

SECTION **BF**

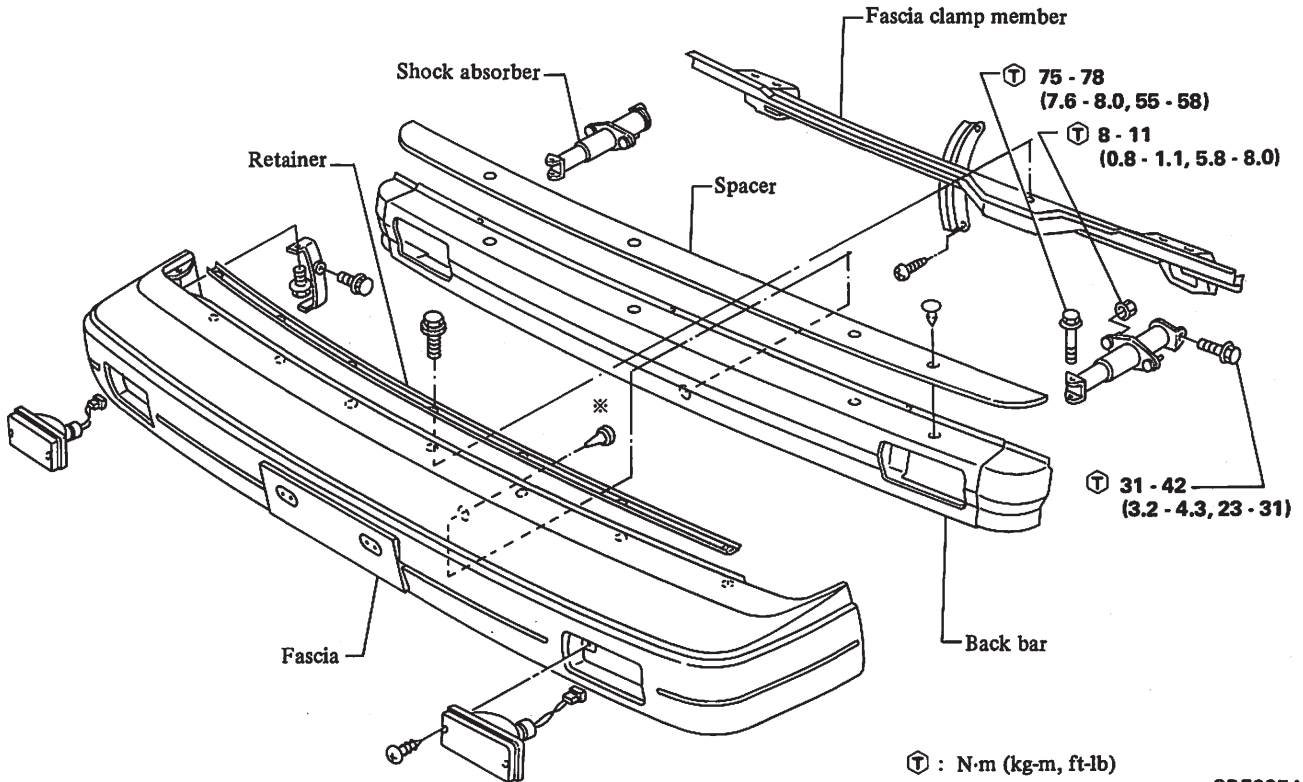
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BODY FRONT END

FRONT BUMPER

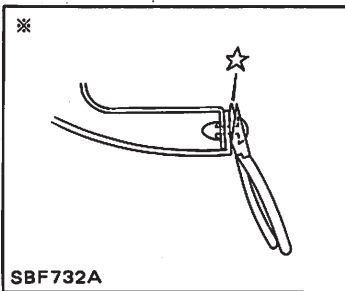
REMOVAL AND INSTALLATION



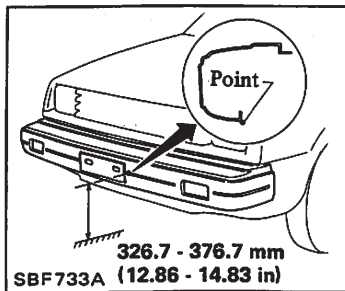
Ⓙ : N·m (kg·m, ft·lb)

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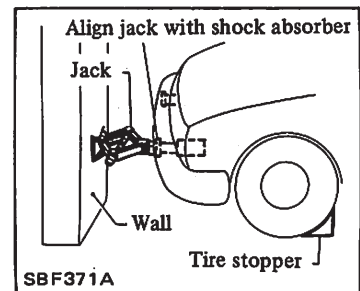
DISASSEMBLY



BUMPER HEIGHT



SHOCK ABSORBER



Shock absorber

1. Check shock absorber for oil leakage, cracks or deformation.
2. Function of shock absorber;
 - (1) Place vehicle in front of a wall. Apply parking brake and place tire stoppers securely.
 - (2) Place a jack between bumper and wall; jack is positioned squarely with

bumper directly in line with shock absorber to be checked.

- (3) Apply pressure to compress shock absorber at least 10.0 mm (0.394 in).

Use a jack with capacity of more than 600 kg (1,323 lb).

- (4) Make sure bumper returns to its original position when jack is retracted. Replace if necessary.

CAUTION:

