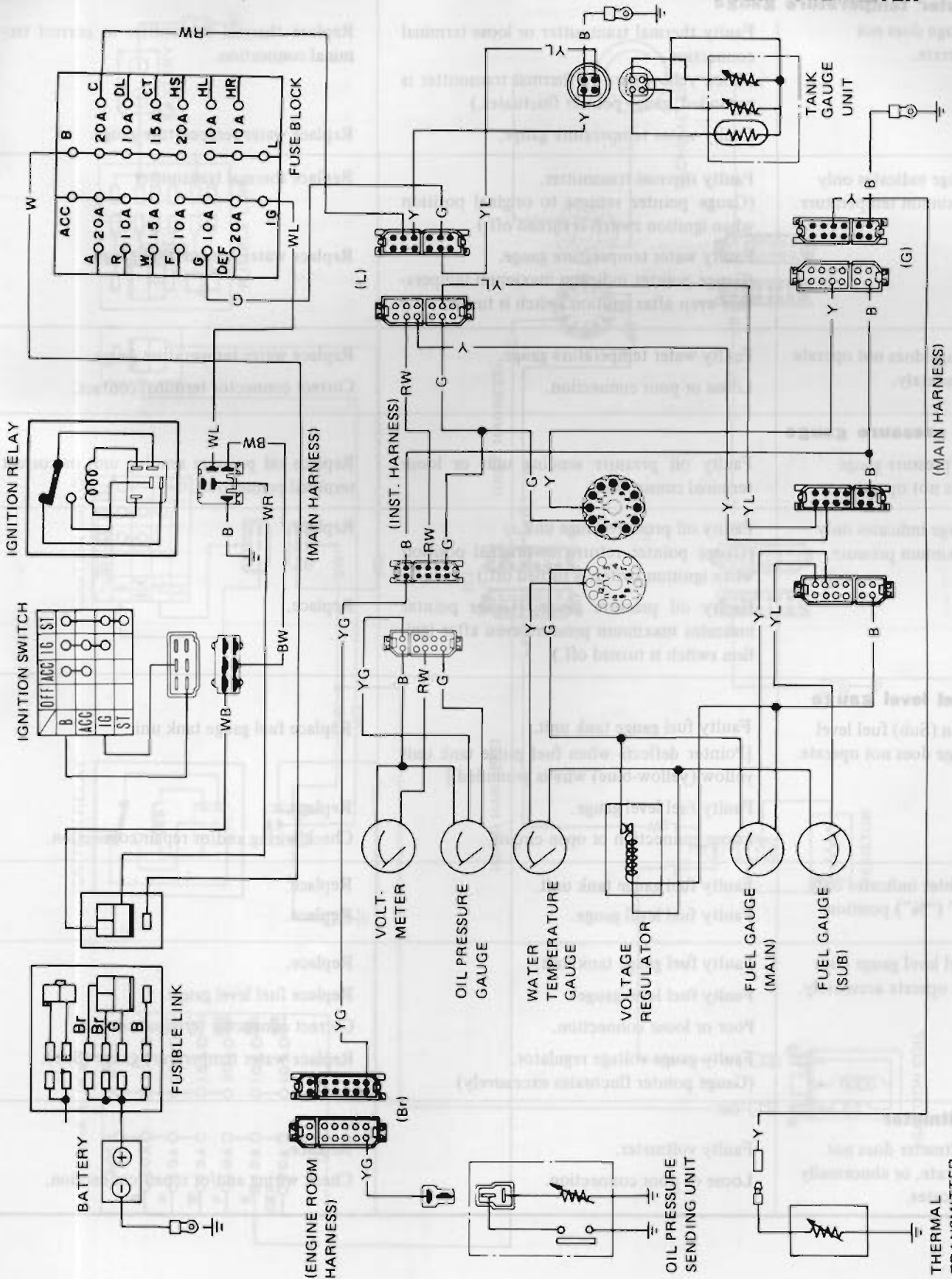


Condition	Probable cause	Corrective action
Neither high nor low horn operates.	Burnt fuse. Faulty horn button contact. [Horn sounds when ④ terminal of inst. harness connector to combination switch is grounded.] Faulty horn relay. [Horn sounds when ① and ③ terminals of engine harness to horn relay are connected with a test lead including 10A fuse.] Loose connection or open circuit.	Correct cause and replace fuse. Repair horn button. Replace. Check wiring and/or repair connection.
High (Low) horn does not operate.	Faulty horn or loose horn terminal connection. Break in wire to horn.	Correct horn terminal connection or replace horn. Repair.
Horn does not stop to sound.	Short-circuited horn button and/or horn button lead wire. [When inst. harness is disconnected from combination switch, horn stops sounding.] Faulty horn relay.	Repair horn button or its wiring. Replace.
Reduced volume and/or tone quality.	Loose or poor connector contact. (Fuse, relay, horn and/or horn button.) Faulty horn.	Repair. Replace.



METERS AND GAUGES

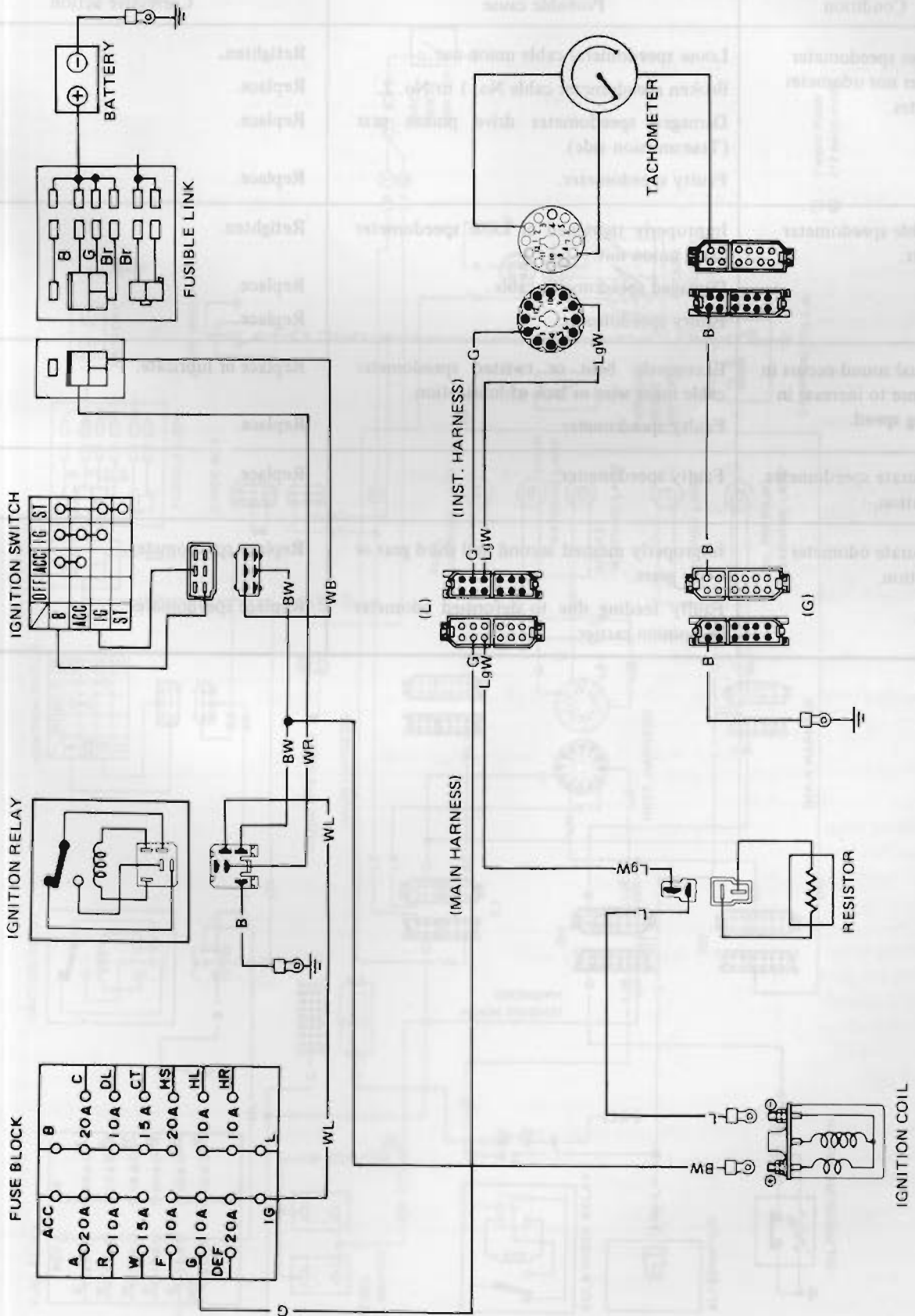
WATER TEMPERATURE, OIL PRESSURE AND FUEL LEVEL GAUGES AND VOLTMETER



SLL774A

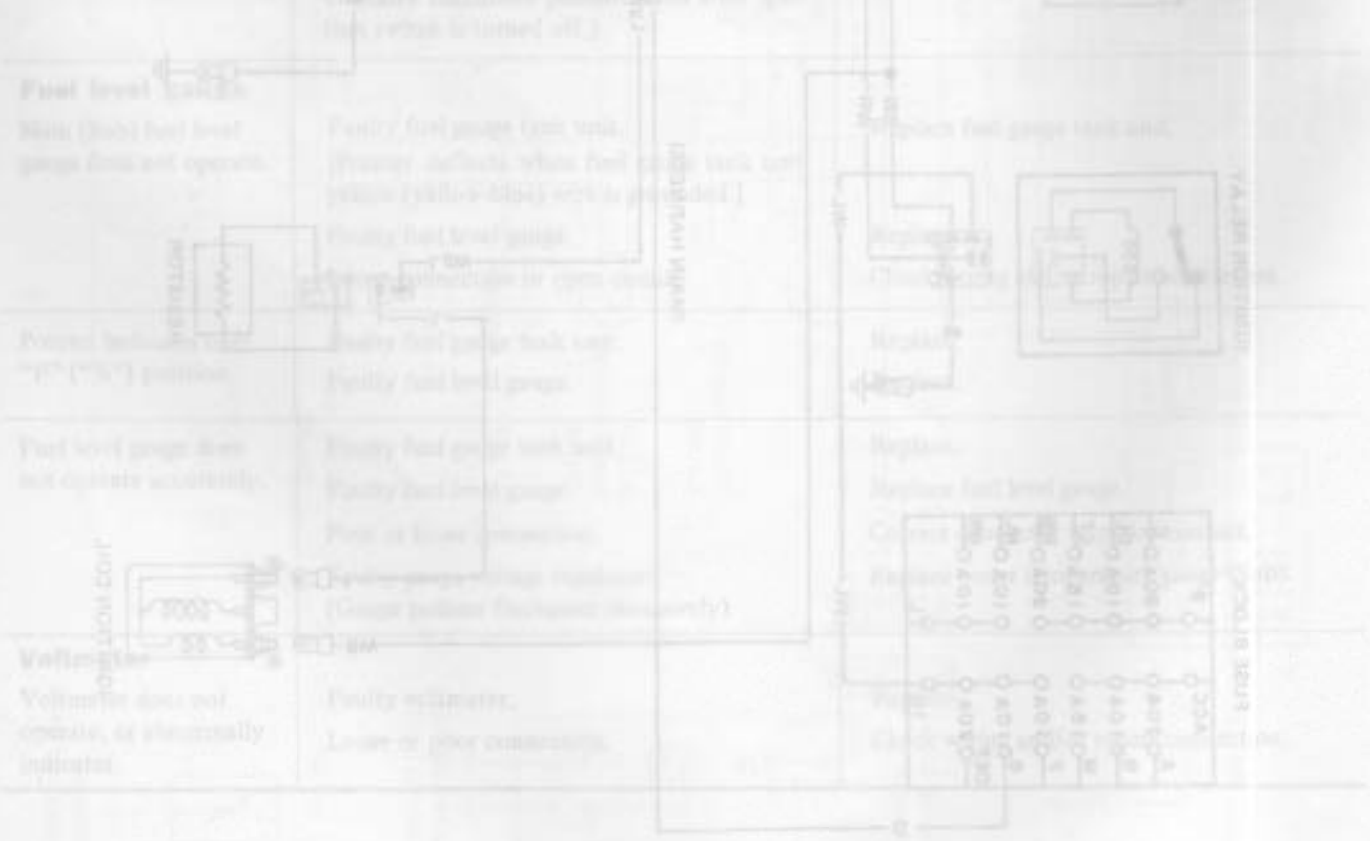
Condition	Probable cause	Corrective action
Water temperature gauge		
Gauge does not operate.	Faulty thermal transmitter or loose terminal connection. (When yellow wire to thermal transmitter is grounded, gauge pointer fluctuates.) Faulty water temperature gauge.	Replace thermal transmitter or correct terminal connection. Replace water temperature gauge.
Gauge indicates only maximum temperature.	Faulty thermal transmitter. (Gauge pointer returns to original position when ignition switch is turned off.) Faulty water temperature gauge. (Gauge pointer indicates maximum temperature even after ignition switch is turned off.)	Replace thermal transmitter. Replace water temperature gauge.
Gauge does not operate accurately.	Faulty water temperature gauge. Loose or poor connection.	Replace water temperature gauge. Correct connector terminal contact.
Oil pressure gauge		
Oil pressure gauge does not operate.	Faulty oil pressure sending unit or loose terminal connection.	Replace oil pressure sending unit or correct terminal connection.
Gauge indicates only maximum pressure.	Faulty oil pressure gauge unit. (Gauge pointer returns to original position when ignition switch is turned off.) Faulty oil pressure gauge. (Gauge pointer indicates maximum pressure even after ignition switch is turned off.)	Replace. Replace.
Fuel level gauge		
Main (Sub) fuel level gauge does not operate.	Faulty fuel gauge tank unit. [Pointer deflects when fuel gauge tank unit yellow (yellow-blue) wire is grounded.] Faulty fuel level gauge. Loose connection or open circuit.	Replace fuel gauge tank unit. Replace. Check wiring and/or repair connection.
Pointer indicates only "F" ("¼") position.	Faulty fuel gauge tank unit. Faulty fuel level gauge.	Replace. Replace.
Fuel level gauge does not operate accurately.	Faulty fuel gauge tank unit. Faulty fuel level gauge. Poor or loose connection. Faulty gauge voltage regulator. (Gauge pointer fluctuates excessively)	Replace. Replace fuel level gauge. Correct connector terminal contact. Replace water temperature gauge (Sub).
Voltmeter		
Voltmeter does not operate, or abnormally indicates.	Faulty voltmeter. Loose or poor connection.	Replace. Check wiring and/or repair connection.

TACHOMETER



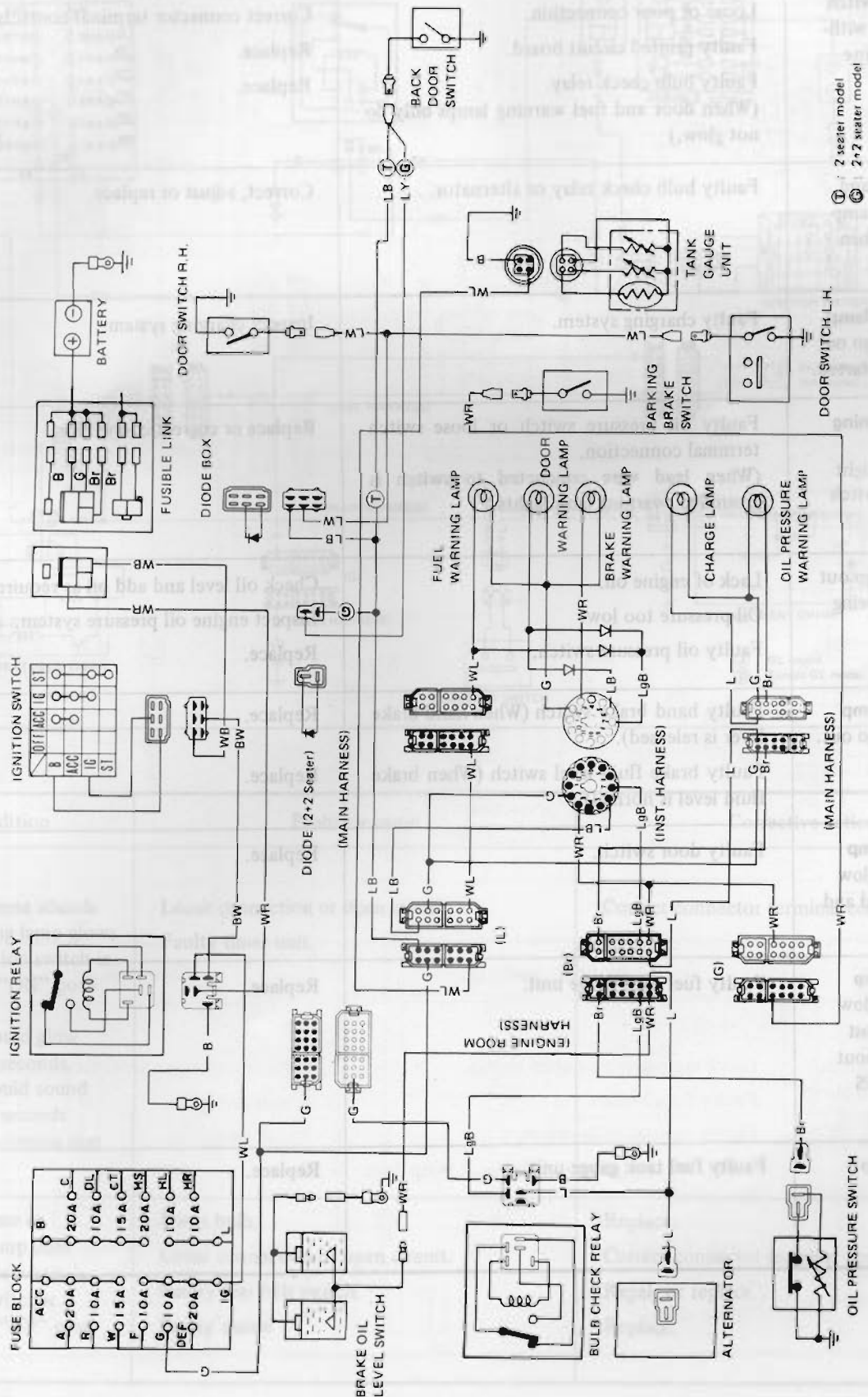
SPEEDOMETER

Condition	Probable cause	Corrective action
Neither speedometer pointer nor odometer operates.	Loose speedometer cable union nut. Broken speedometer cable No. 1 or No. 2. Damaged speedometer drive pinion gear (Transmission side). Faulty speedometer.	Retighten. Replace. Replace. Replace.
Unstable speedometer pointer.	Improperly tightened or loose speedometer cable union nut. Damaged speedometer cable. Faulty speedometer.	Retighten. Replace. Replace.
Unusual sound occurs in response to increase in driving speed.	Excessively bent or twisted speedometer cable inner wire or lack of lubrication. Faulty speedometer.	Replace or lubricate. Replace.
Inaccurate speedometer indication.	Faulty speedometer.	Replace.
Inaccurate odometer operation.	Improperly meshed second and third gear or worn gears. Faulty feeding due to deformed odometer and pinion carrier.	Replace speedometer. Replace speedometer.