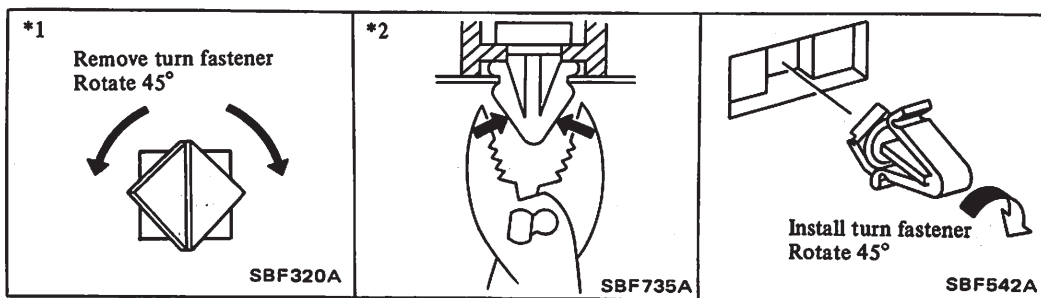
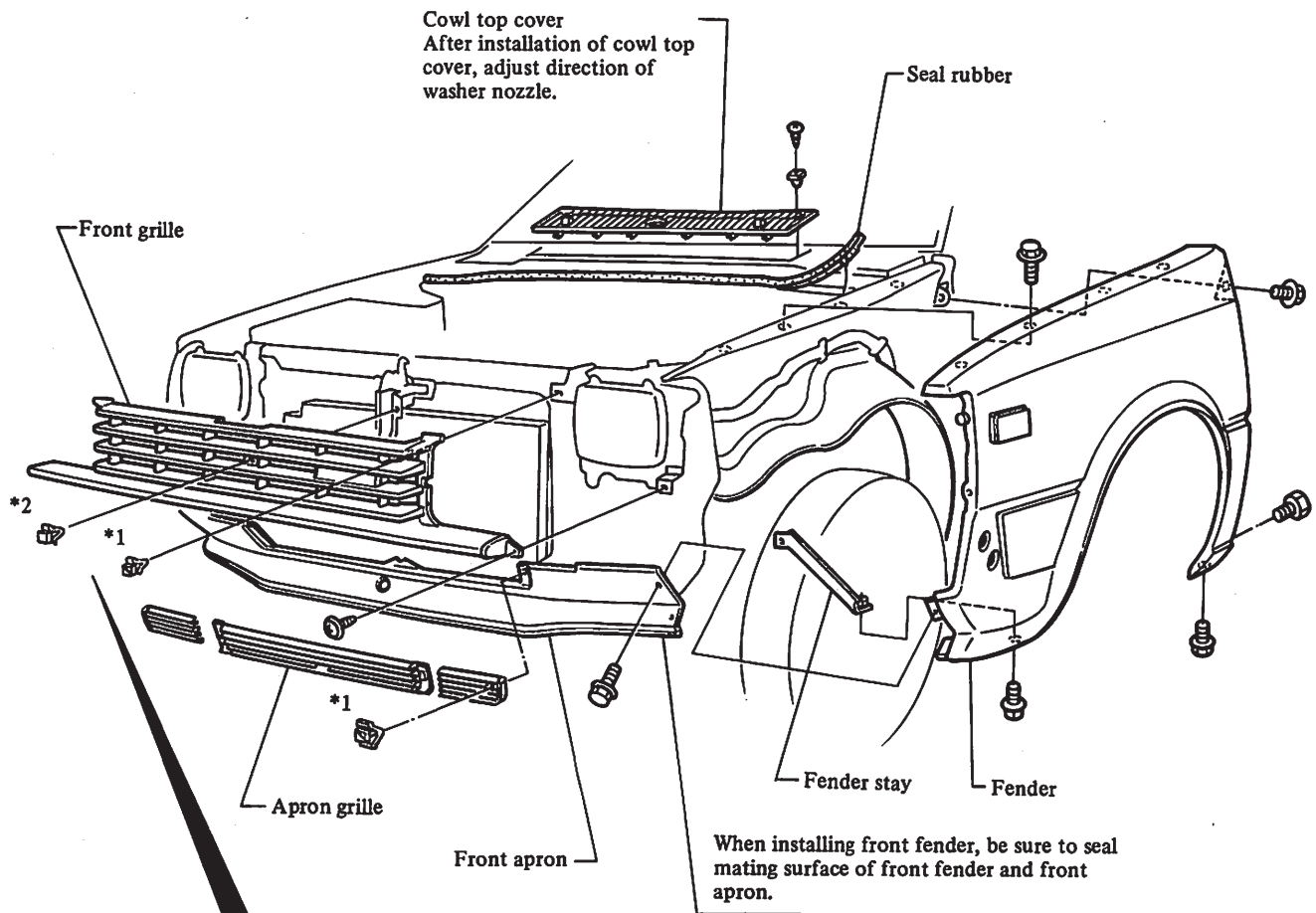
It is not recommended to confirm proper installation by driving into walls or other barriers as this could cause personal injury or damage to the vehicle.

When replacing shock absorbers, make sure they are of the same type and rating, and manufactured by the same maker.

BODY FRONT END

FRONT FENDER

REMOVAL AND INSTALLATION



CAUTION:

- Grille is made of plastic, so do not use excessive force.
- Take care to keep oil away from grille.

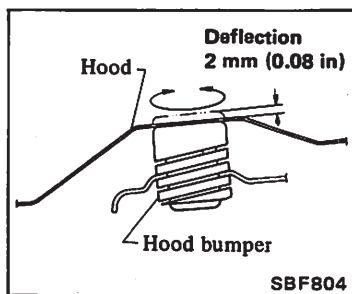
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BODY FRONT END

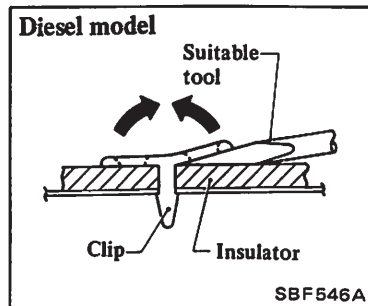
HOOD

REMOVAL AND INSTALLATION

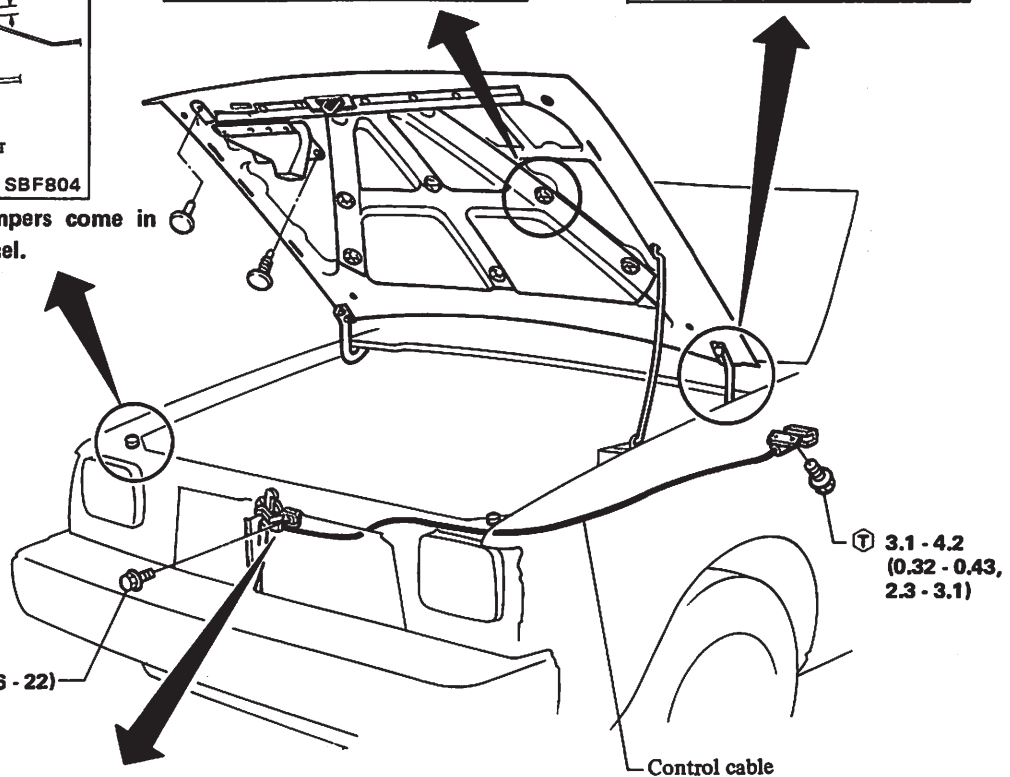
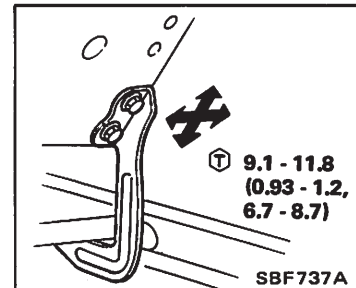
When removing and installing hood, place a cloth or other padding on hood corners to avoid scratching vehicle body.



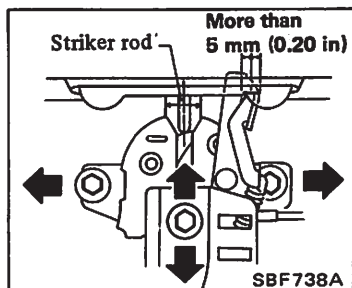
Ensure that hood bumpers come in contact with mating panel.