WARNING SYSTEM

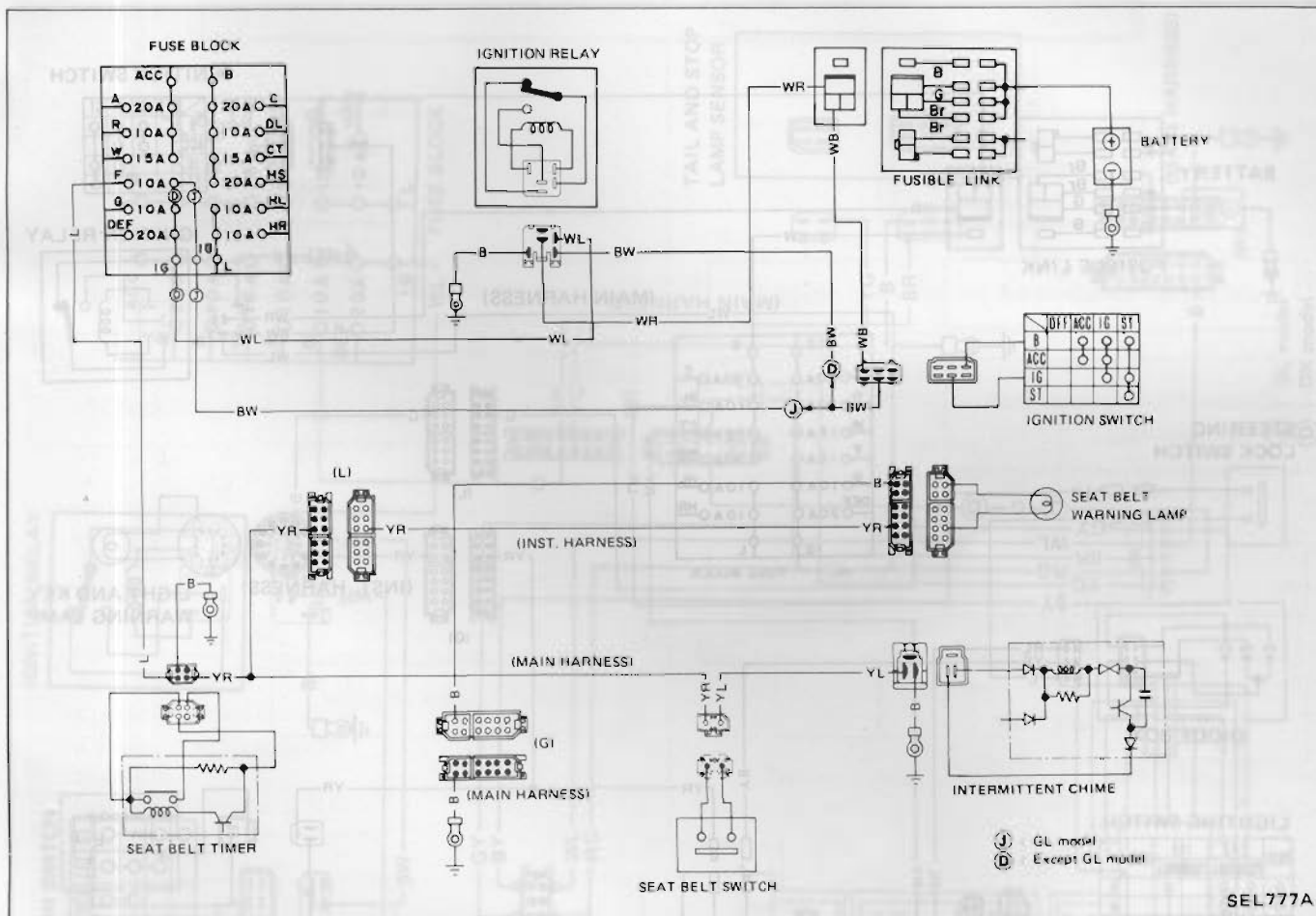
BRAKE, CHARGE, FUEL LEVEL, OIL PRESSURE AND DOOR WARNING



Ⓢ : 2 seater model
 Ⓣ : 2+2 seater model

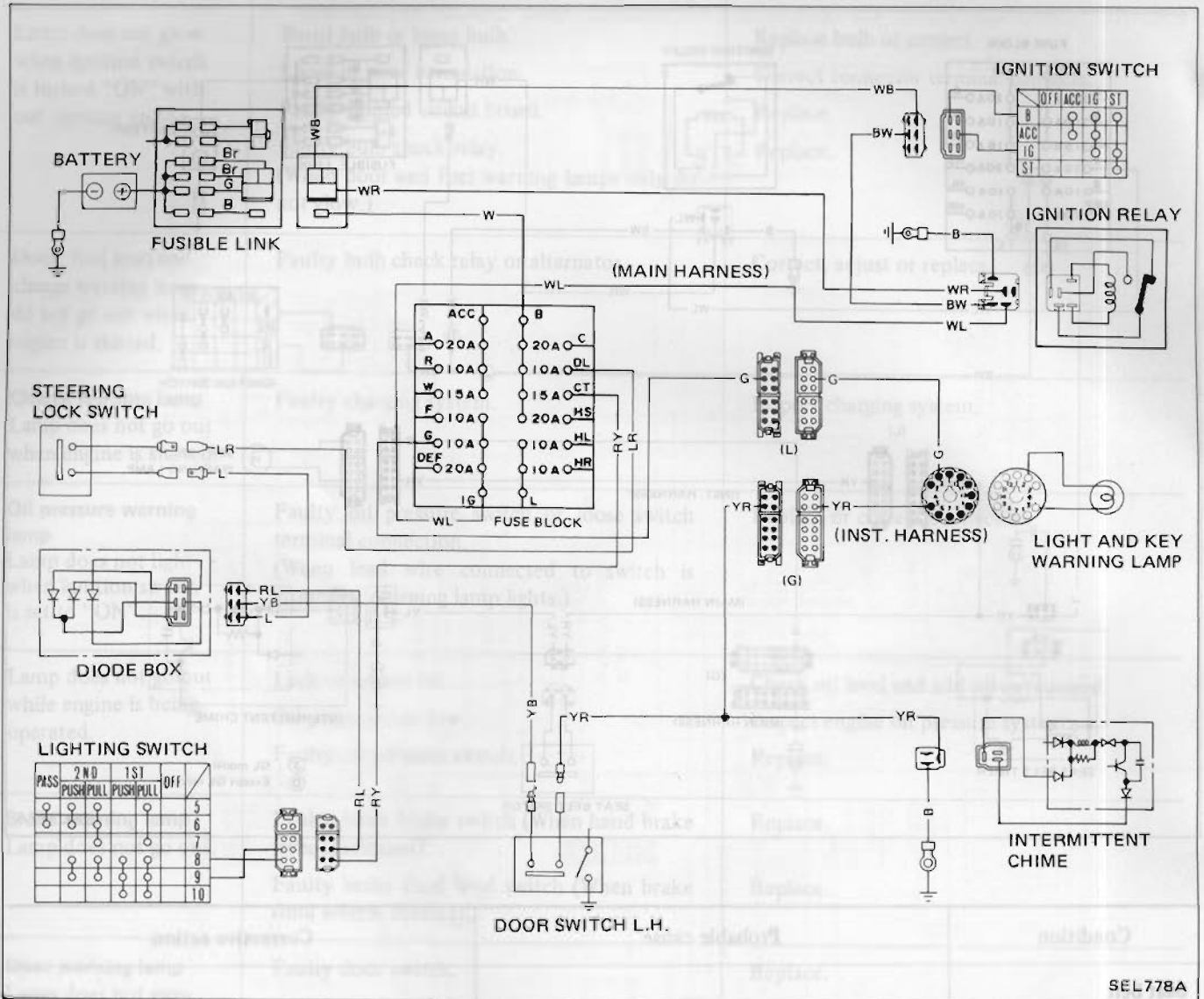
Condition	Probable cause	Corrective action
Lamp does not glow when ignition switch is turned "ON" without running engine.	Burnt bulb or loose bulb. Loose or poor connection. Faulty printed circuit board. Faulty bulb check relay. (When door and fuel warning lamps only do not glow.)	Replace bulb or correct. Correct connector terminal contacts. Replace. Replace.
Door, fuel level and charge warning lamp do not go out when engine is started.	Faulty bulb check relay or alternator.	Correct, adjust or replace.
Charge warning lamp Lamp does not go out when engine is started.	Faulty charging system.	Inspect charging system.
Oil pressure warning lamp Lamp does not light when ignition switch is set to "ON".	Faulty oil pressure switch or loose switch terminal connection. (When lead wire connected to switch is grounded, warning lamp lights.)	Replace or correct connection.
Lamp does not go out while engine is being operated.	Lack of engine oil. Oil pressure too low. Faulty oil pressure switch.	Check oil level and add oil as required. Inspect engine oil pressure system. Replace.
Brake warning lamp Lamp does not go out.	Faulty hand brake switch (When hand brake lever is released). Faulty brake fluid level switch (When brake fluid level is normal).	Replace. Replace.
Door warning lamp Lamp does not glow with door opened and engine running.	Faulty door switch.	Replace.
Fuel warning lamp Lamp does not glow when fuel is almost empty (below about 13.5 liters (3 3/4 US gal, 3 Imp gal)).	Faulty fuel tank gauge unit.	Replace.
Lamp does not go out with about specified volume of fuel.	Faulty fuel tank gauge unit.	Replace.

SEAT BELT WARNING



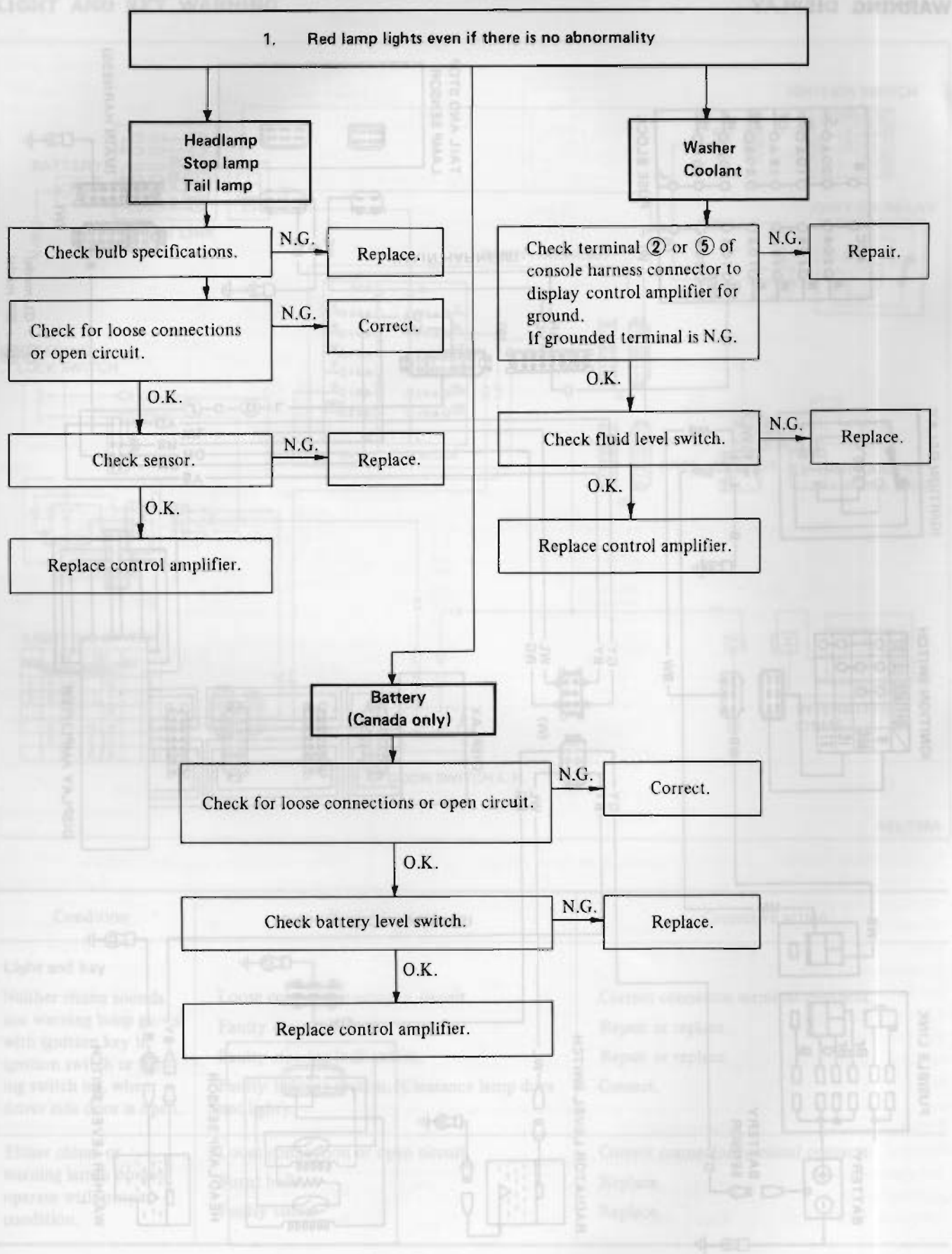
Condition	Probable cause	Corrective action
<p>Seat belt</p> <p>Neither chime sounds nor warning lamp glows when ignition switch is turned to "ON" position. (Lamp should glow for 4 to 8 seconds. Chime should sound for 4 to 8 seconds without fastening seat belt).</p>	<p>Loose connection or open circuit.</p> <p>Faulty timer unit.</p>	<p>Correct connector terminal contacts.</p> <p>Replace.</p>
<p>Either chime or warning lamp does not operate when ignition switch is turned to "ON" position.</p>	<p>Burnt bulb.</p> <p>Loose connection or open circuit.</p> <p>Faulty seat belt switch.</p> <p>Faulty chime</p>	<p>Replace.</p> <p>Correct connector terminal contacts.</p> <p>Repair or replace.</p> <p>Replace.</p>

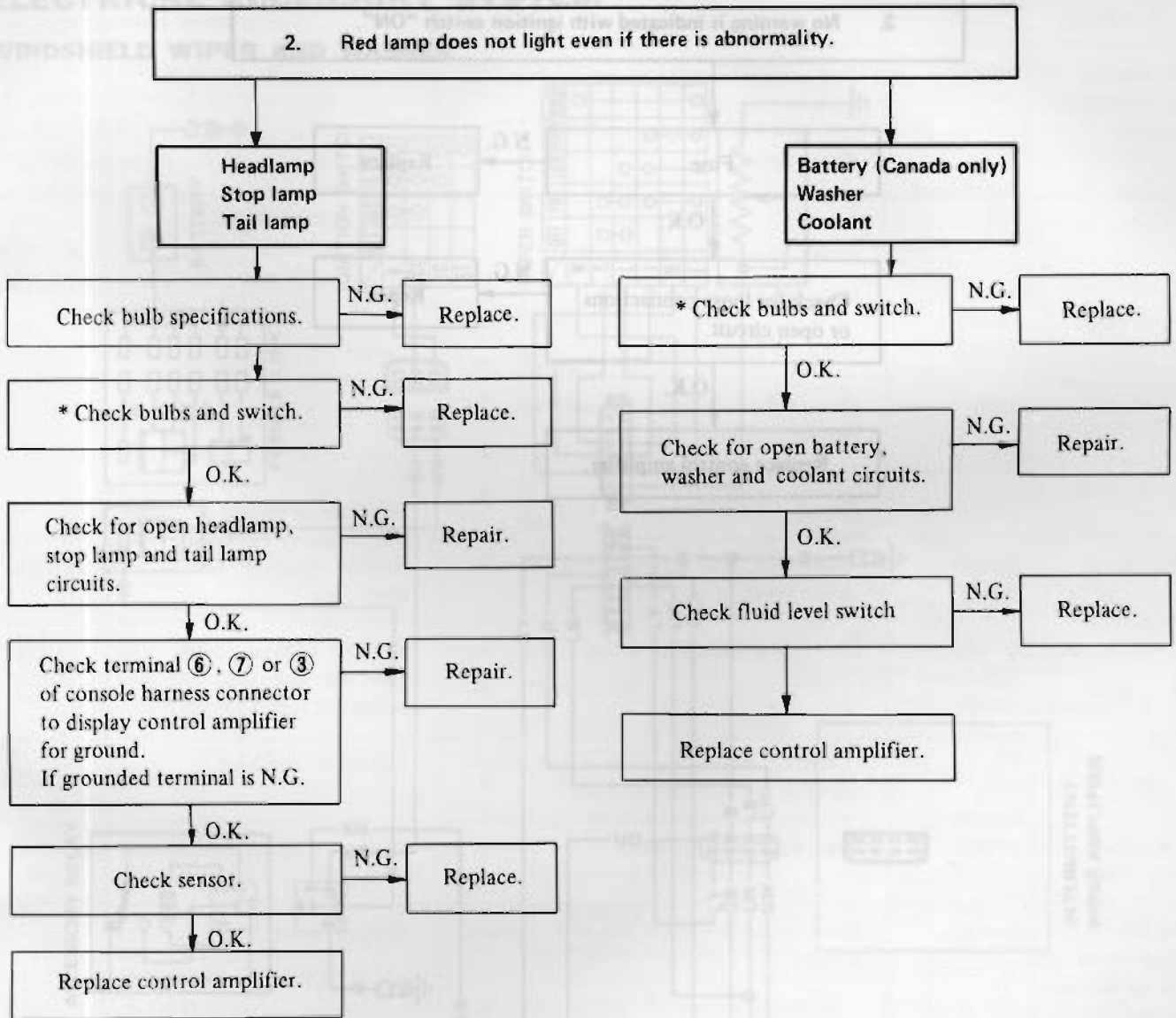
LIGHT AND KEY WARNING



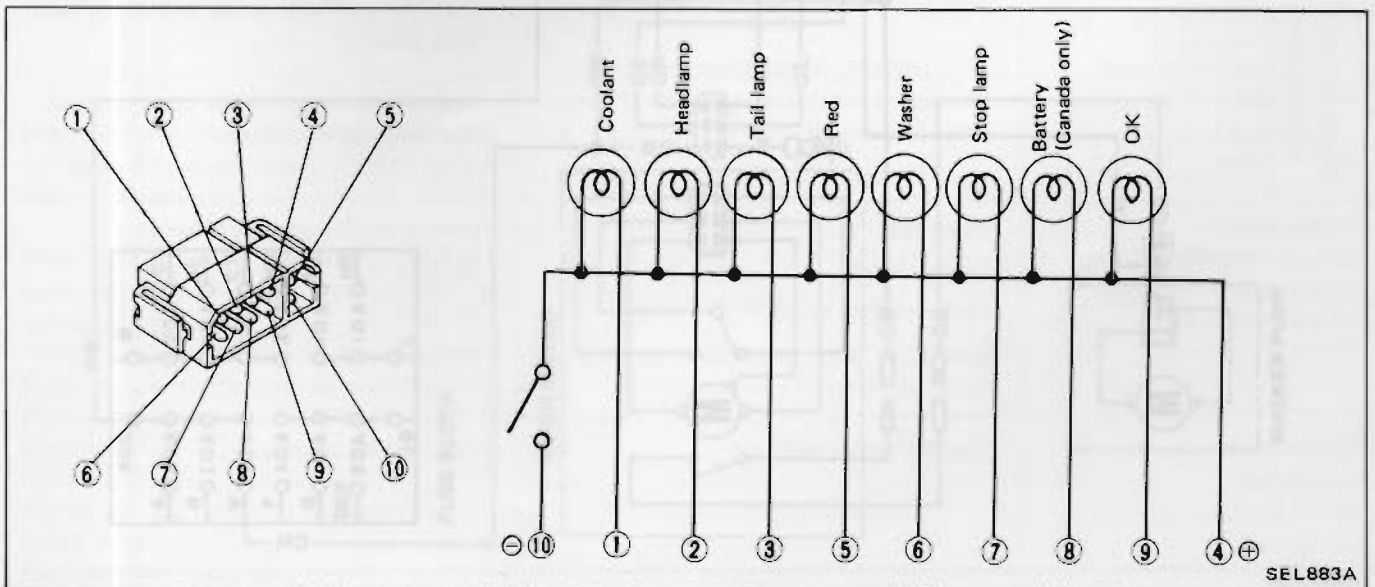
SEL778A

Condition	Probable cause	Corrective action
<p>Light and key Neither chime sounds nor warning lamp glows with ignition key in ignition switch or lighting switch on, when driver side door is open.</p>	<p>Loose connection or open circuit. Faulty door switch. Faulty steering lock switch. Faulty lighting system. (Clearance lamp does not light).</p>	<p>Correct connector terminal contacts. Repair or replace. Repair or replace. Correct.</p>
<p>Either chime or warning lamps do not operate with proper condition.</p>	<p>Loose connection or open circuit. Burnt bulb. Faulty chime</p>	<p>Correct connector terminal contacts. Replace. Replace.</p>





* Method of checking bulbs and switch



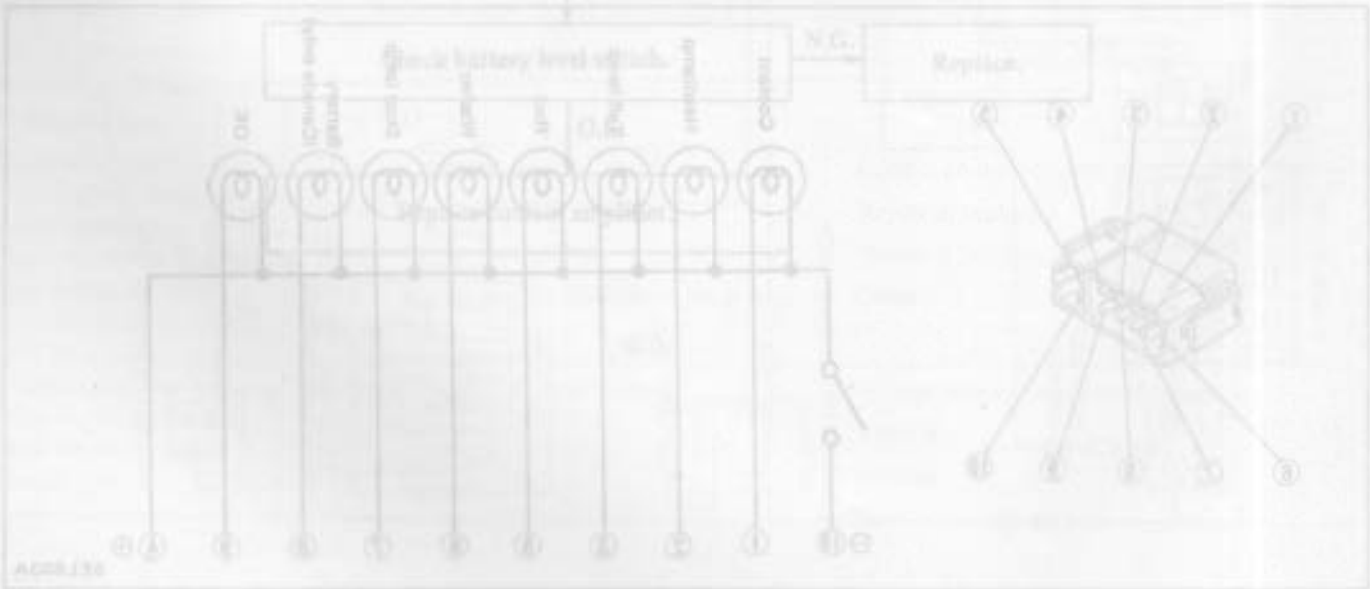
SEL883A

3. No warning is indicated with ignition switch "ON".

Fuse → N.G. → Replace.