ADJUSTMENT



Hood lock
 T 22 - 29 (2.2 - 3.0, 16 - 22)



- When installing hood lock, ensure that striker rod is positioned in the center of lock slit. Then, temporarily tighten the lock.
- With the lock temporarily tightened, properly adjust hood height and securely tighten the lock.
- Ensure that safety catch engages at least 5 mm (0.20 in) with mating part.
- Check hood lock control operation. Apply a coat of grease to hood lock's engaging mechanism.

- Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood.

T : N·m (kg·m, ft·lb)

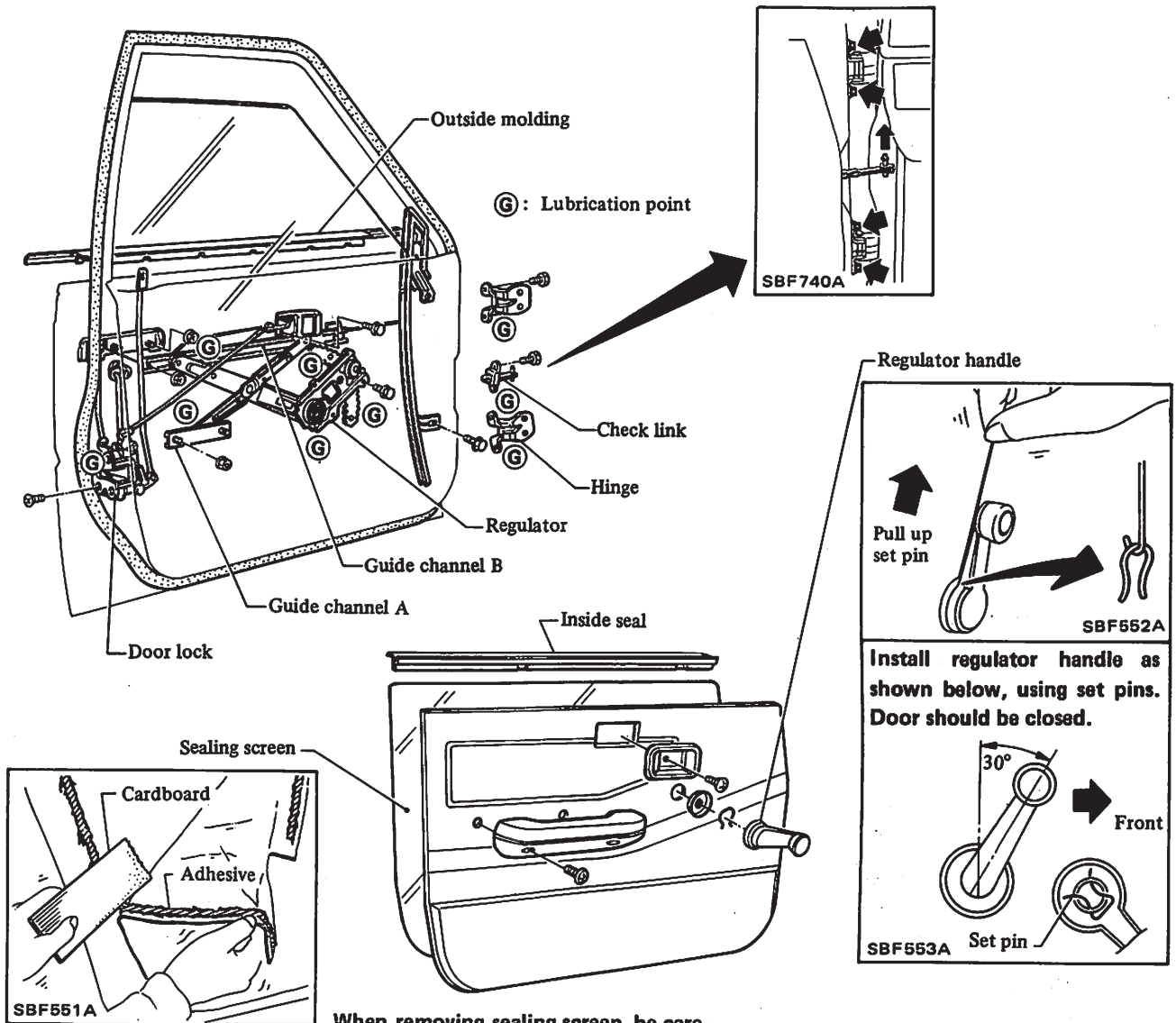
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DOOR

DOOR

FRONT DOOR

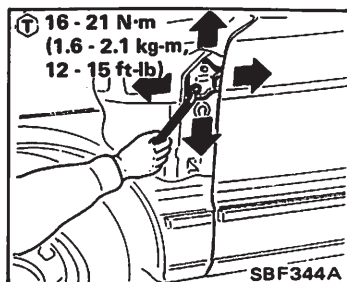
REMOVAL AND INSTALLATION



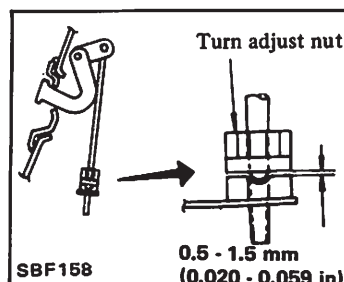
When removing sealing screen, be careful not to allow it to come in contact with adjacent parts.

ADJUSTMENT

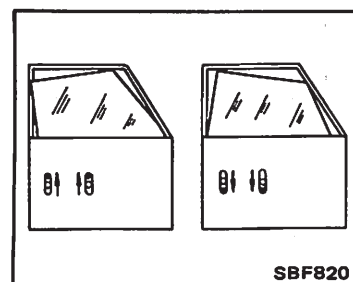
Door assembly



Outside handle



Door glass



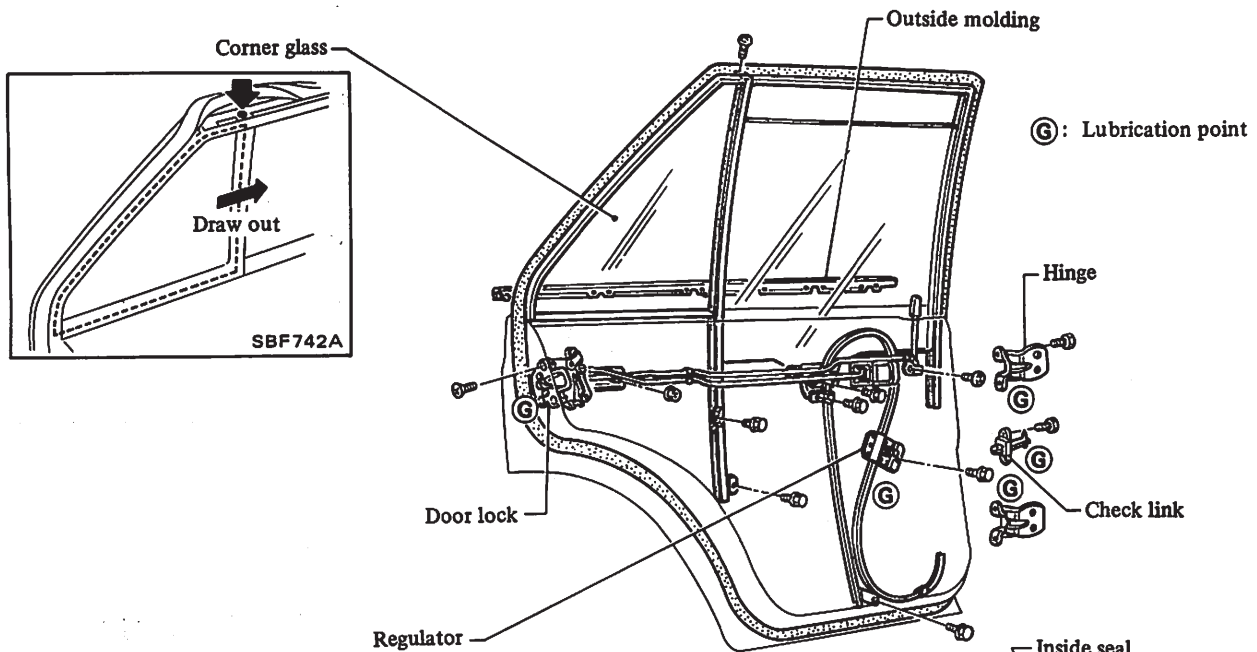
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DOOR

REAR DOOR

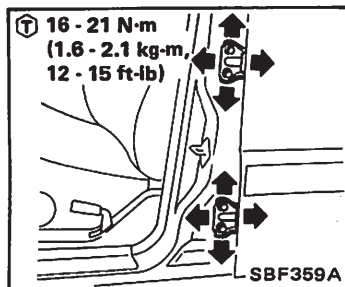
REMOVAL AND INSTALLATION

Removal and installation procedures are basically the same as those for front door.

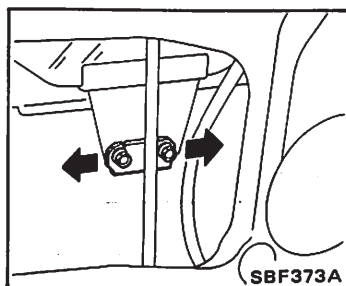


ADJUSTMENT

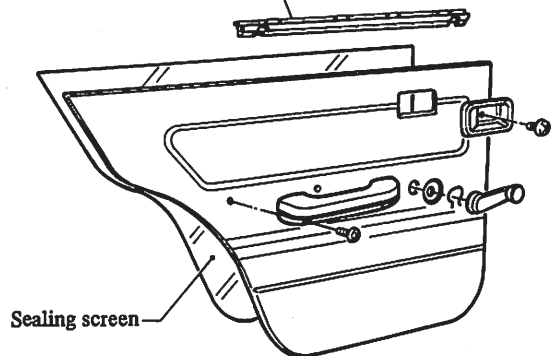
Door assembly



Door glass



Outside handle
Refer to front door.

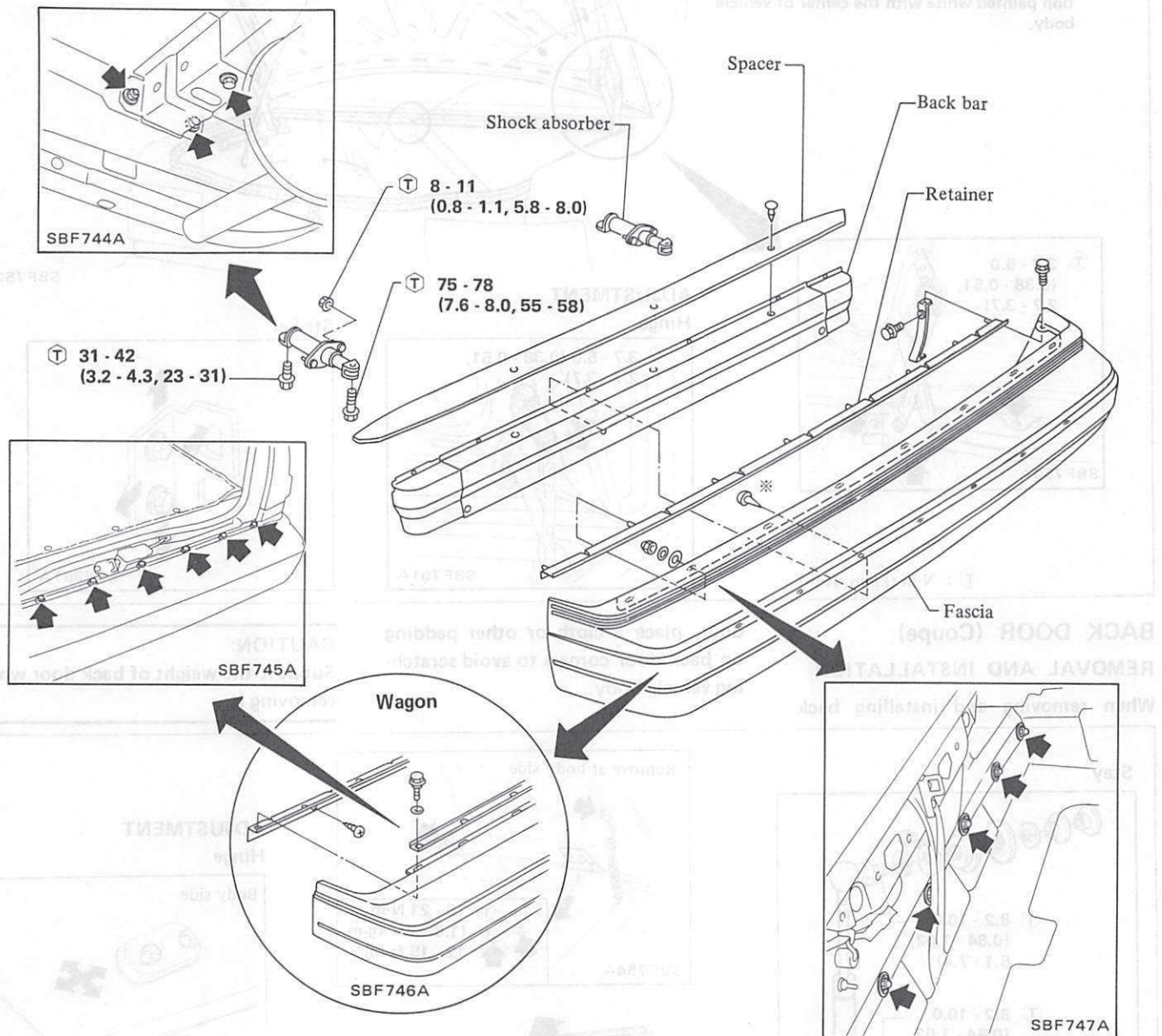


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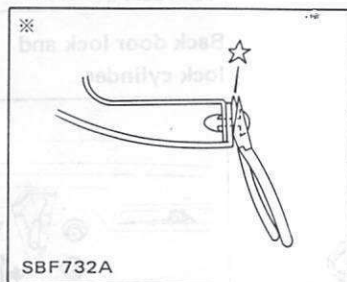
BODY REAR END