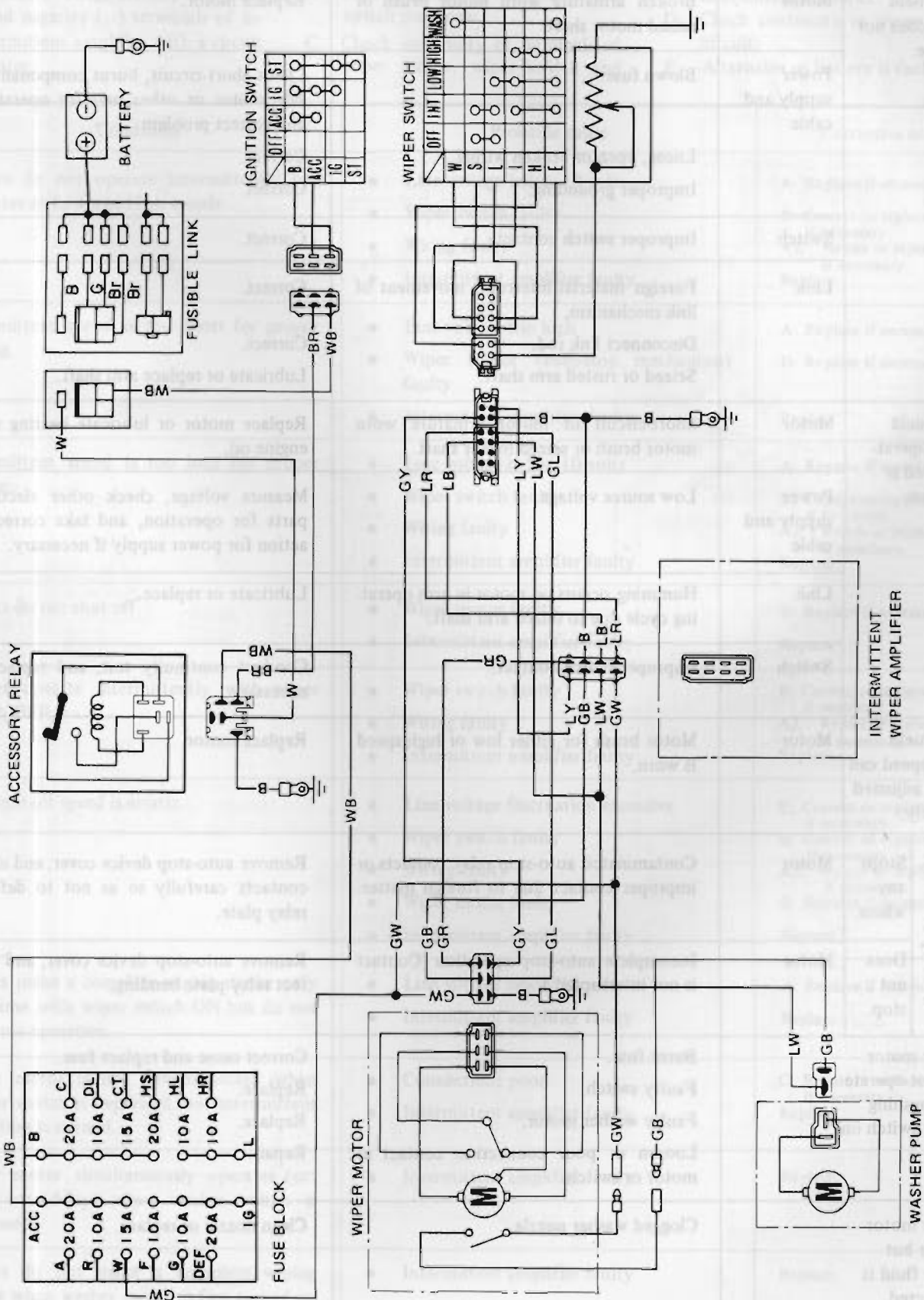
↓ O.K. → Check for loose connections or open circuit. → N.G. → Repair.

↓ O.K. → Replace control amplifier.



ELECTRICAL ACCESSORY SYSTEM

WINDSHIELD WIPER AND WASHER



SEL780A

Condition		Probable cause	Corrective action	
Windshield wiper does not operate.	Motor	Broken armature worn motor brush or seized motor shaft.	Replace motor.	
	Power supply and cable	Blown fuse.	Check short-circuit, burnt component inside motor or other part for operation, and correct problem.	
		Loose, open or broken wiring. Improper grounding.	Correct. Correct.	
	Switch	Improper switch contact.	Correct.	
Link	Foreign material interrupts movement of link mechanism. Disconnect link rod. Seized or rusted arm shaft.	Correct. Correct. Lubricate or replace arm shaft.		
Windshield wiper operating speed is too slow.	Motor	Short-circuit of motor armature worn motor brush or seized motor shaft.	Replace motor or lubricate bearing with engine oil.	
	Power supply and cable	Low source voltage.	Measure voltage, check other electrical parts for operation, and take corrective action for power supply if necessary.	
	Link	Humming occurs on motor in arm operating cycle due to seized arm shaft.	Lubricate or replace.	
	Switch	Improper switch contact.	Conduct continuity test, and replace if necessary.	
Windshield wiper speed can not be adjusted correctly.	Motor	Motor brush for either low or high speed is worn.	Replace motor.	
Windshield wiper does not stop correctly.	Stops anywhere.	Motor	Contaminated auto-stop relay contacts or improper contact due to foreign matter.	Remove auto-stop device cover, and clean contacts carefully so as not to deform relay plate.
	Does not stop.	Motor	Incomplete auto-stop operation (Contact is not interrupted.)	Remove auto-stop device cover, and correct relay plate bending.
Washer motor does not operate when pushing washer switch on.		Burnt fuse. Faulty switch. Faulty washer motor. Loosen or poor connection contact at motor or switch.	Correct cause and replace fuse. Replace. Replace. Repair.	
Washer motor operate but washer fluid is not ejected.		Clogged washer nozzle.	Clean nozzle or replace.	

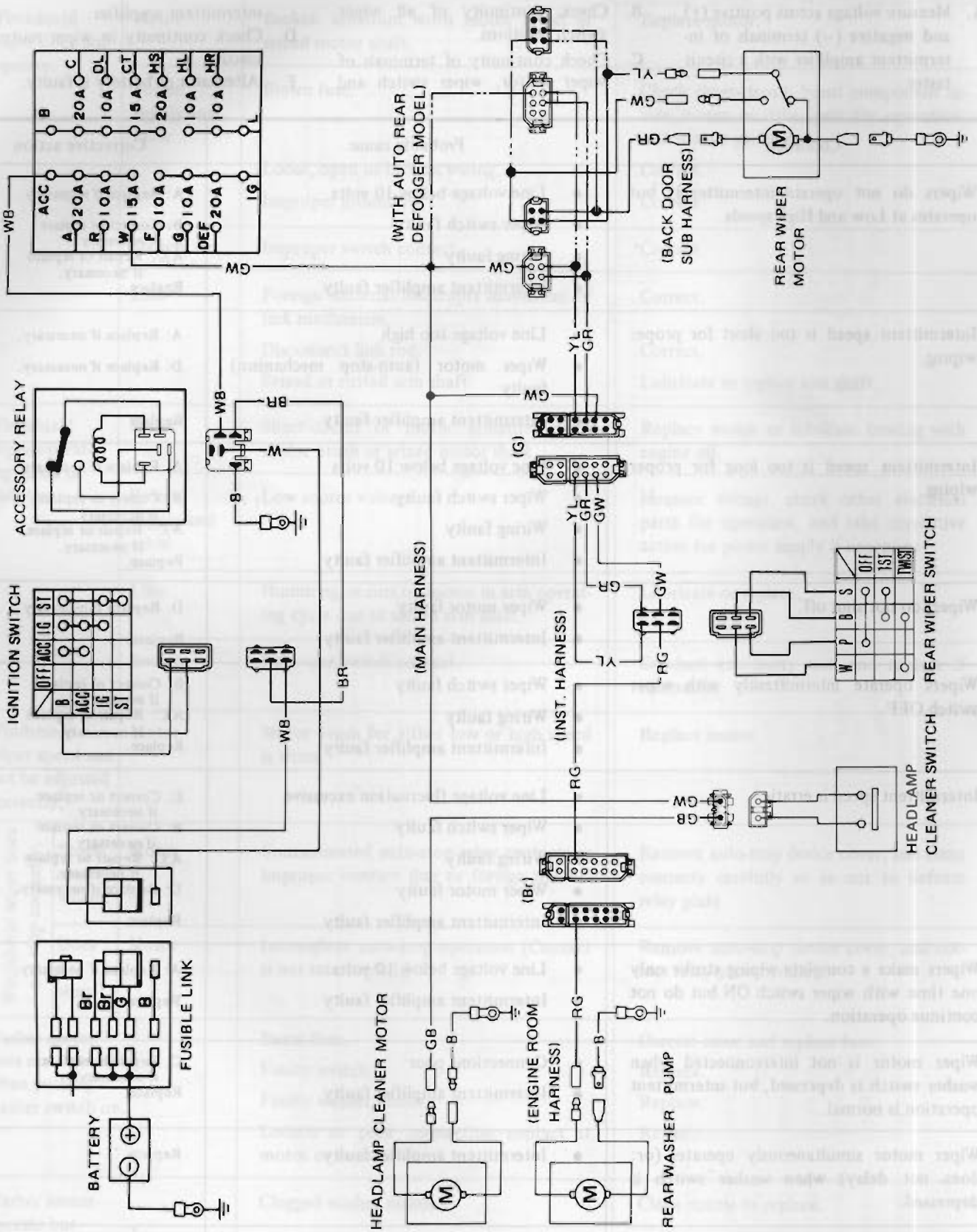
Intermittent windshield wiper

The sign for corrective action

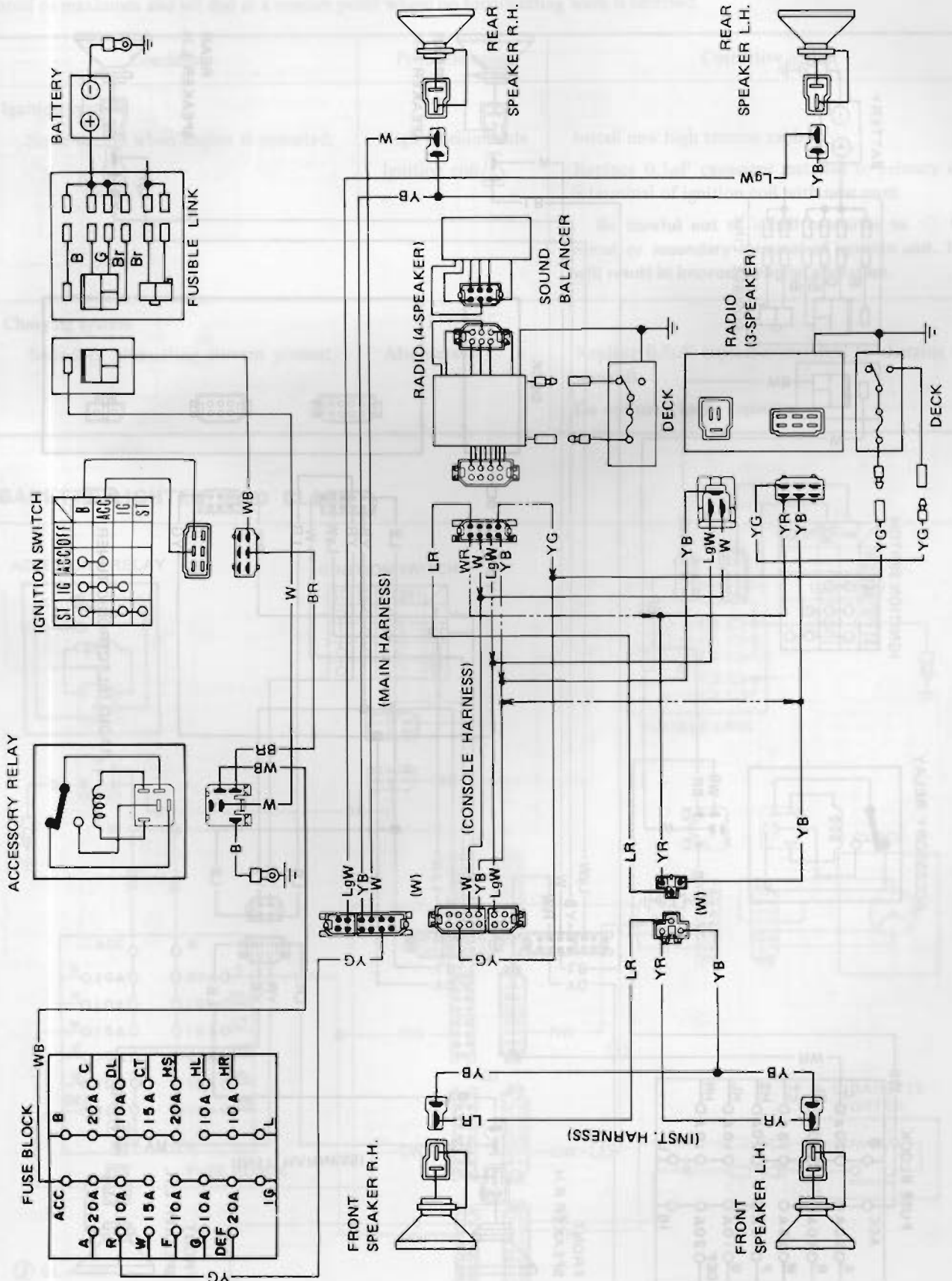
- A. Measure voltage across positive (+) and negative (-) terminals of intermittent amplifier with a circuit tester.
- B. Check continuity of all wiper switch positions.
- C. Check continuity of terminals of wiper motor, wiper switch and intermittent amplifier.
- D. Check continuity in wiper motor circuit.
- E. Alternator or battery is faulty.

Condition	Probable cause	Corrective action
Wipers do not operate intermittently but operates at Low and High speeds.	<ul style="list-style-type: none"> Line voltage below 10 volts Wiper switch faulty Wiring faulty Intermittent amplifier faulty 	A: Replace if necessary. B: Correct or replace if necessary. A,C: Repair or replace if necessary. Replace.
Intermittent speed is too short for proper wiping.	<ul style="list-style-type: none"> Line voltage too high Wiper motor (auto-stop mechanism) faulty Intermittent amplifier faulty 	A: Replace if necessary. D: Replace if necessary. Replace
Intermittent speed is too long for proper wiping.	<ul style="list-style-type: none"> Line voltage below 10 volts Wiper switch faulty Wiring faulty Intermittent amplifier faulty 	A: Replace if necessary. B: Correct or replace if necessary. A,C: Repair or replace if necessary. Replace.
Wipers do not shut off.	<ul style="list-style-type: none"> Wiper motor faulty Intermittent amplifier faulty 	D: Replace if necessary. Replace.
Wipers operate intermittently with wiper switch OFF.	<ul style="list-style-type: none"> Wiper switch faulty Wiring faulty Intermittent amplifier faulty 	B: Correct or replace if necessary. A,C: Repair or replace if necessary. Replace.
Intermittent speed is erratic.	<ul style="list-style-type: none"> Line voltage fluctuation excessive Wiper switch faulty Wiring faulty Wiper motor faulty Intermittent amplifier faulty 	E: Correct or replace if necessary. B: Correct or replace if necessary. A,C: Repair or replace if necessary. D: Replace if necessary. Replace.
Wipers make a complete wiping stroke only one time with wiper switch ON but do not continue operation.	<ul style="list-style-type: none"> Line voltage below 10 volts Intermittent amplifier faulty 	A: Replace if necessary. Replace.
Wiper motor is not interconnected when washer switch is depressed, but intermittent operation is normal.	<ul style="list-style-type: none"> Connections poor Intermittent amplifier faulty 	C: Repair or replace if necessary. Replace.
Wiper motor simultaneously operates (or: does not delay) when washer switch is depressed.	<ul style="list-style-type: none"> Intermittent amplifier faulty 	Replace.
Wipers do not make a complete wiping stroke when washer switch is first turned on and is quickly turned off.	<ul style="list-style-type: none"> Intermittent amplifier faulty 	Replace.

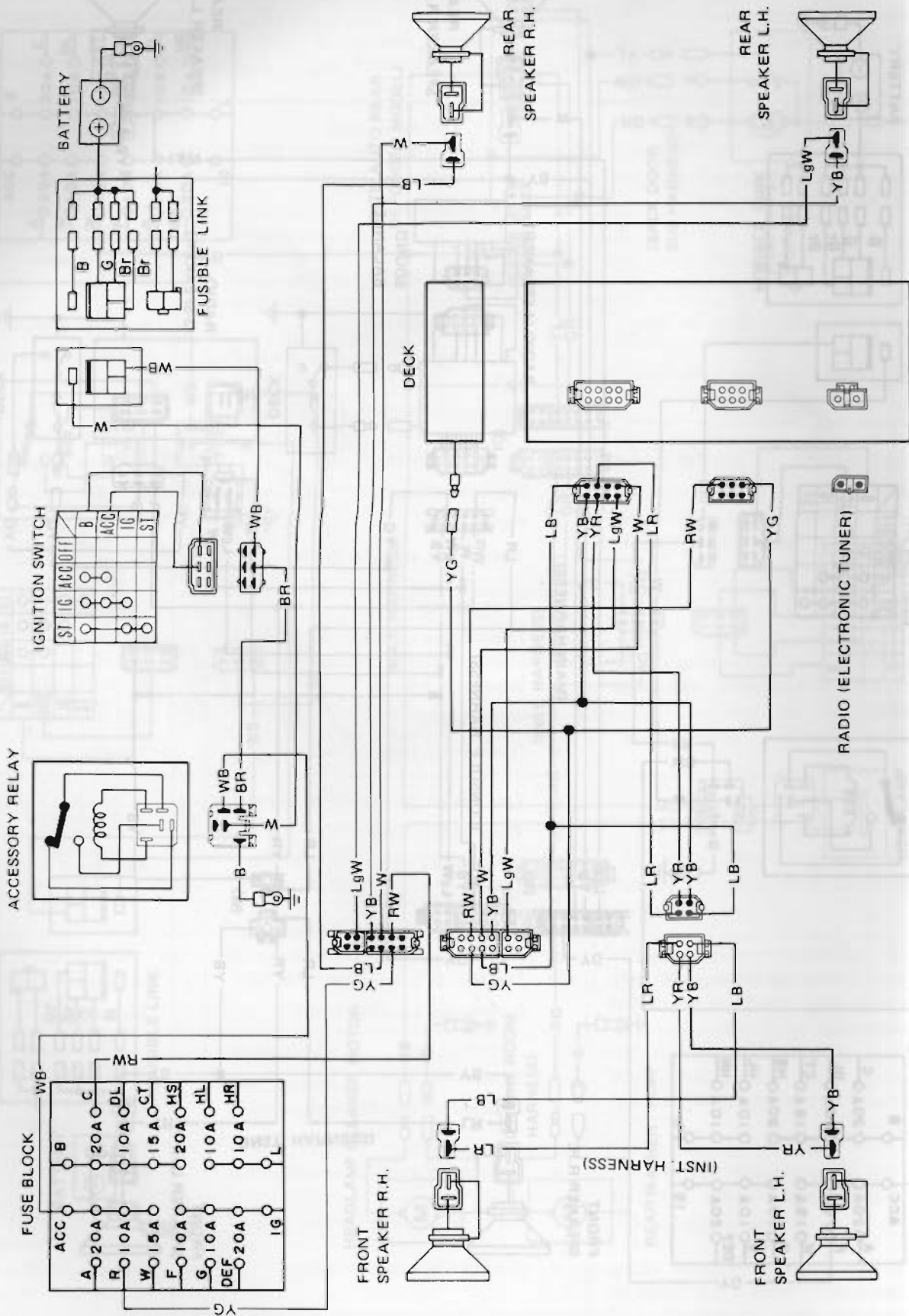
REAR WINDOW WIPER AND WASHER, AND HEADLAMP CLEANER



RADIO AND STEREO



RADIO AND STEREO (Electronic tuner type)

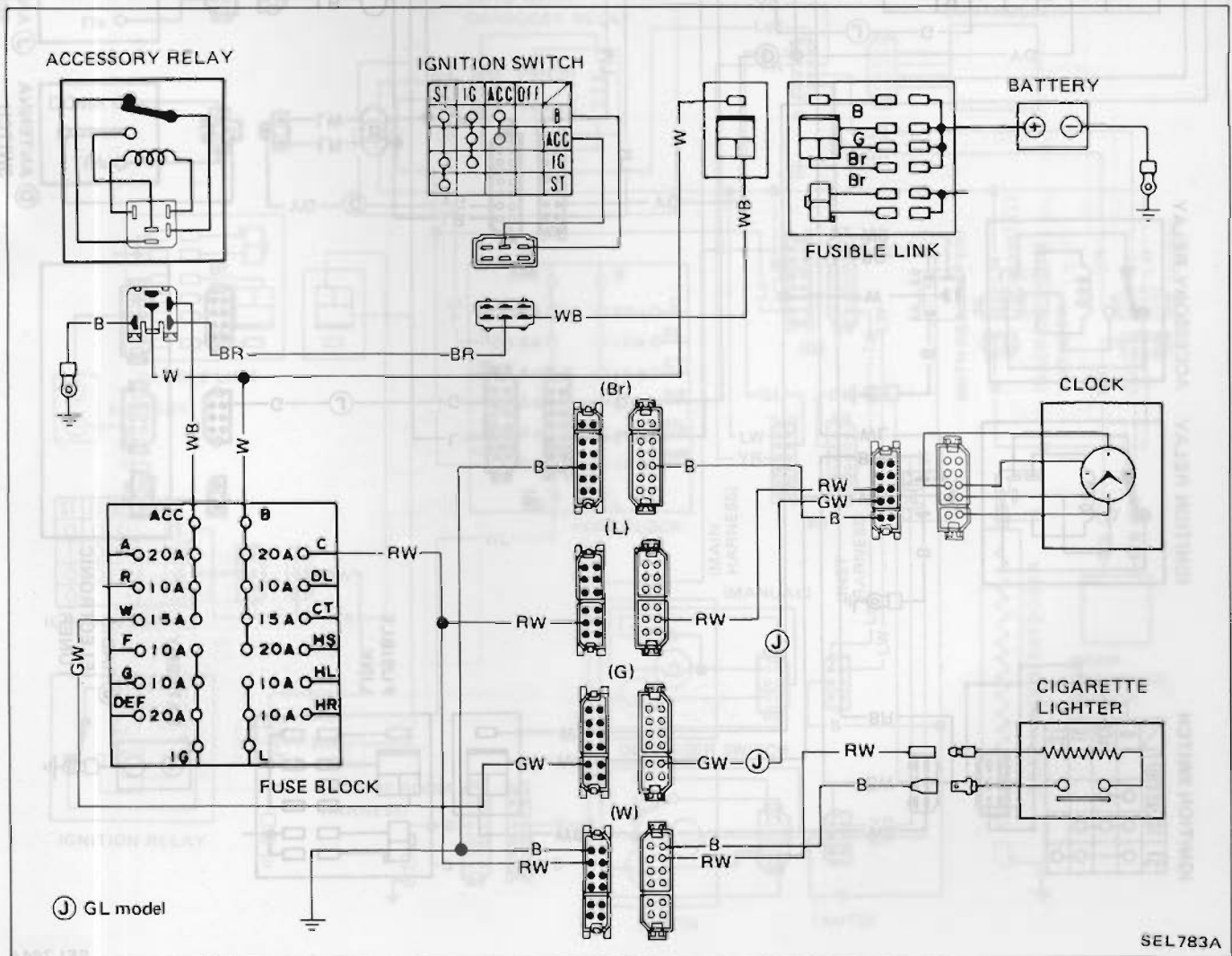


Noise prevention chart

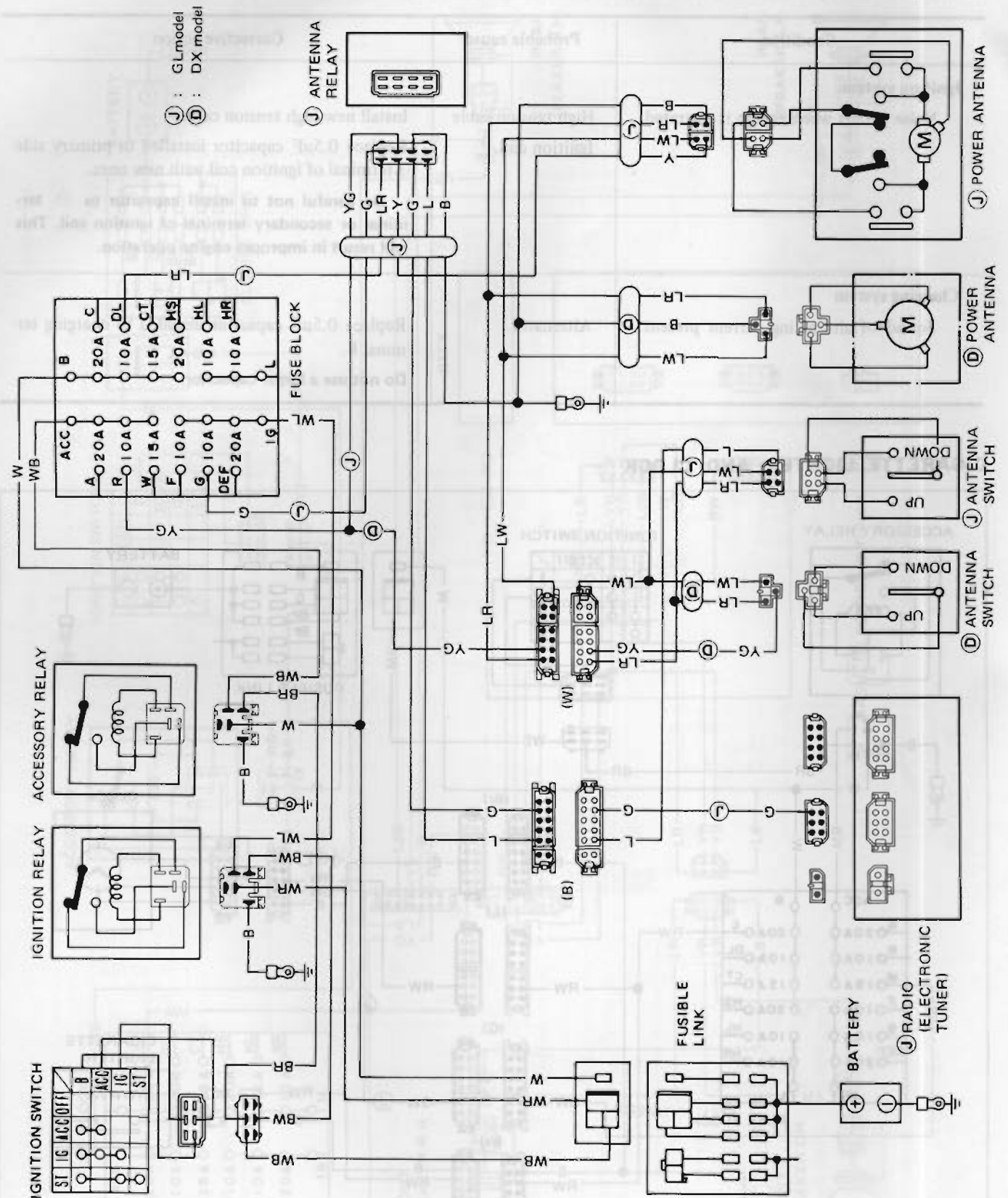
Position car in an open area away from steel buildings, run engine, extend antenna to its maximum length, set volume control to maximum and set dial at a median point where no broadcasting wave is received.

Condition	Probable cause	Corrective action
<p>Ignition system</p> <p>Noise occurs when engine is operated.</p>	<p>High tension cable</p> <p>Ignition coil.</p>	<p>Install new high tension cable.</p> <p>Replace 0.5μF capacitor installed to primary side \oplus terminal of ignition coil with new ones.</p> <p>Be careful not to install capacitor to \ominus terminal or secondary terminal of ignition coil. This will result in improper engine operation.</p>
<p>Charging system</p> <p>Sound of alternating current present.</p>	<p>Alternator.</p>	<p>Replace 0.5μF capacitor installed to charging terminal B.</p> <p>Do not use a larger capacitor.</p>

CIGARETTE LIGHTER AND CLOCK

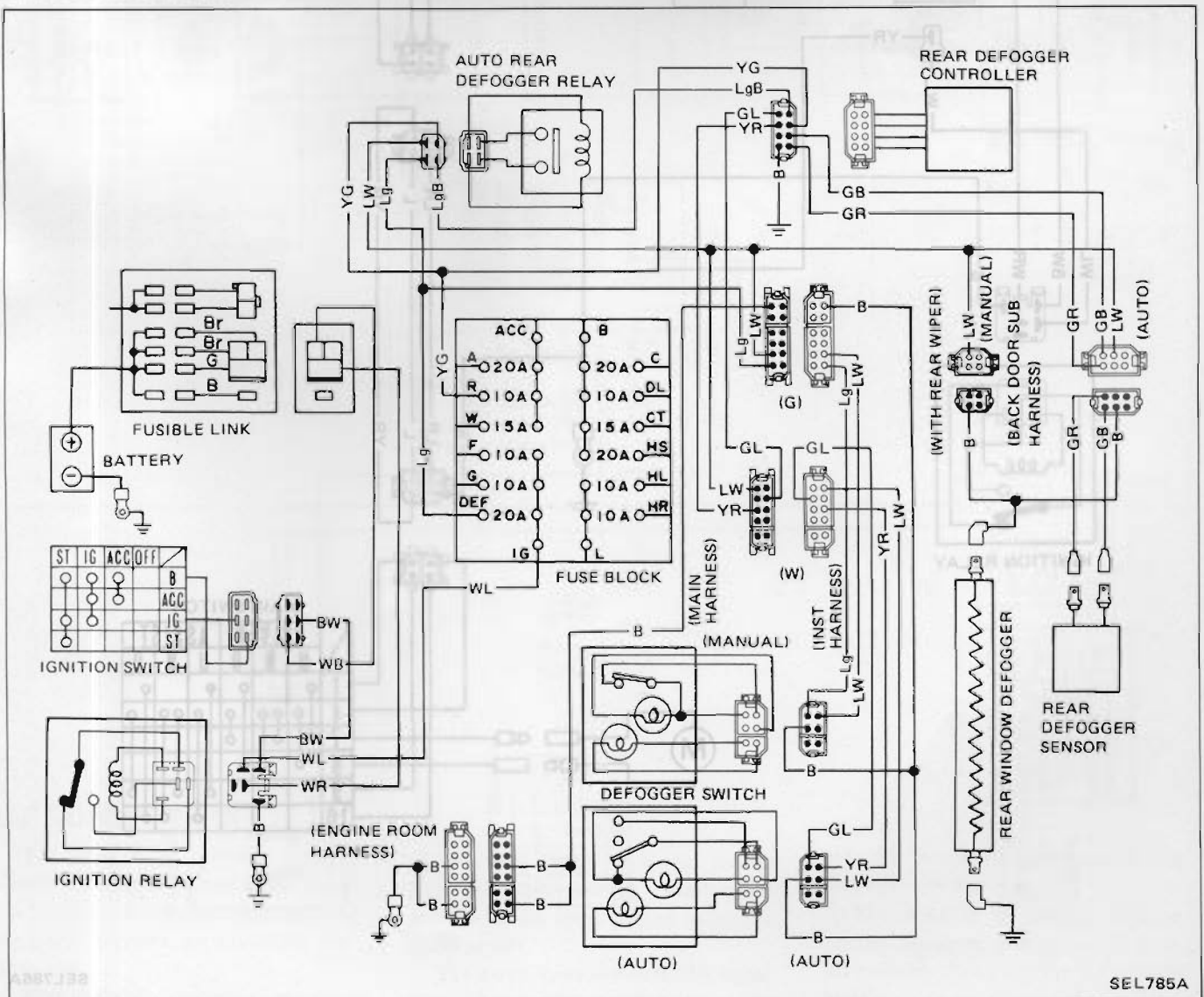


POWER ANTENNA



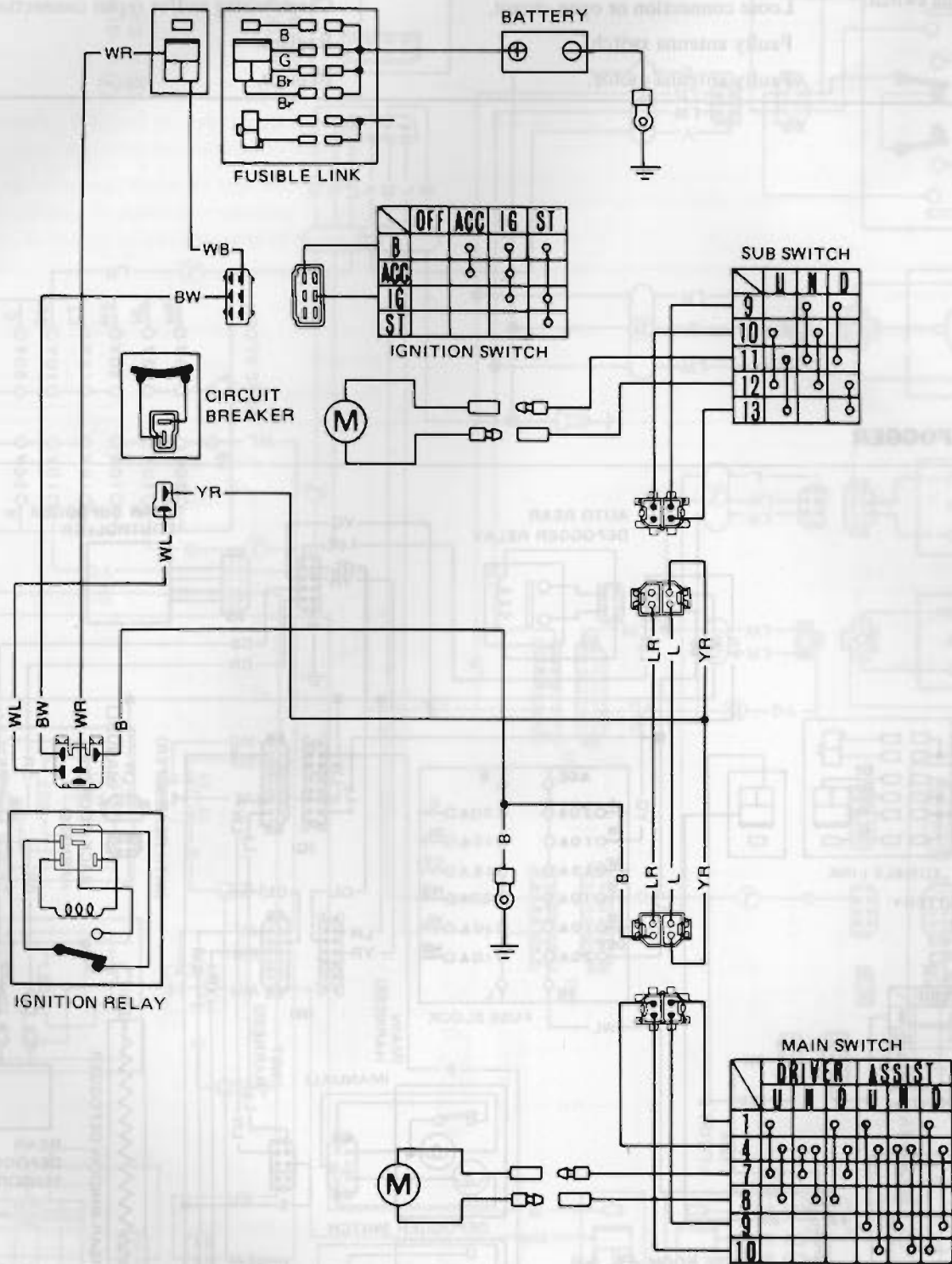
Condition	Probable cause	Corrective action
Antenna does not move up or down with antenna switch.	Burnt fuse. [Radio does not operate.] Loose connection or open circuit. Faulty antenna switch. Faulty antenna motor.	Correct cause and replace. Check wiring and/or repair connection. Replace. Replace.