REAR BUMPER

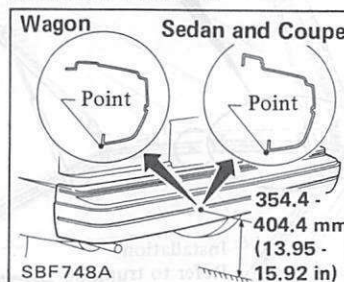
REMOVAL AND INSTALLATION



DISASSEMBLY



BUMPER HEIGHT



SHOCK ABSORBER

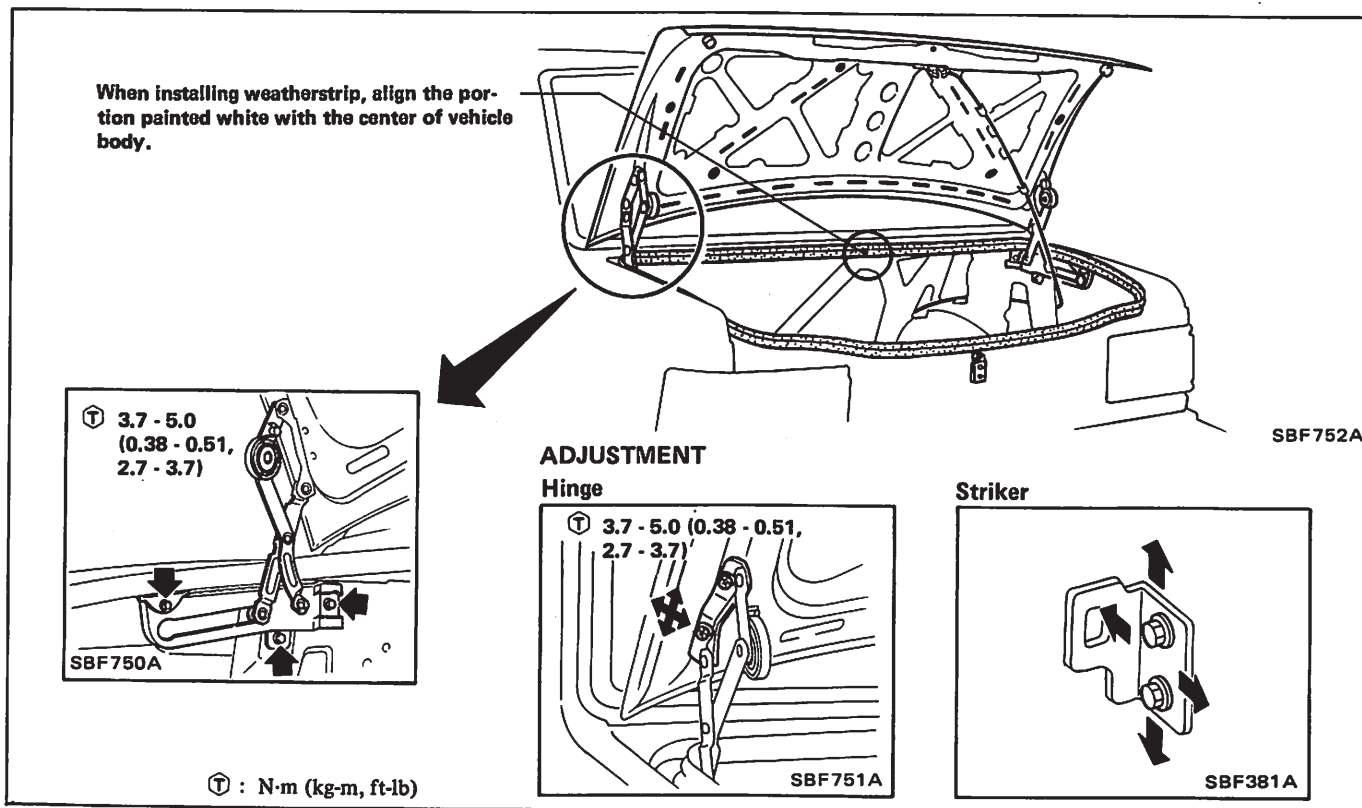
- Refer to front bumper.

BODY REAR END

TRUNK LID

REMOVAL AND INSTALLATION

When removing and installing trunk lid, place a cloth or other padding on trunk lid corners to avoid scratching vehicle body.



BACK DOOR (Coupe)

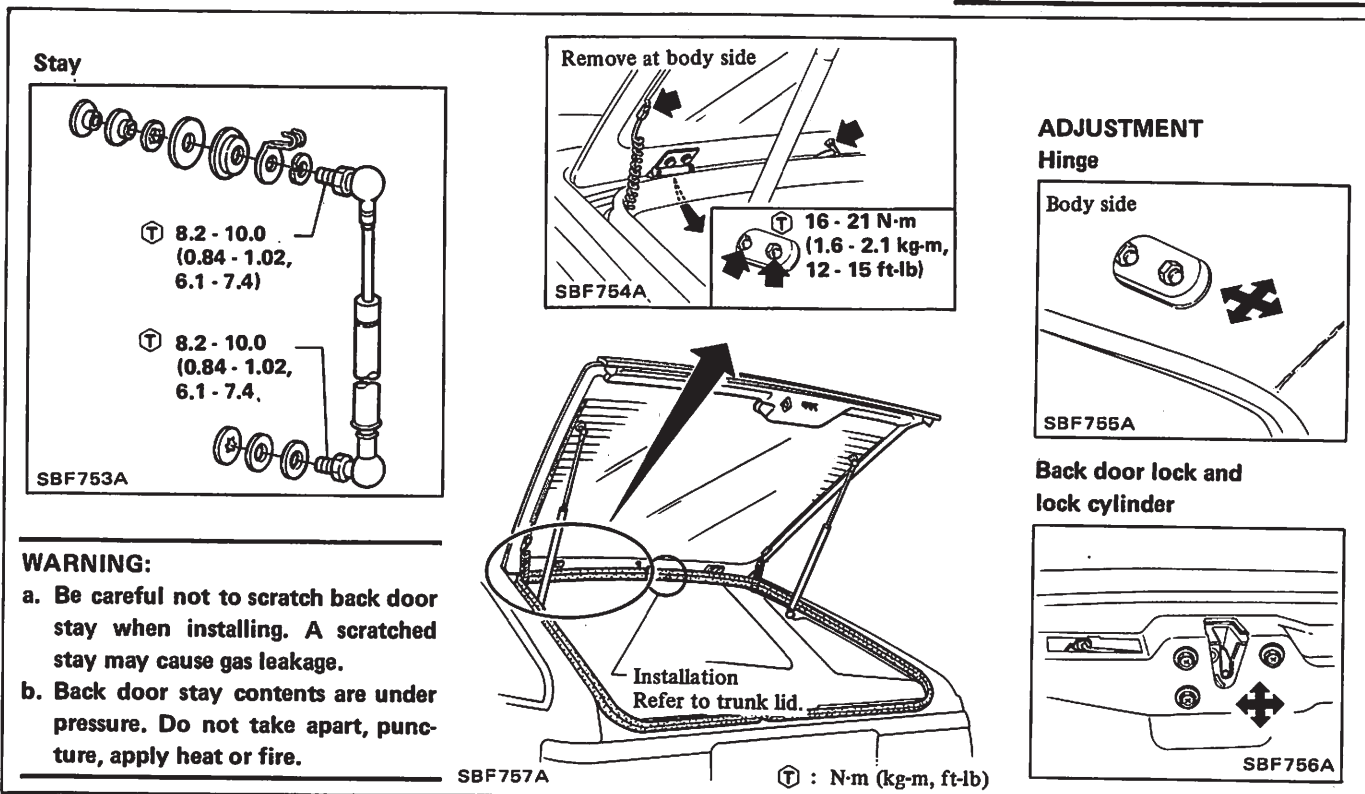
REMOVAL AND INSTALLATION

When removing and installing back

door, place a cloth or other padding on back door corners to avoid scratching vehicle body.

CAUTION:

Support the weight of back door when removing it.



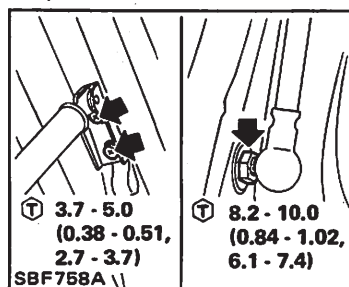
BODY REAR END

BACK DOOR (Wagon)

REMOVAL AND INSTALLATION

When removing and installing back door, place a cloth or other padding on back door corners to avoid scratching vehicle body.

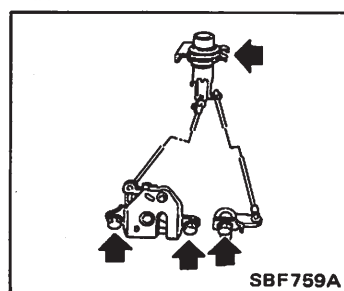
Stay



WARNING:

- Be careful not to scratch back door stay when installing. A scratched stay may cause gas leakage.
- Back door stay contents are under pressure. Do not take apart, puncture, apply heat or fire.

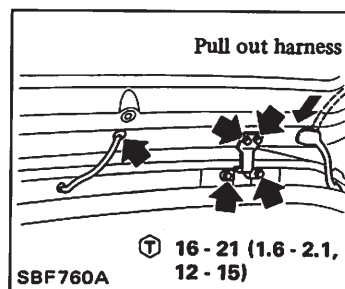
Black door lock



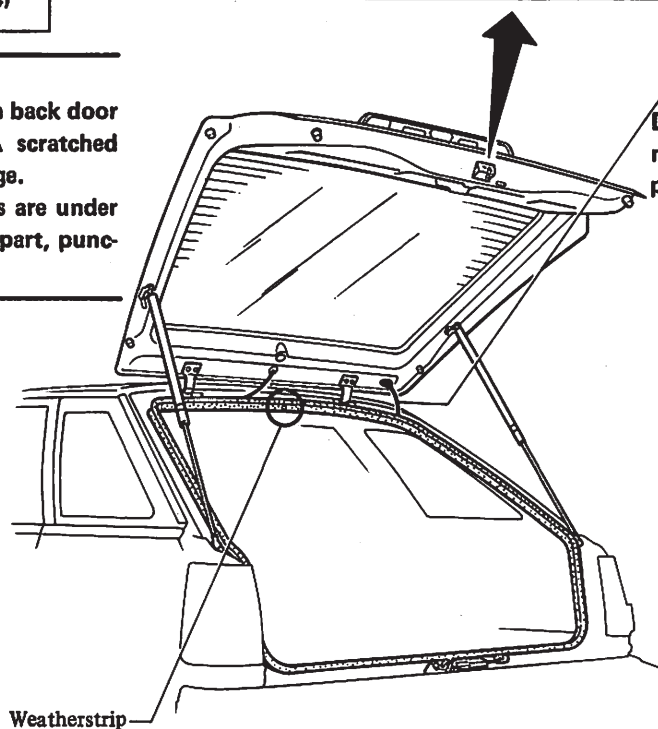
Harness

Disconnect back door harness connectors, tie free ends with string and pull out of back door side.

Pull out harness



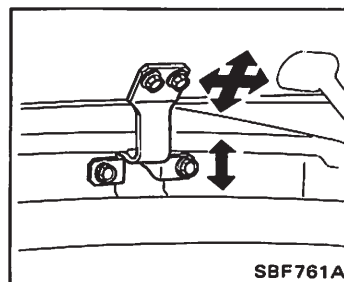
Ⓙ : N-m (kg-m, ft-lb)



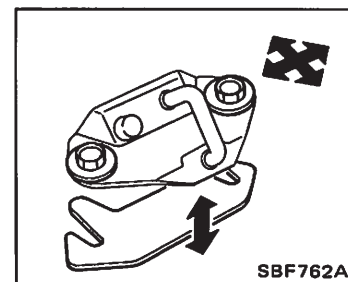
When installing weatherstrip, align white paint indicated with the center of vehicle body.

ADJUSTMENT

Back door



Striker



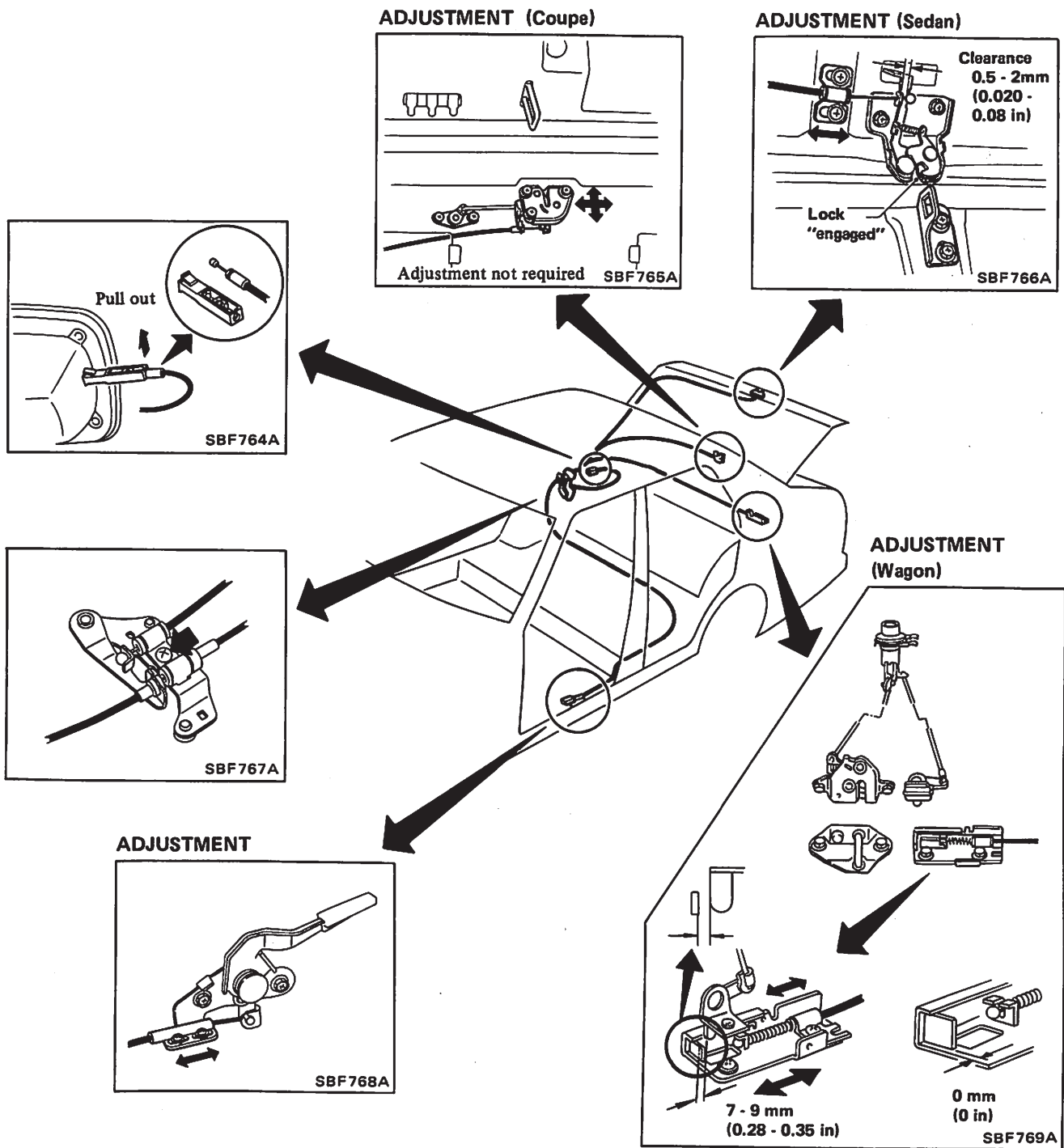
Back door lock does not need adjustment.