REAR DEFOGGER

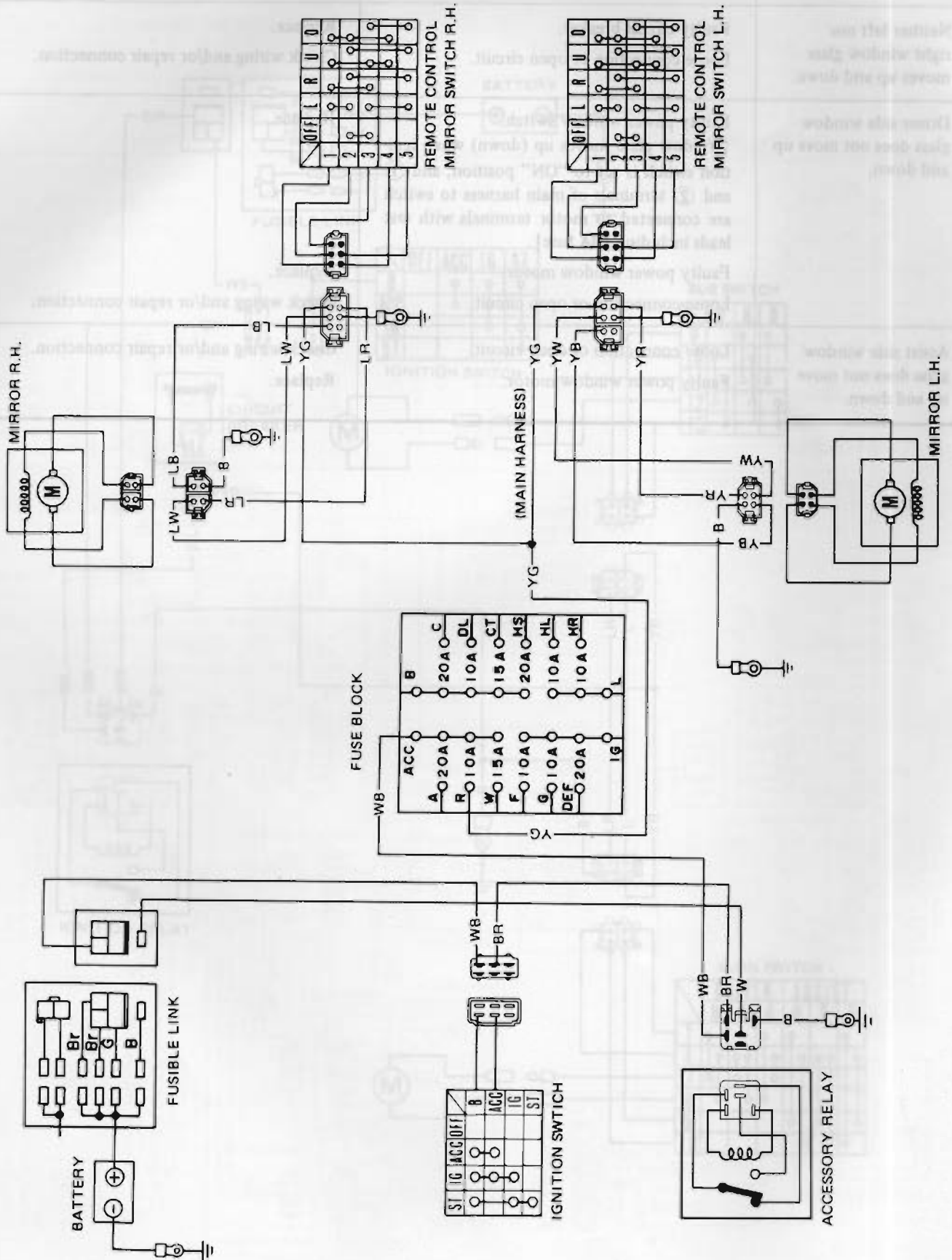


SEL785A

POWER WINDOW

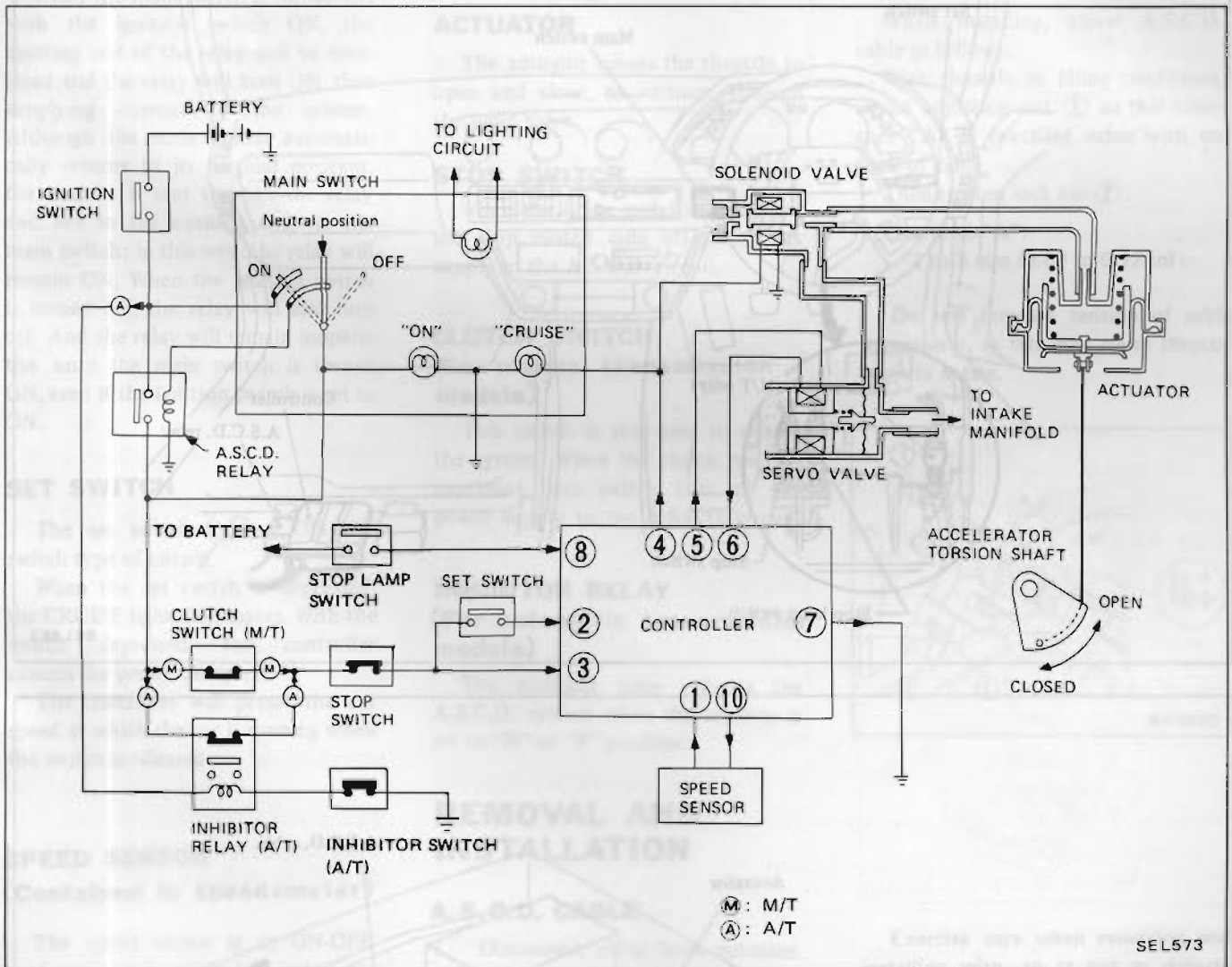


REMOTE-CONTROL DOOR MIRROR



AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.



DESCRIPTION

The Automatic Speed Control Device (subsequently referred to as "A.S.C.D.") is a combined unit of electronic circuits with vacuum mechanisms.

The A.S.C.D. controller generates

an electrical signal equivalent to the difference between the preset speed and the actual speed picked up by the speed sensor.

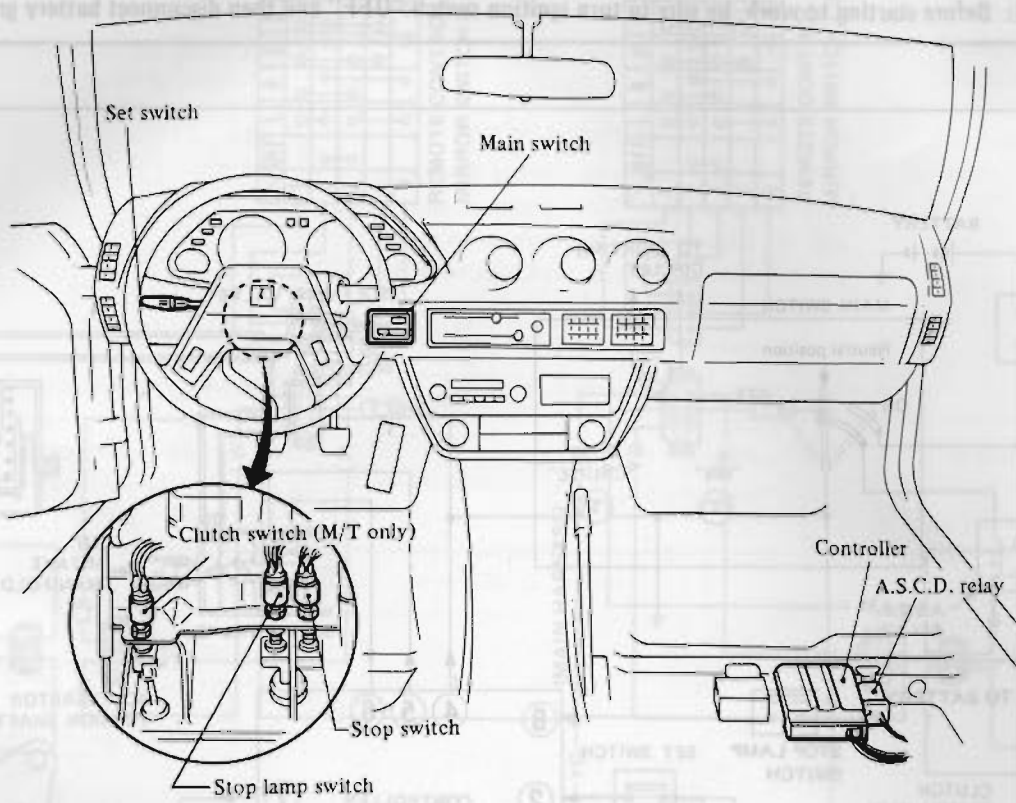
The servo valve converts this signal into corresponding vacuum and oper-

ates the actuator which adjusts the throttle valve opening.

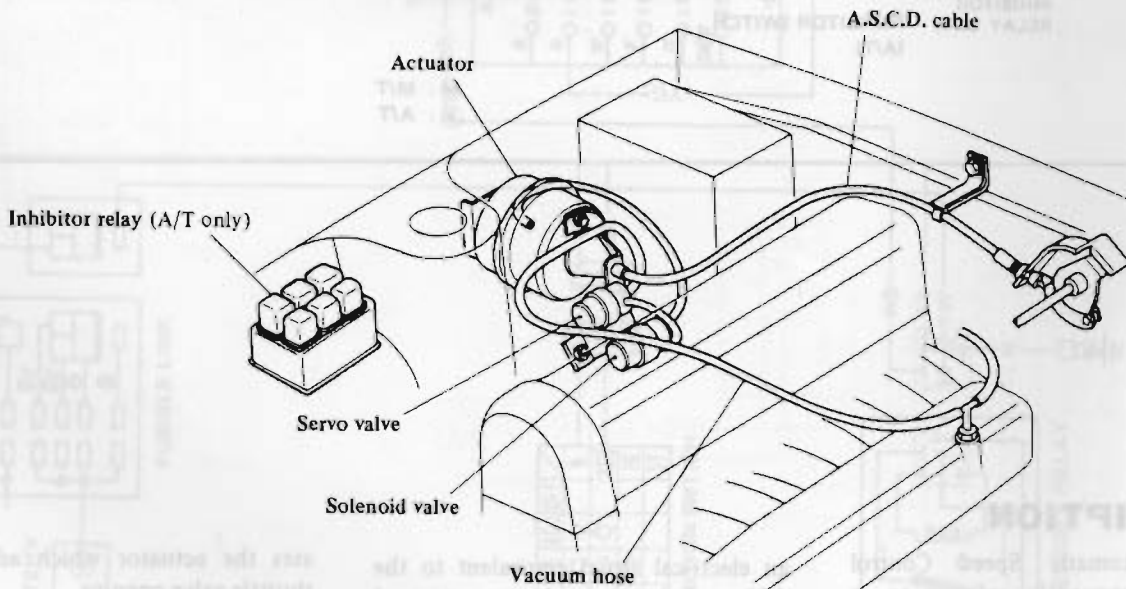
The A.S.C.D. is capable of maintaining speeds within the range of approximately 60 to 120 km/h (37 to 75 MPH).

Automatic Speed Control Device (A.S.C.D.) – ELECTRICAL SYSTEM

Speed sensor is incorporated in speedometer.



SEL663



SEL789A

FUNCTION AND OPERATION

MAIN SWITCH

When the main switch is turned ON with the ignition switch ON, the exciting coil of the relay will be energized and the relay will turn ON, thus supplying current to the system. Although the main switch automatically returns to its original position, the current is sent through the relay and fed to the exciting coil via the main switch; in this way, the relay will remain ON. When the ignition switch is turned off, the relay will also turn off. And the relay will remain inoperative until the main switch is turned ON, even if the ignition switch is set to ON.

SET SWITCH

The set switch has an ON-OFF switch type of circuit.

When the set switch is depressed, the CRUISE light illuminates. With the switch depressed, the controller cancels the preset car speed.

The controller will preset the car speed at which the car is running when the switch is released.

SPEED SENSOR (Contained in speedometer)

The speed sensor is an ON-OFF type sensor generating two pulses per revolution of the meter cable.

SERVO VALVE (Transducer)

The servo valve causes the vacuum valve and atmospheric valve to open or close according to the input current and adjusts the vacuum from the intake manifold.

Controller

The controller compares the preset speed with the actual car speed, and maintains the preset speed by increasing or decreasing the current flowing through the servo valve.

SOLENOID VALVE

The solenoid valve is the safety valve which shuts off the atmospheric passage to the vacuum line, when the system activates.

ACTUATOR

The actuator causes the throttle to open and close, by vacuum, through the servo valve.

STOP SWITCH

When the brake pedal is depressed, the stop switch cuts off the power supply to the A.S.C.D. circuit.

CLUTCH SWITCH (For manual transmission models)

This switch is also used to release the system. When the clutch pedal is depressed, this switch cuts off the power supply to the A.S.C.D. circuit.

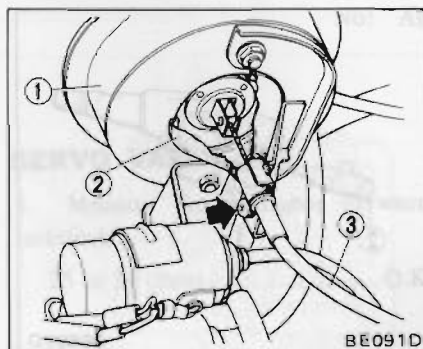
INHIBITOR RELAY (For automatic transmission models)

The inhibitor relay releases the A.S.C.D. system when the selector is set to "N" or "P" position.

REMOVAL AND INSTALLATION

A. S. C. D. CABLE

1. Disconnect cable from actuator.
 - (1) Remove screw attaching cable bracket.
 - (2) Remove rubber boots.



1 Actuator 3 Cable
2 Rubber boot

2. Loosen lock nut and remove cable from torsion shaft.
3. To install the cable, reverse the order of removal.

Adjustment

When installing, adjust A.S.C.D. cable as follows:

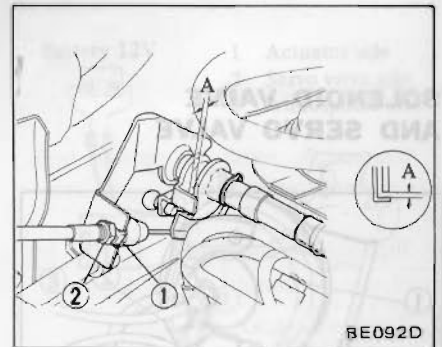
With throttle in idling conditions, adjust adjusting nut ① so that clearance "A" is specified value with no slack of cable.

Then tighten lock nut ②.

Clearance "A":

2 to 3 mm (0.08 to 0.12 in)

Do not increase tension of cable excessively, as this may cause throttle lever to rotate.



BE092D

Exercise care when removing and installing wire, so as not to deform wire end.

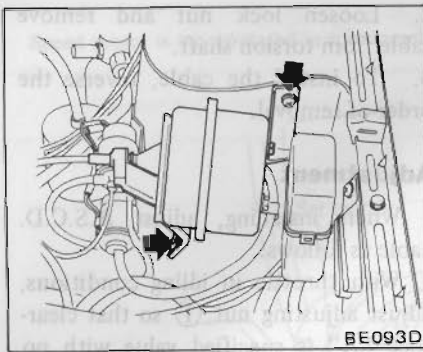
TORSION SHAFT

Refer to Accelerator Linkage for removal (Section FE).

ACTUATOR

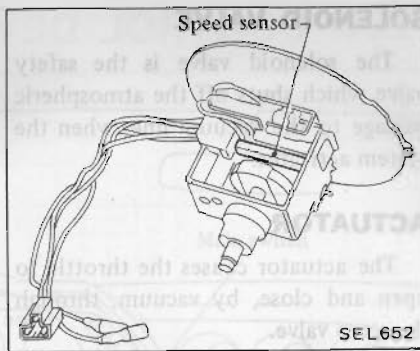
1. Disconnect battery ground cable.
2. Disconnect cable from actuator.

Refer to A.S.C.D. cable for removal.
3. Disconnect harness connector of servo valve and solenoid valve, and disconnect vacuum hose connecting intake manifold to servo valve.
4. Remove bolt attaching actuator to body.



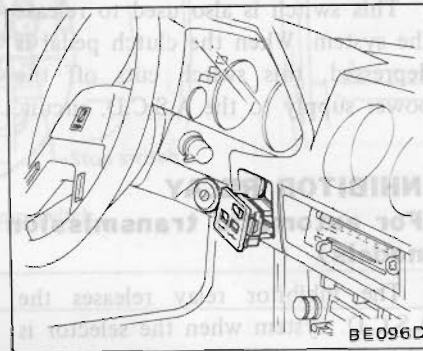
Actuator can then be taken out with servo valve and solenoid valve.

5. Disconnect vacuum hose from actuator and remove servo valve and solenoid valve.
6. To install actuator, reverse the order of removal.



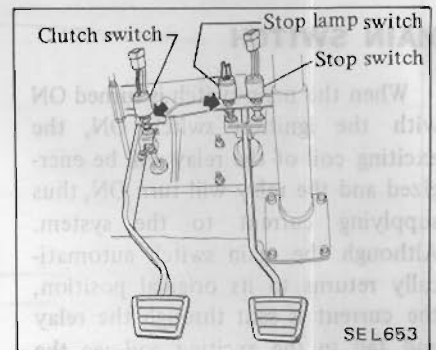
MAIN SWITCH

1. Disconnect battery ground cable.
2. Push out main switch from behind instrument panel.
3. Remove harness connector.



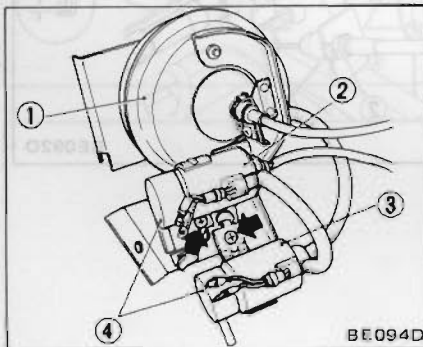
4. To install the switch, reverse the order of removal.

STOP LAMP SWITCH AND CLUTCH SWITCH



1. Disconnect battery ground cable.
2. Remove instrument panel L.H. lower cover and floor assist nozzle.
3. Loosen lock nut and remove switch.
4. To install switch, reverse the order of removal.

SOLENOID VALVE AND SERVO VALVE



- | | |
|---------------|---------------------|
| 1 Actuator | 3 Solenoid valve |
| 2 Servo valve | 4 Water-tight cover |

1. Disconnect battery ground cable.
2. Disconnect harness connector and remove valve.
3. To install the valve, reverse the order of removal.

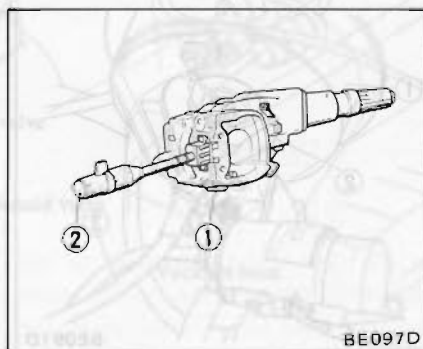
Install valve so that water drain of water-tight cover faces downward.

SPEED SENSOR

The speed sensor is built into the speedometer. It can only be removed and installed as an assembly.

SET SWITCH

Remove set switch as an assembly as it is built into combination switch. Refer to Combination Switch for removal.

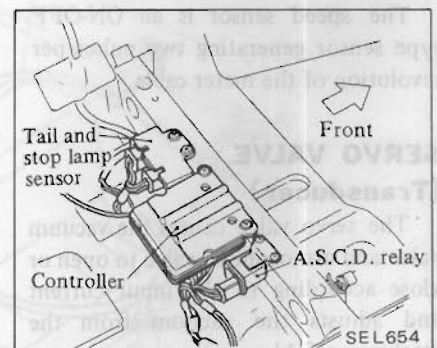


- 1 Combination switch assembly
- 2 Set switch

Adjustment

Refer to Brake Pedal or Clutch Pedal for adjustment (Section BR or CL).