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BODY REAR END

TRUNK LID/BACK DOOR OPENER AND FUEL FILLER LID OPENER REMOVAL AND INSTALLATION

- Install cable without bending it forcibly.
- After installation, make sure that trunk lid, back door and fuel filler lid open smoothly.



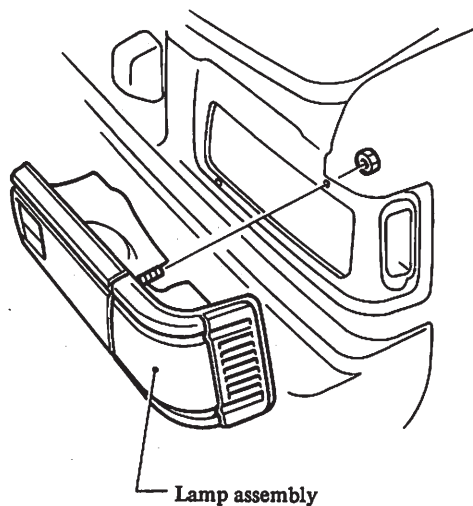
SBF770A

BODY REAR END

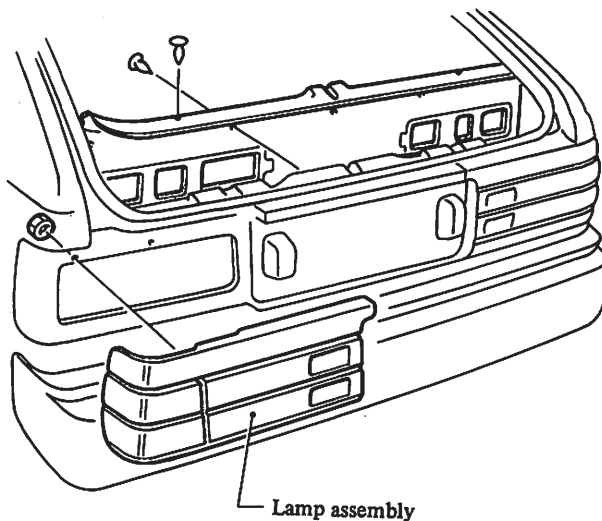
REAR COMBINATION LAMP

REMOVAL AND INSTALLATION (Sedan and Coupe)

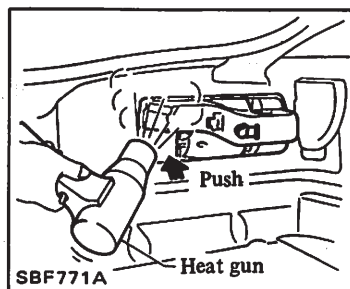
Sedan



Coupe

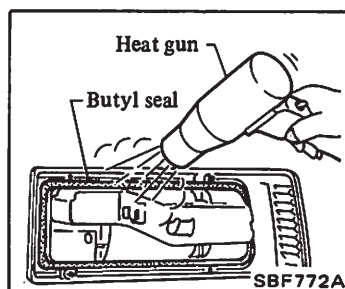


Removal



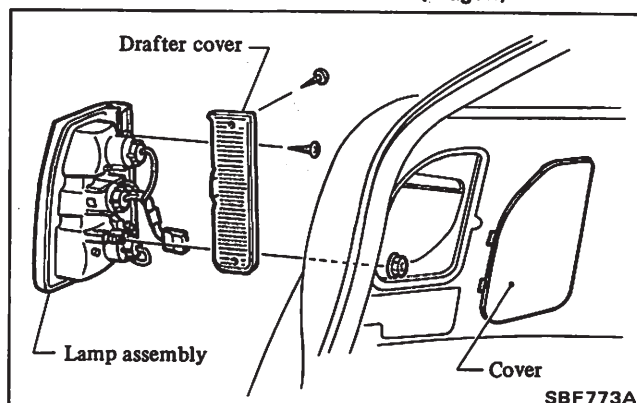
- Warm up lamp assembly area to a temperature of a little below 60°C (140°F).

Installation



- Warm up lamp assembly area to a temperature of a little below 60°C (140°F).
- Apply butyl seal evenly as it tends to become thin in the corners.

REMOVAL AND INSTALLATION (Wagon)