CONTROLLER AND A.S.C.D. RELAY



1. Disconnect battery ground cable.
2. Remove passenger seat.
3. Remove controller or A.S.C.D. relay.
4. To install controller or A.S.C.D. relay, reverse the order of removal.

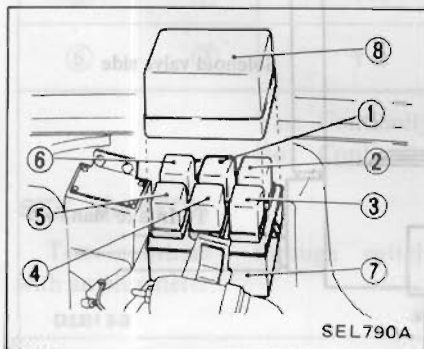
A.S.C.D. CABLE AND TORSION SHAFT

Visually check A.S.C.D. cable and torsion shaft for rust, damage or looseness.

CAUTION:

When checking actuator by applying vacuum, do not apply engine vacuum directly.

INHIBITOR RELAY (For A.S.C.D.)



- 1 Fuel pump relay-2
- 2 Fuel pump relay-3
- 3 Lighting relay
- 4 Bulb check relay
- 5 Air conditioner relay
- 6 Inhibitor relay
- 7 Relay bracket
- 8 Relay bracket cover

ACTUATOR

1. Visually check actuator for damage or deformation.
2. Make sure that actuator moves smoothly without binding when diaphragm is pushed by hand.
3. Apply vacuum to actuator. If diaphragm moves to full position, it is normal.

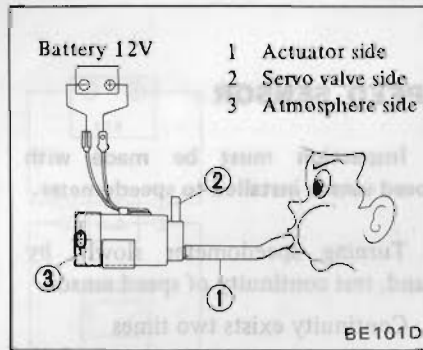
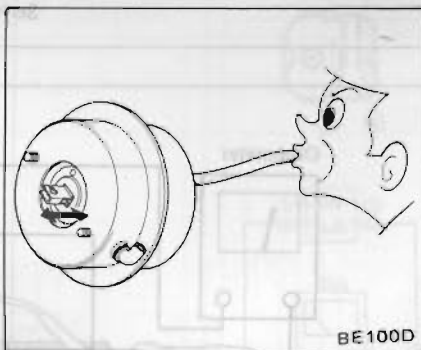
Plug hose with vacuum applied. Make sure that actuator remains in full position.

SOLENOID VALVE

1. Measure the resistance between terminals.

25 to 30 ohms O.K.

2. Check to be sure that the valve opens or closes by blowing air through port on actuator side.



1. Disconnect battery ground cable.
2. Remove relay cover.
3. Remove relay from relay fixing board.
4. To install relay, reverse the order of removal.

	Normal condition	12V direct current is applied between terminals
Normal condition	Yes	Yes
Plug port at servo valve side with a finger.	Yes	No

Yes: Air flow should exist.

No: Air flow should not exist.

COMPONENT PARTS INSPECTION

CAUTION:

- a. Do not disassemble component parts when checking as all of them are replaced as assemblies.
- b. When checking by using battery or circuit tester, be careful not to touch adjacent terminal at the same time. Extreme care must be taken in handling controller.

SERVO VALVE

1. Measure the resistance between terminals.

25 to 30 ohms O.K.

2. Check to be sure that output vacuum of valve is proper.

Note: This check should be performed with the valve installed on car.

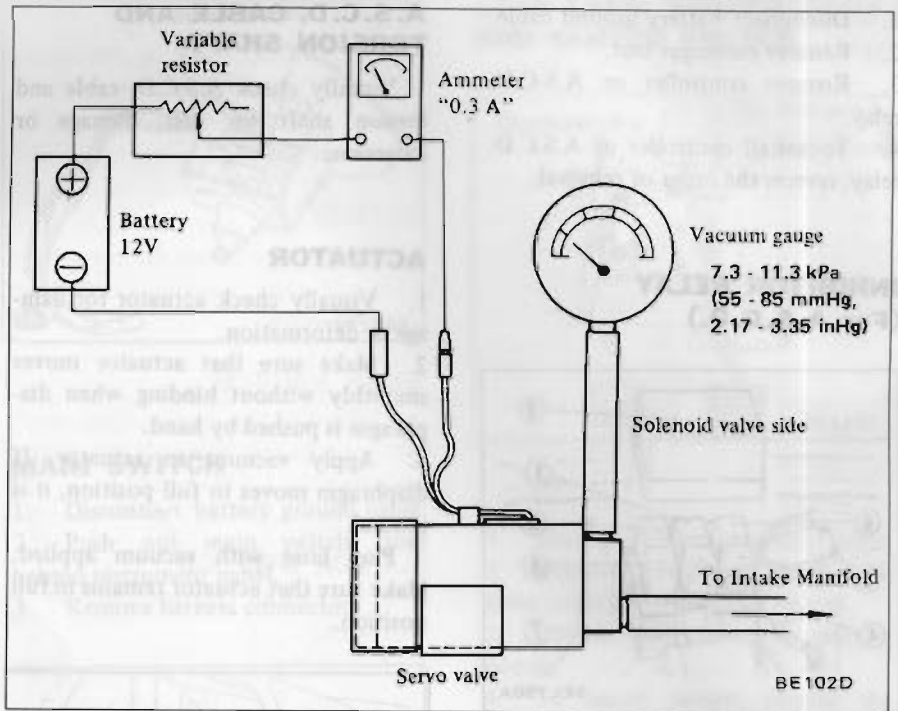
CAUTION:

With servo valve connected to system, do not apply current to servo valve. Be sure to disconnect solenoid valve side vacuum hose.

- (1) Disconnect solenoid valve side vacuum hose at solenoid valve and connect vacuum gauge.
- (2) Start engine and warm up engine until water temperature indicator points to the middle of gauge.
- (3) Apply 0.3A direct current between terminals.

Using about 20Ω-5W variable resistor, adjust so that a current of 0.3A will flow.

- (4) Read vacuum gauge.
 7.3 - 11.3 kPa
 (55 - 85 mmHg,
 2.17 - 3.35 inHg) O.K.

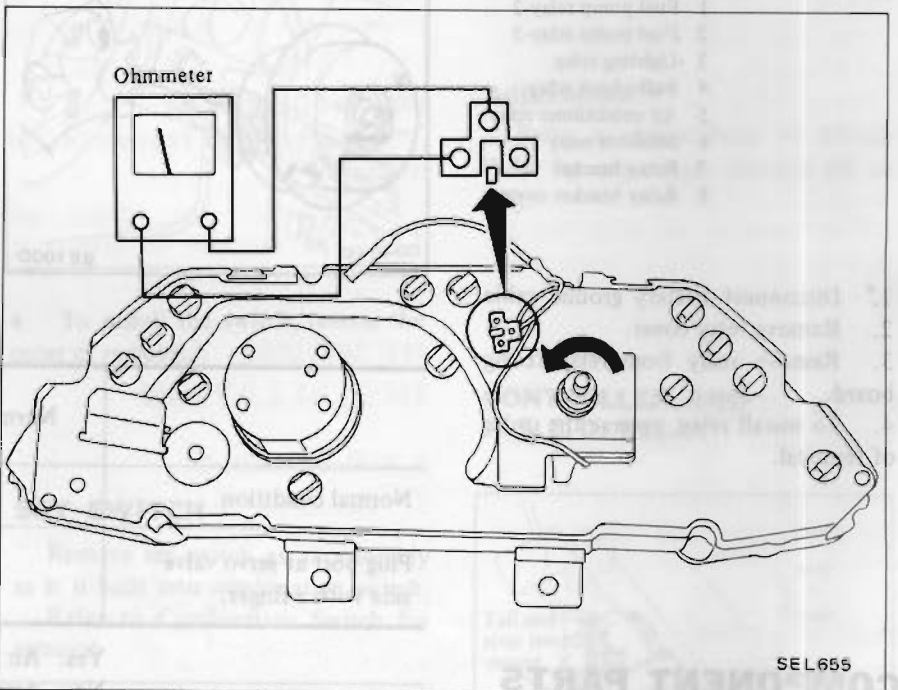


SPEED SENSOR

Inspection must be made with speed sensor installed to speedometer.

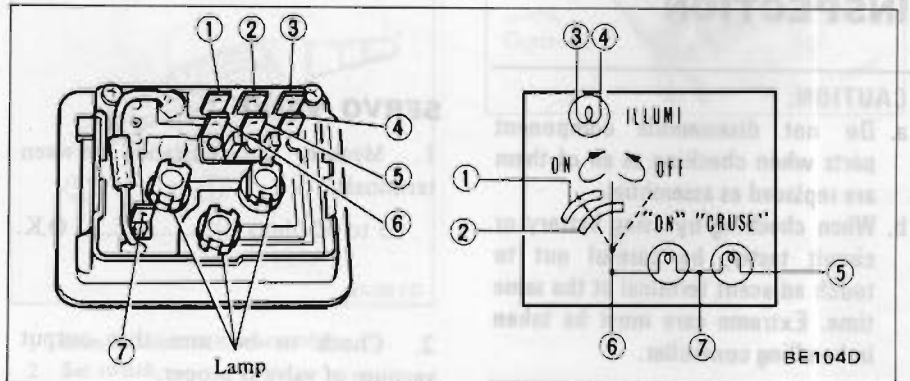
Turning speedometer slowly by hand, test continuity of speed sensor.

Continuity exists two times a turn O.K.



MAIN SWITCH

Test continuity through switch or light with an ohmmeter in accordance with the following chart.



Switch position Check terminal	Normal	ON	OFF
① – ②	No	Yes	No
① – ⑥	No	Yes	No
② – ⑥	Yes	Yes	No
③ – ④	Yes	--	--
⑤ – ⑦	Yes	--	--
⑥ – ⑦	Yes	--	--

Yes: Continuity should exist.
No: Continuity should not exist.

CONTROLLER

Controller must not be checked as a single part. Check controller for operation as a system, referring to Diagnosis.

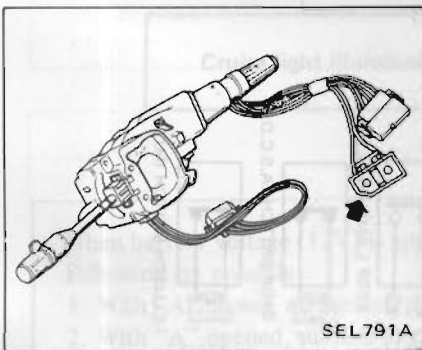
CAUTION:

Do not touch the circuit tester probe to any unnecessary terminal on controller. Doing so could cause damage to controller.

- a. Handle controller carefully to avoid damage.
- b. Keep controller away from electric noise source to prevent A.S.C.D. system from malfunctioning and IC circuit, etc. from being degraded.

SET SWITCH

Test continuity through switch with an ohmmeter.

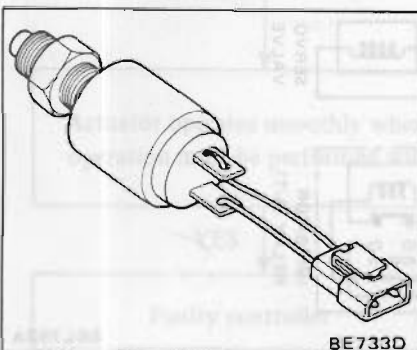


Normal condition	Depress switch
No	Yes

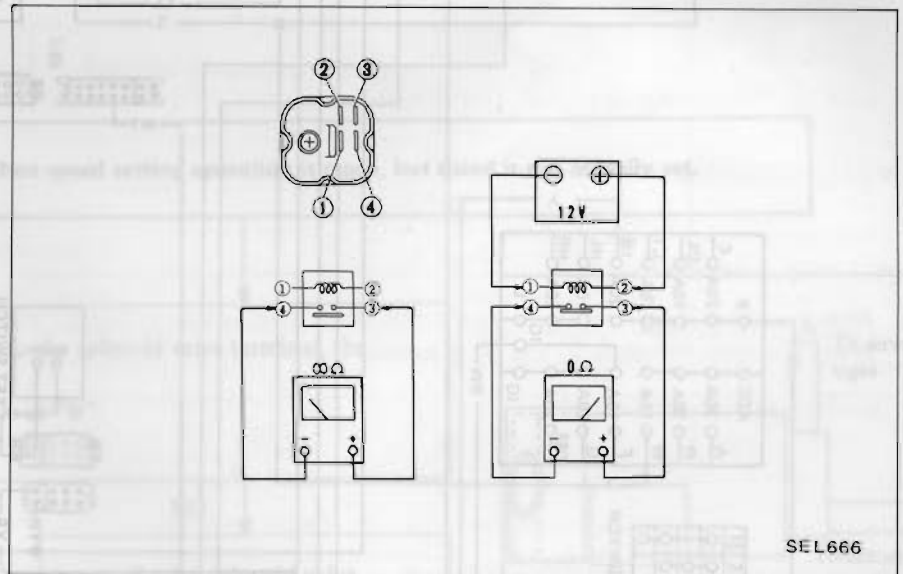
Yes: Continuity should exist.
No: Continuity should not exist.

CLUTCH AND STOP SWITCH

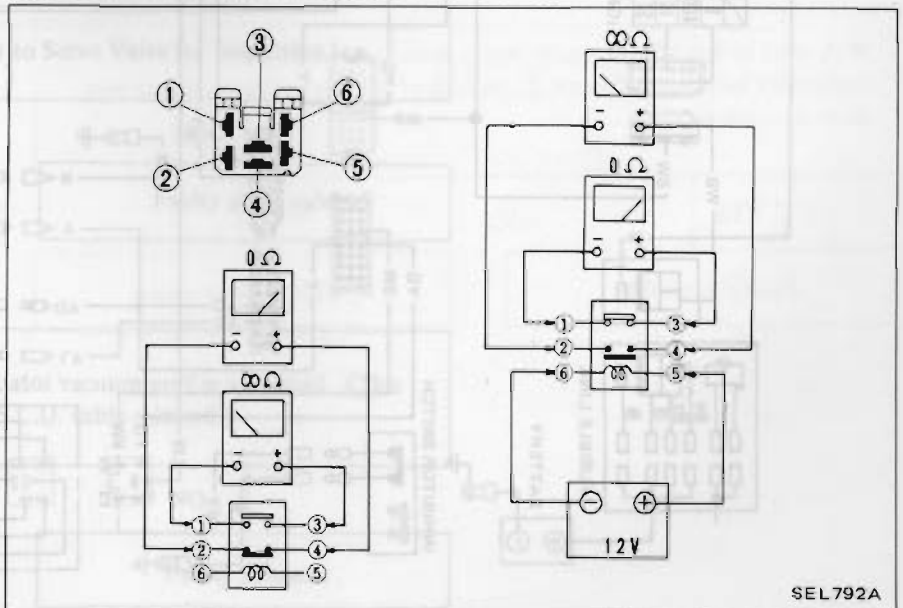
Test continuity through switch with an ohmmeter.



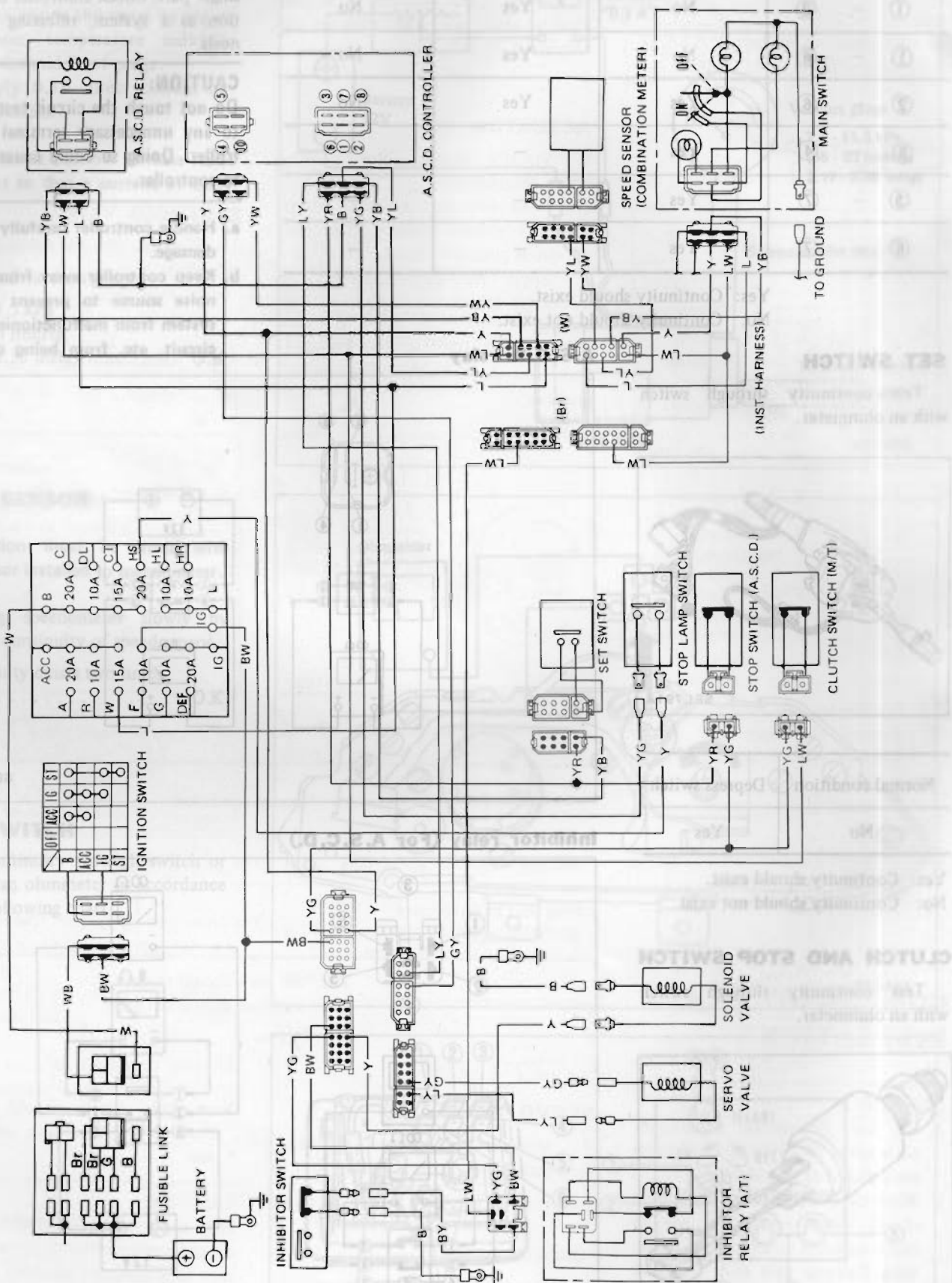
A.S.C.D. relay



Inhibitor relay (For A.S.C.D.)



WIRING DIAGRAM AND TROUBLE DIAGNOSES



TEST CONDITIONS

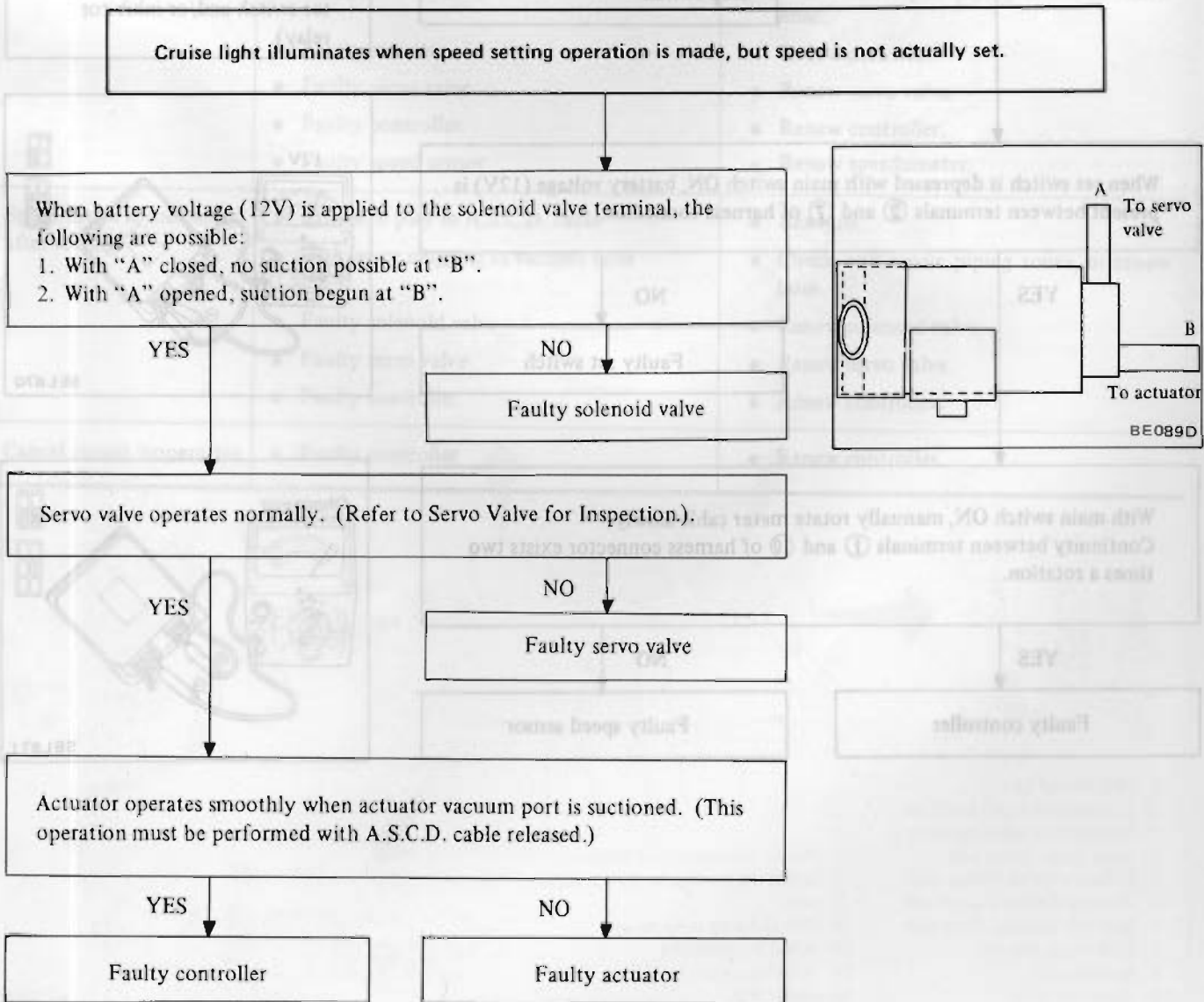
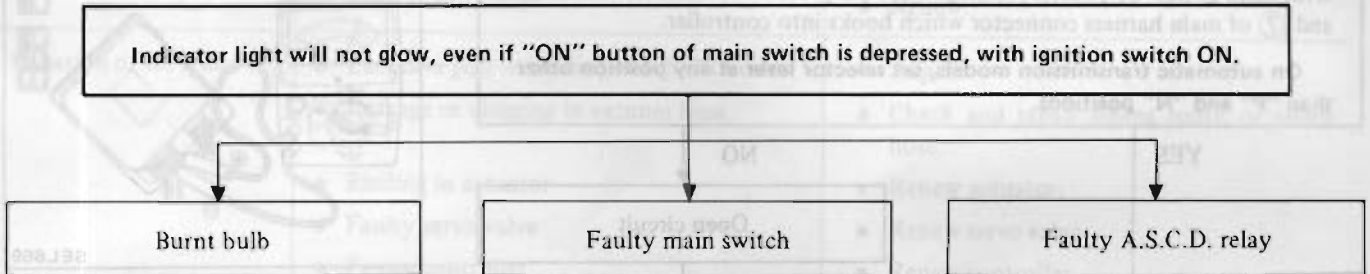
If a malfunction is found, be sure to check the following before performing the system test.

1. Turn signal operates. (Supply circuit is used in common with turn signal.)

2. All wiring harness connectors must be securely connected.
3. A.S.C.D. cable must be securely installed with proper adjustment.
4. Vacuum hoses must be properly attached with no abnormal conditions such as vacuum leakage, sharp bends or kinks.

DIAGNOSIS

WARNING:
All following system tests can be performed without running engine. Avoid making test while driving car or running engine.



Cruise light will not glow, even if set switch is depressed and released at proper car speed between 60 and 120 km/h (37 and 75 MPH), with main switch ON. (Speed not set in system.)

With main switch ON, battery voltage (12V) is present between terminals ③ and ⑦ of main harness connector which hooks into controller.

On automatic transmission models, set selector lever at any position other than "P" and "N" positions.

YES

NO

Open circuit

Faulty or improperly adjusted stop switch

Faulty or improperly adjusted clutch switch (Faulty inhibitor switch and/or inhibitor relay).

When set switch is depressed with main switch ON, battery voltage (12V) is present between terminals ② and ⑦ of harness connector.

YES

NO

Faulty set switch

With main switch ON, manually rotate meter cable slowly. Continuity between terminals ① and ⑩ of harness connector exists two times a rotation.

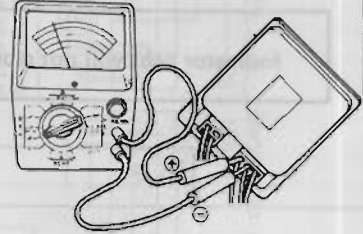
YES

NO

Faulty controller

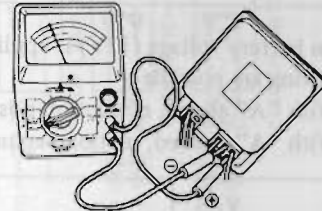
Faulty speed sensor

12V



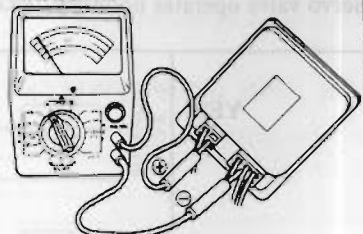
SEL669

12V



SEL670

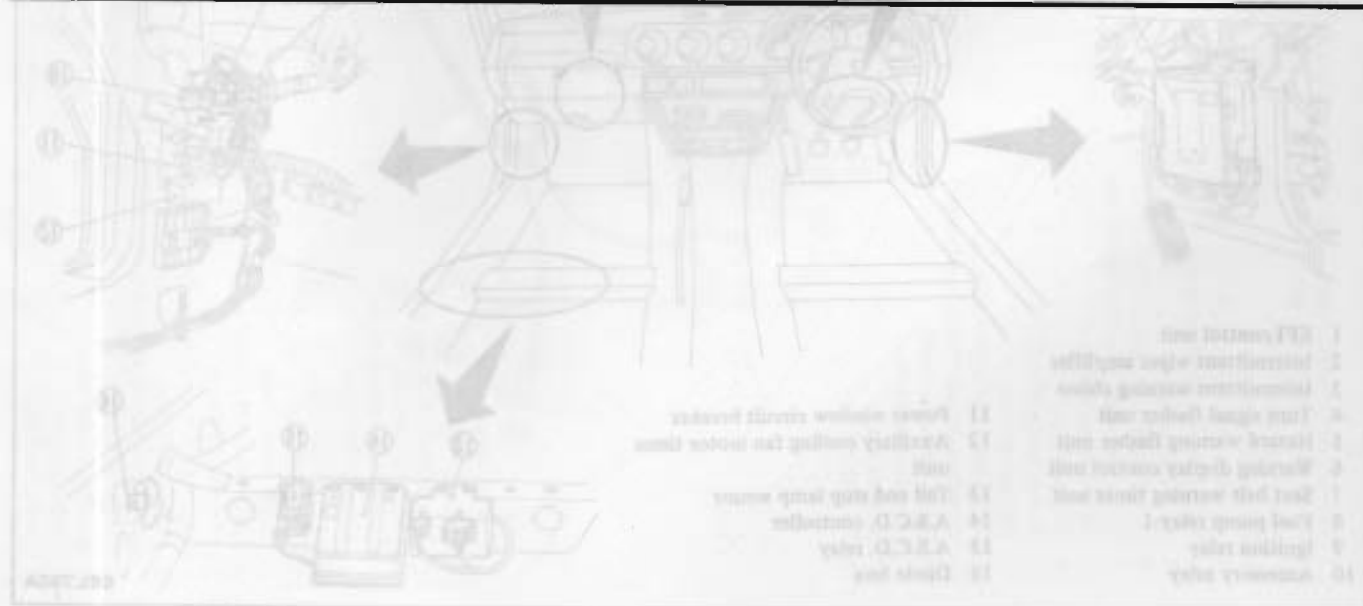
Ohmmeter



SEL671

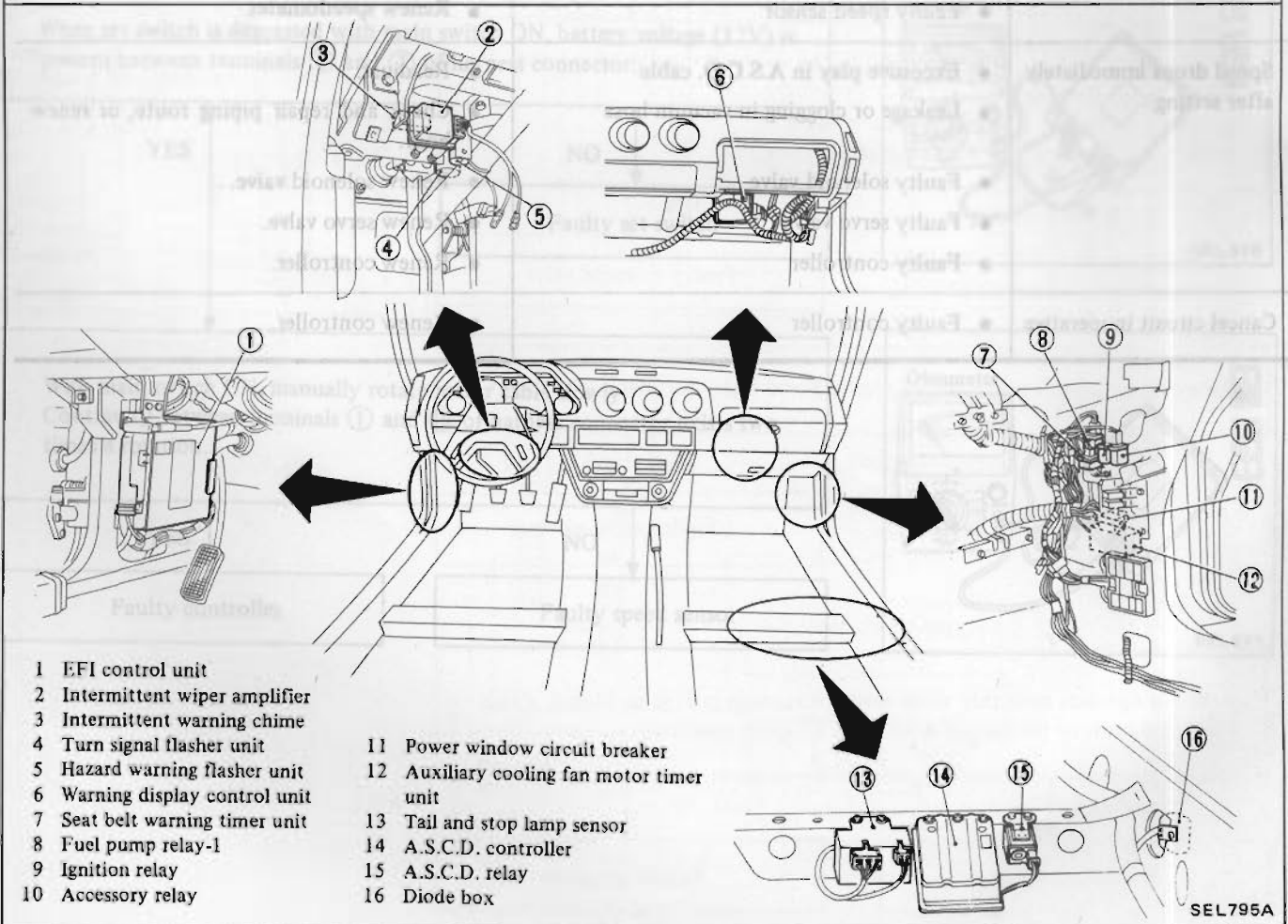
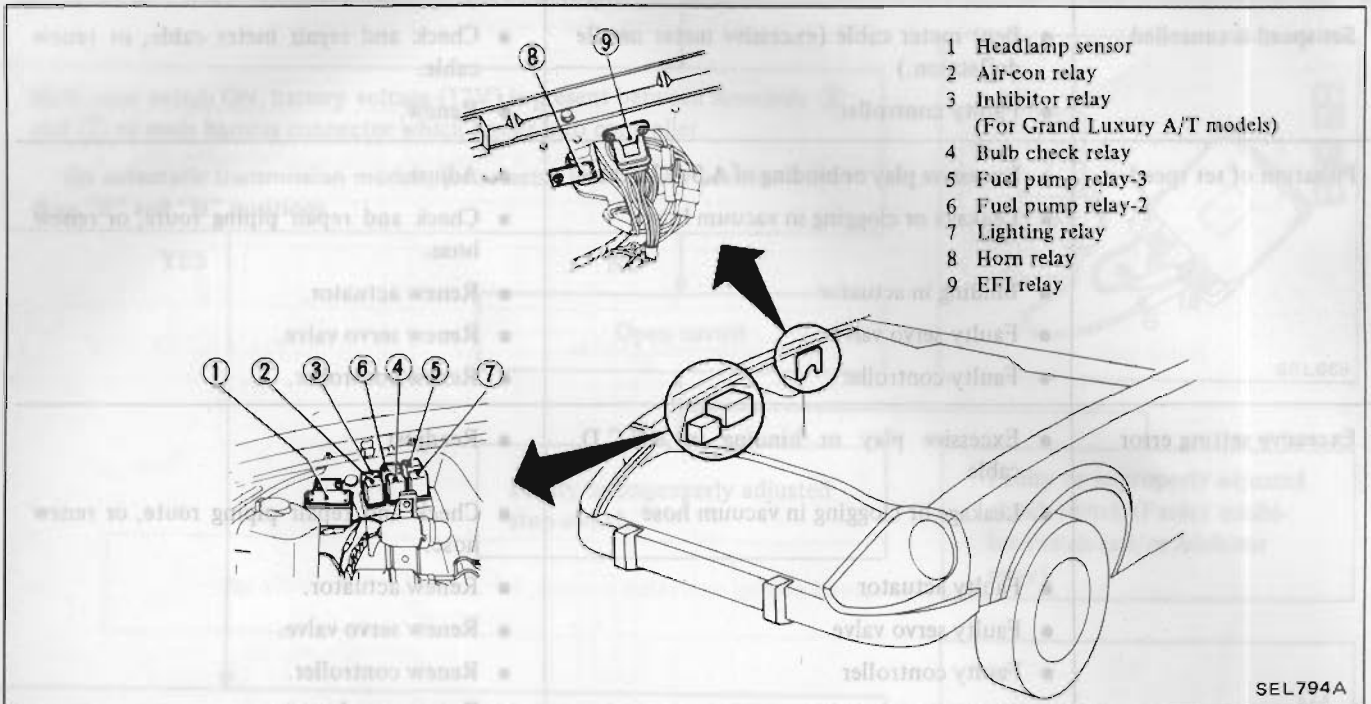
Other malfunctions and faults

Condition	Probable cause	Corrective action
Set speed is cancelled.	<ul style="list-style-type: none"> ● Bent meter cable (excessive meter needle deflection.) ● Faulty controller 	<ul style="list-style-type: none"> ● Check and repair meter cable, or renew cable. ● Renew.
Pulsation of set speed	<ul style="list-style-type: none"> ● Excessive play or binding of A.S.C.D. cable ● Leakage or clogging in vacuum hose ● Binding in actuator ● Faulty servo valve ● Faulty controller 	<ul style="list-style-type: none"> ● Adjust. ● Check and repair piping route, or renew hose. ● Renew actuator. ● Renew servo valve. ● Renew controller.
Excessive setting error	<ul style="list-style-type: none"> ● Excessive play or binding in A.S.C.D. cable ● Leakage or clogging in vacuum hose ● Faulty actuator ● Faulty servo valve ● Faulty controller ● Faulty speed sensor 	<ul style="list-style-type: none"> ● Readjust. ● Check and repair piping route, or renew hose. ● Renew actuator. ● Renew servo valve. ● Renew controller. ● Renew speedometer
Speed drops immediately after setting	<ul style="list-style-type: none"> ● Excessive play in A.S.C.D. cable ● Leakage or clogging in vacuum hose ● Faulty solenoid valve ● Faulty servo valve ● Faulty controller 	<ul style="list-style-type: none"> ● Readjust. ● Check and repair piping route, or renew hose. ● Renew solenoid valve. ● Renew servo valve. ● Renew controller.
Cancel circuit inoperative	<ul style="list-style-type: none"> ● Faulty controller 	<ul style="list-style-type: none"> ● Renew controller.



LOCATION OF ELECTRICAL UNIT

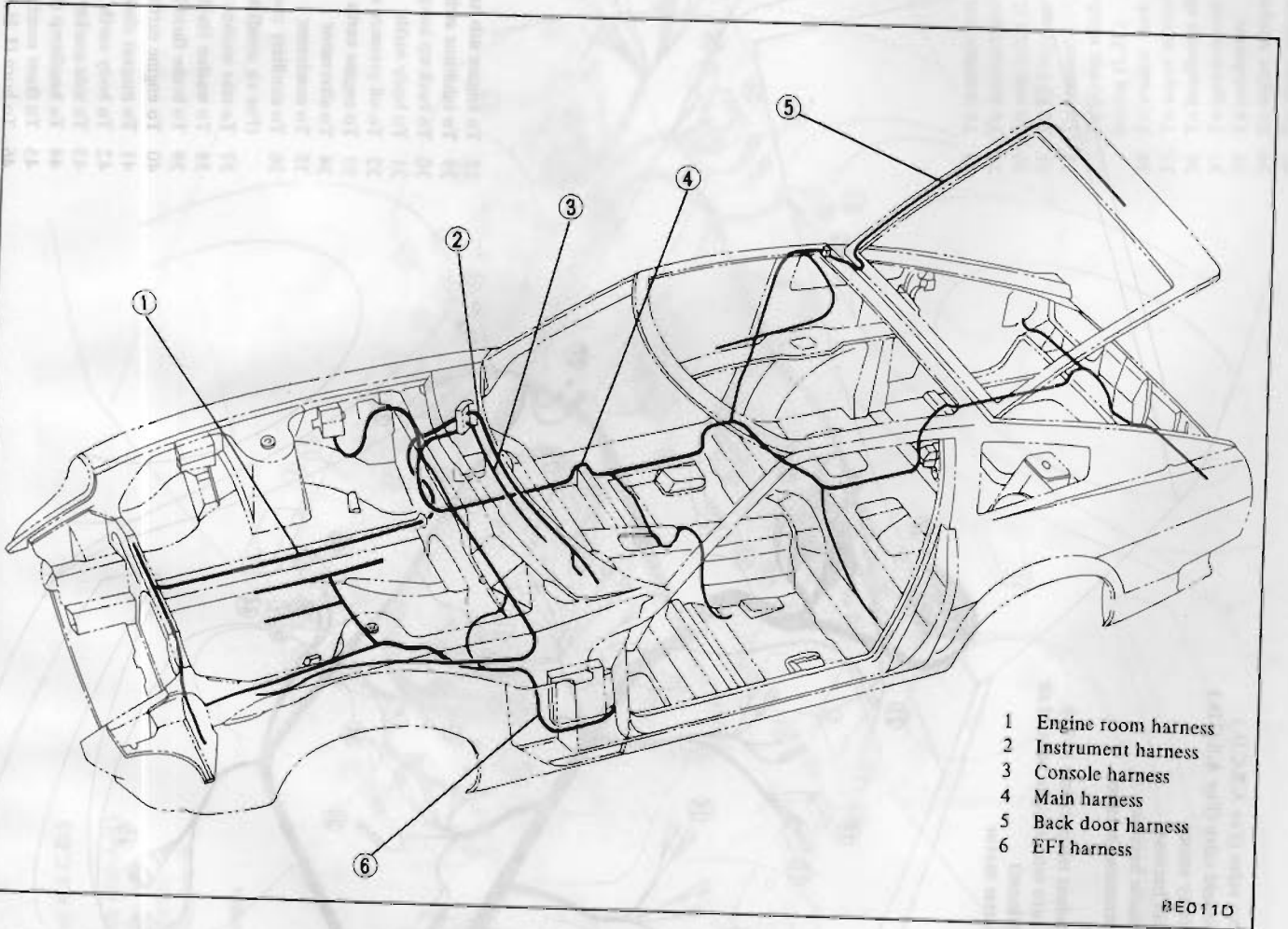
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.



WIRING

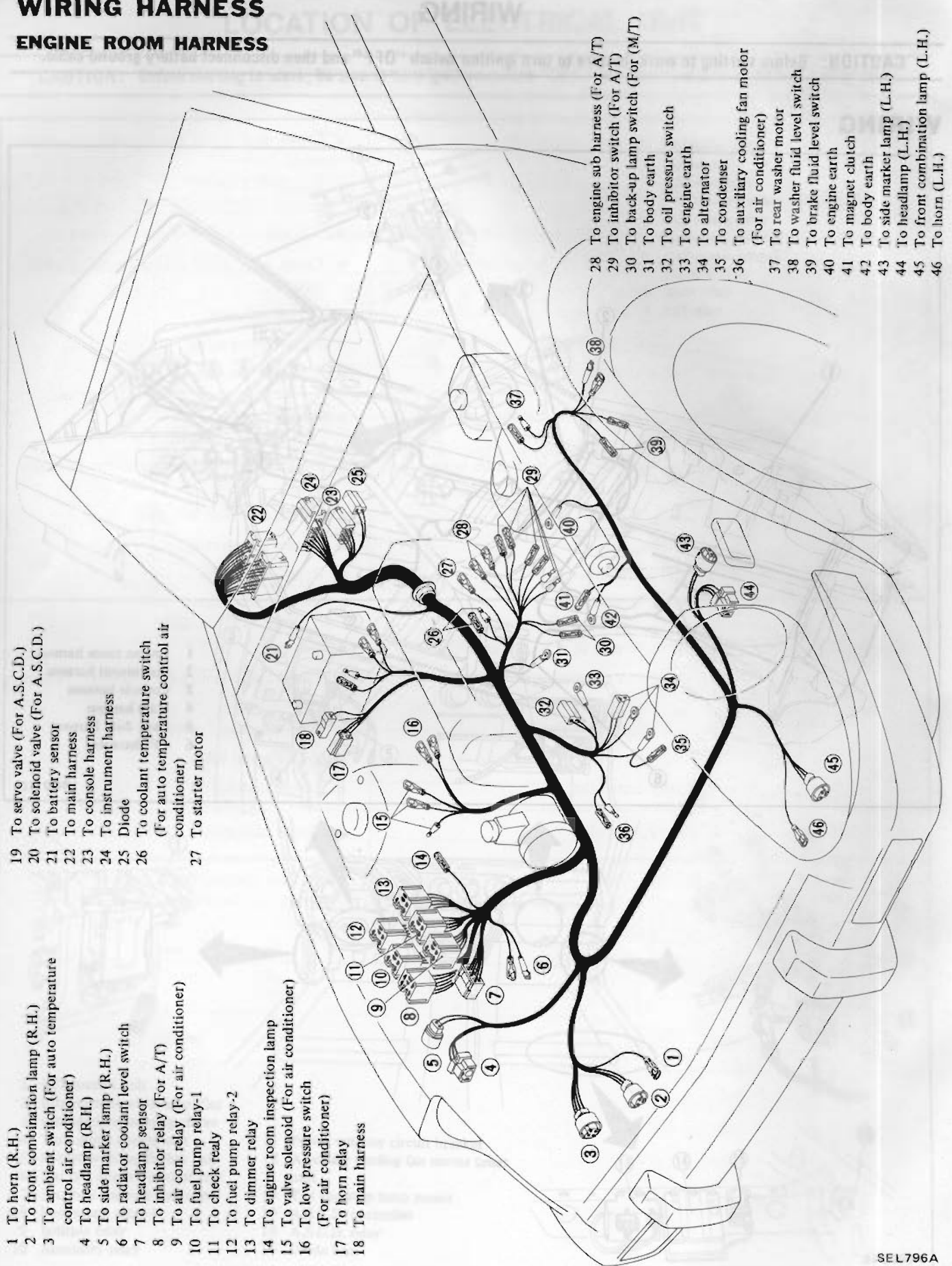
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

WIRING



WIRING HARNESS

ENGINE ROOM HARNESS



- 1 To horn (R.H.)
- 2 To front combination lamp (R.H.)
- 3 To ambient switch (For auto temperature control air conditioner)
- 4 To headlamp (R.H.)
- 5 To side marker lamp (R.H.)
- 6 To radiator coolant level switch
- 7 To headlamp sensor
- 8 To inhibitor relay (For A/T)
- 9 To air con. relay (For air conditioner)
- 10 To fuel pump relay-1
- 11 To check relay
- 12 To fuel pump relay-2
- 13 To dimmer relay
- 14 To engine room inspection lamp
- 15 To valve solenoid (For air conditioner)
- 16 To low pressure switch (For air conditioner)
- 17 To horn relay
- 18 To main harness

- 19 To servo valve (For A.S.C.D.)
- 20 To solenoid valve (For A.S.C.D.)
- 21 To battery sensor
- 22 To main harness
- 23 To console harness
- 24 To instrument harness
- 25 Diode
- 26 To coolant temperature switch (For auto temperature control air conditioner)
- 27 To starter motor

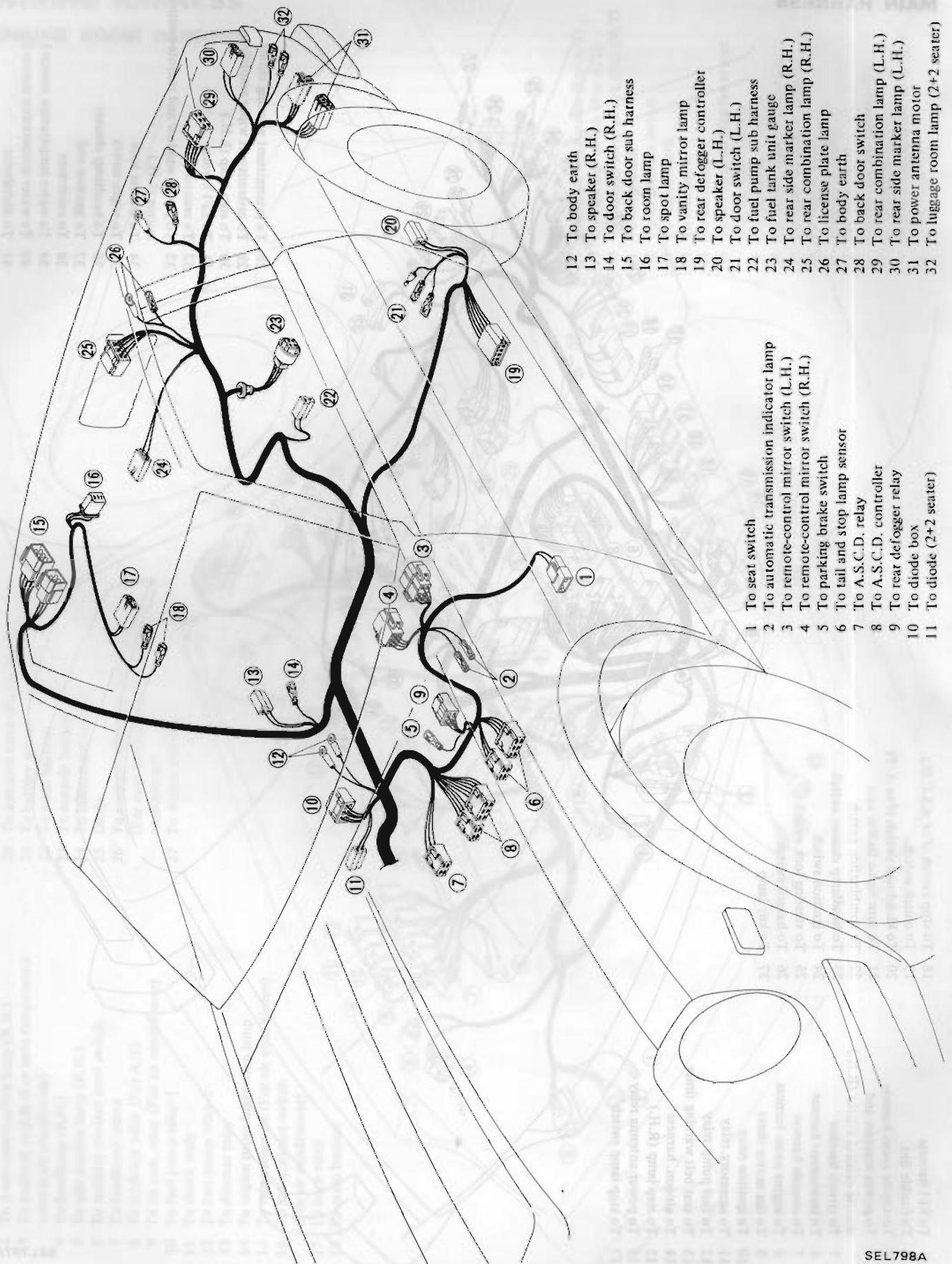
- 28 To engine sub harness (For A/T)
- 29 To inhibitor switch (For A/T)
- 30 To back-up lamp switch (For (M/T)
- 31 To body earth
- 32 To oil pressure switch
- 33 To engine earth
- 34 To alternator
- 35 To condenser
- 36 To auxiliary cooling fan motor (For air conditioner)
- 37 To rear washer motor
- 38 To washer fluid level switch
- 39 To brake fluid level switch
- 40 To engine earth
- 41 To magnet clutch
- 42 To body earth
- 43 To side marker lamp (L.H.)
- 44 To headlamp (L.H.)
- 45 To front combination lamp (L.H.)
- 46 To horn (L.H.)

MAIN HARNESS

- 1 To EFI harness
- 2 To fusible link
- 3 To engine room harness
- 4 To power window and remote-control mirror (R.H.)
- 5 To circuit breaker
- 6 To instrument harness
- 7 To console harness
- 8 To engine room harness
- 9 To fan motor timer
- 10 To ignition relay
- 11 To accessory relay
- 12 To fuel pump relay
- 13 To seat belt warning timer
- 14 To air-con. harness
- 15 To step lamp (R.H.)
- 16 To power antenna relay
- 17 To stop lamp switch
- 18 To stop switch (For A.S.C.D.)
- 19 To clutch switch
- 20 To kickdown switch (For A/T)
- 21 To turn signal flasher unit
- 22 To combination switch
- 23 To headlamp cleaner switch
- 24 To ignition switch
- 25 To steering lock switch
- 26 To hazard switch
- 27 To key lamp



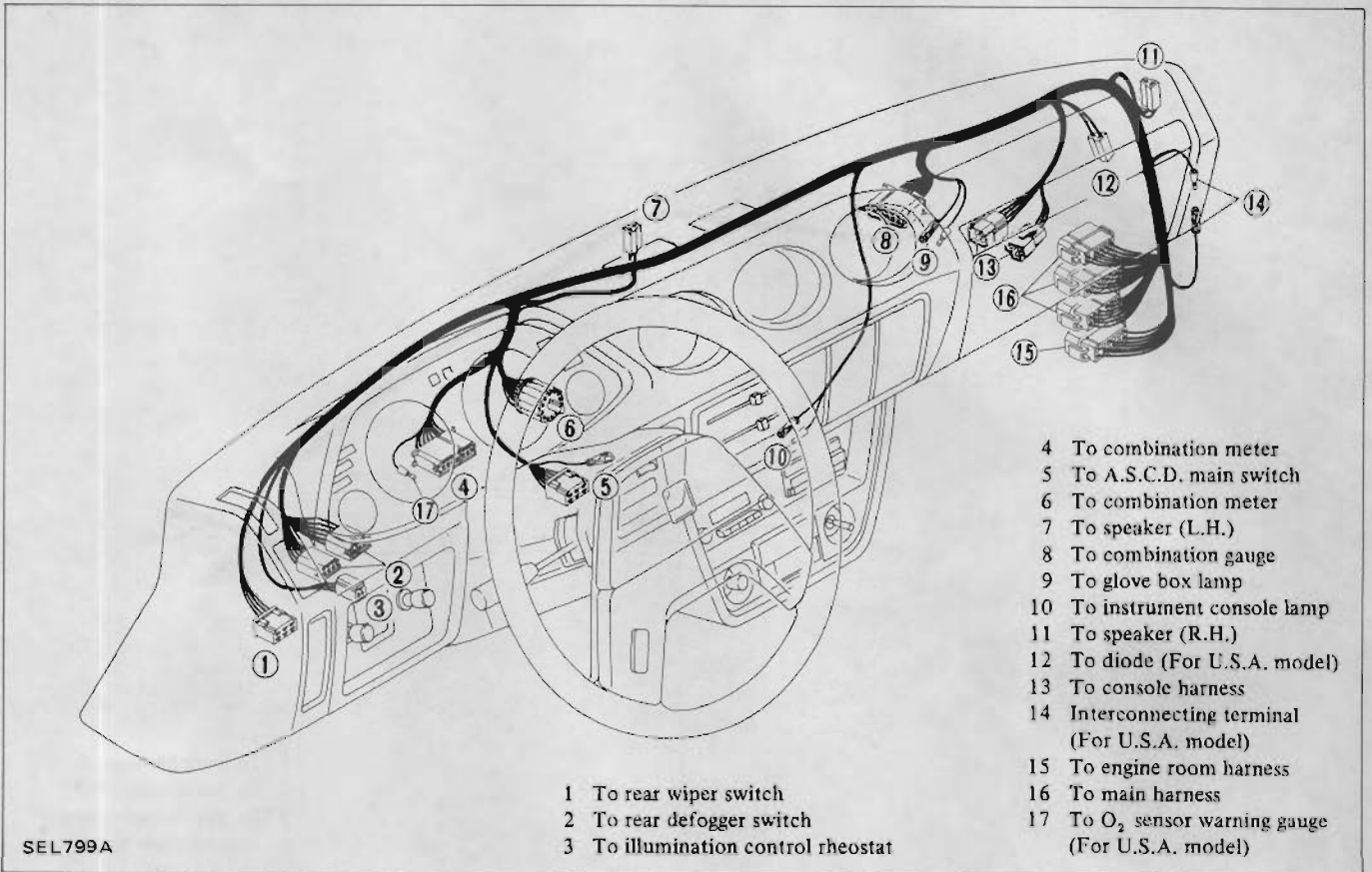
- 28 To intermittent warning chime
- 29 To intermittent wiper amplifier
- 30 To step lamp (L.H.)
- 31 To EFI harness
- 32 To resistor
- 33 To power window and remote-control mirror (L.H.)
- 34 To washer tank
- 35 To wiper motor
- 36 To headlamp cleaner
- 37 To ignition coil
- 38 To condenser
- 39 To water temperature sensor-1
- 40 To water temperature sensor-2
- 41 To distributor



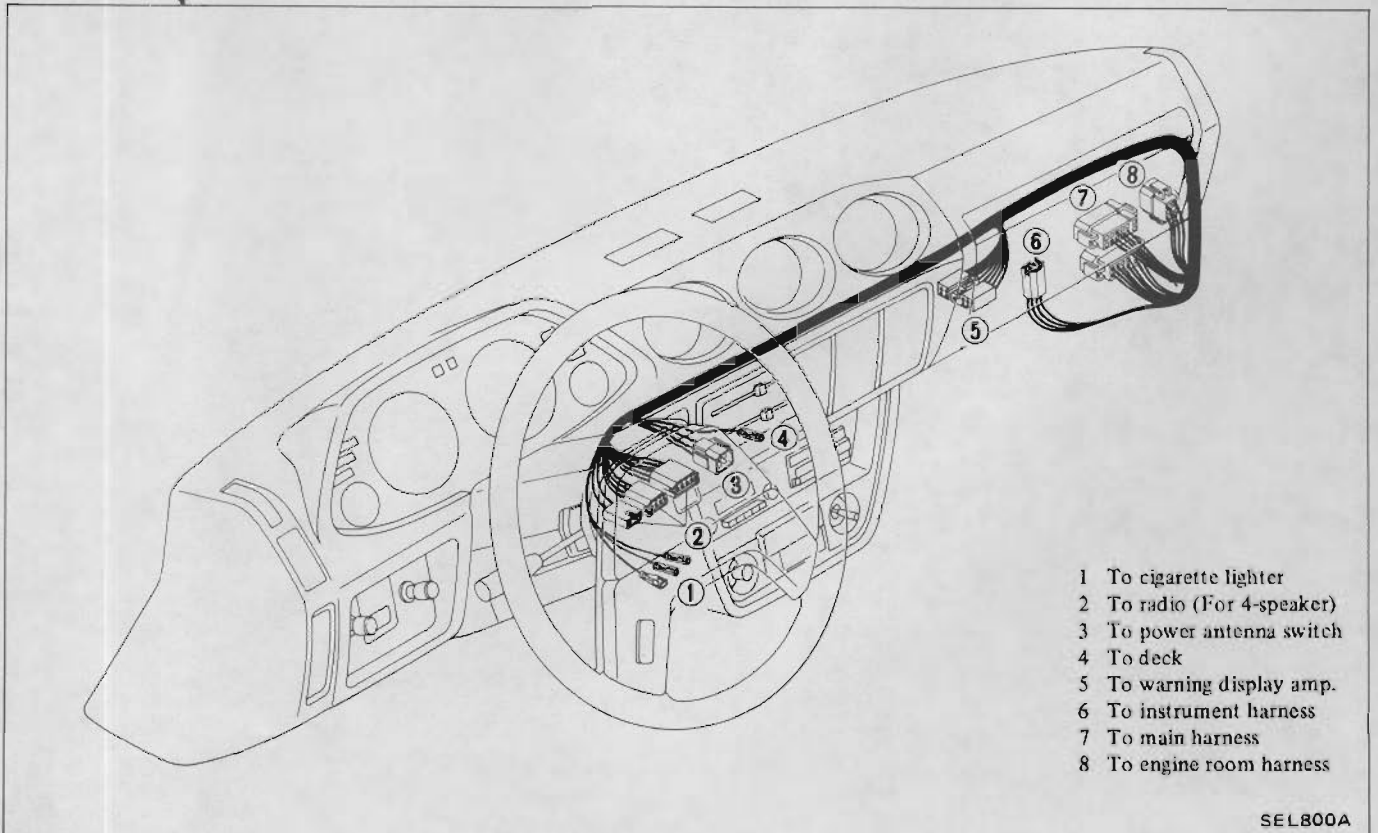
- 1 To seat switch
- 2 To automatic transmission indicator lamp
- 3 To remote-control mirror switch (L.H.)
- 4 To remote-control mirror switch (R.H.)
- 5 To parking brake switch
- 6 To tail and stop lamp sensor
- 7 To A.S.C.D. relay
- 8 To A.S.C.D. controller
- 9 To rear defogger relay
- 10 To diode box
- 11 To diode (2+2 seater)

- 12 To body earth
- 13 To speaker (R.H.)
- 14 To door switch (R.H.)
- 15 To back door sub harness
- 16 To room lamp
- 17 To spot lamp
- 18 To vanity mirror lamp
- 19 To rear defogger controller
- 20 To speaker (L.H.)
- 21 To door switch (L.H.)
- 22 To fuel pump sub harness
- 23 To fuel tank unit gauge
- 24 To rear side marker lamp (R.H.)
- 25 To rear combination lamp (R.H.)
- 26 To license plate lamp
- 27 To body earth
- 28 To back door switch
- 29 To rear combination lamp (L.H.)
- 30 To rear side marker lamp (L.H.)
- 31 To power antenna motor
- 32 To luggage room lamp (2+2 seater)

INSTRUMENT HARNESS



CONSOLE HARNESS



BACK DOOR HARNESS

INSTRUMENT HARNESS