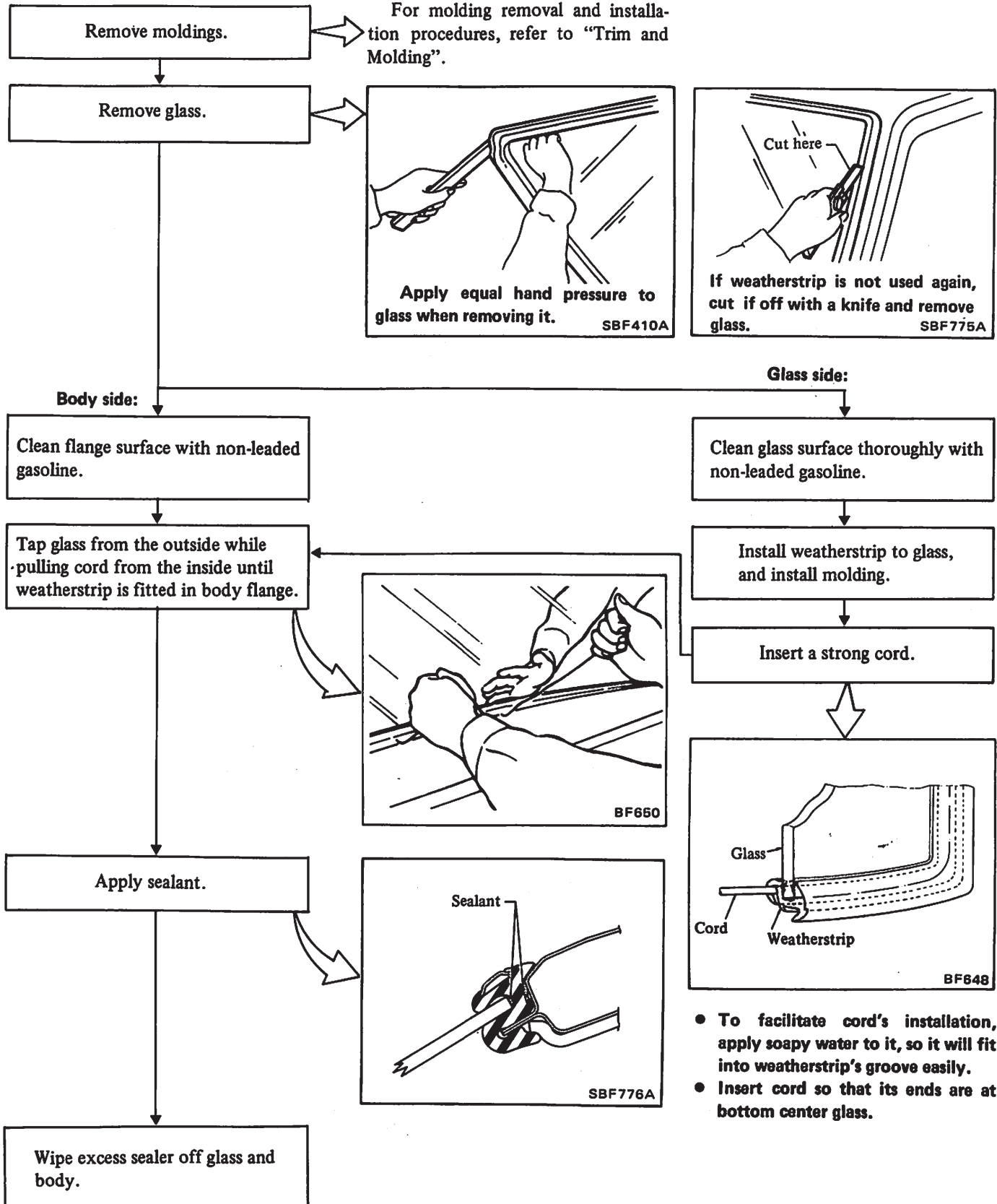


SBF774A

WINDSHIELD AND WINDOWS

WINDSHIELD

REMOVAL AND INSTALLATION



WINDSHIELD AND WINDOWS

REAR WINDOW (Sedan) REMOVAL AND INSTALLATION

Follow the same procedures as for Windshield.

BACK DOOR WINDOW (Coupe) REMOVAL AND INSTALLATION

Back door window glass cannot be dis-

assembled. Replace as a glass assembly, if necessary.

BACK DOOR WINDOW (Wagon) REMOVAL AND INSTALLATION

A pre-mixed, one-part sealant to cement window glass to window opening is available.

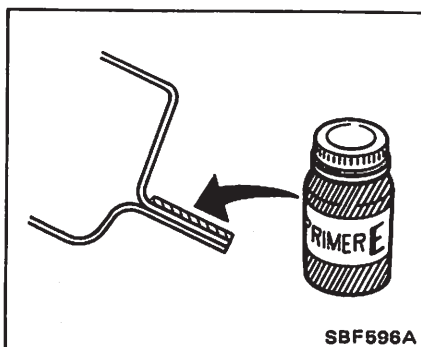
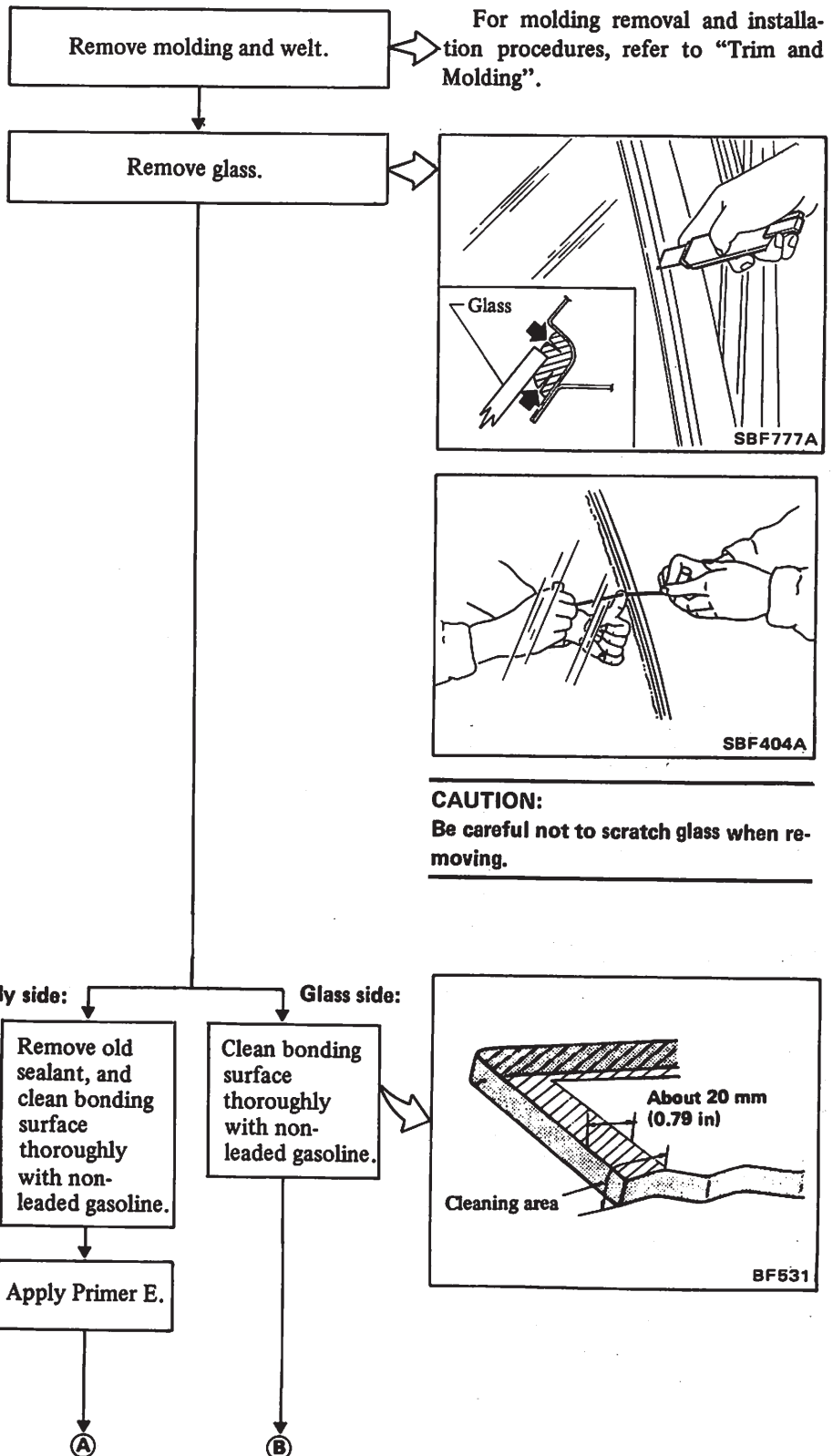
After using this sealant, it is highly recommended that the vehicle should remain stationary for about 24 hours so that the sealant can cure well.

CAUTION:

- Use Genuine Nissan Sealant Kit "72891 U2025" or equivalent. Sealant kit consists of Primer-A, Primer-E, caution label and sealant which is made from silicone. Using this kit, proceed to operations described in removal and installation.
- It is not recommended to use the sealant passed more than 12 months from the production date. Production date is shown on the cartridge.
- Open cartridge only at the time of use.
- Keep Primers and sealant in a cool, dry place. Ideally, sealant should be stored in a refrigerator.

WARNING:

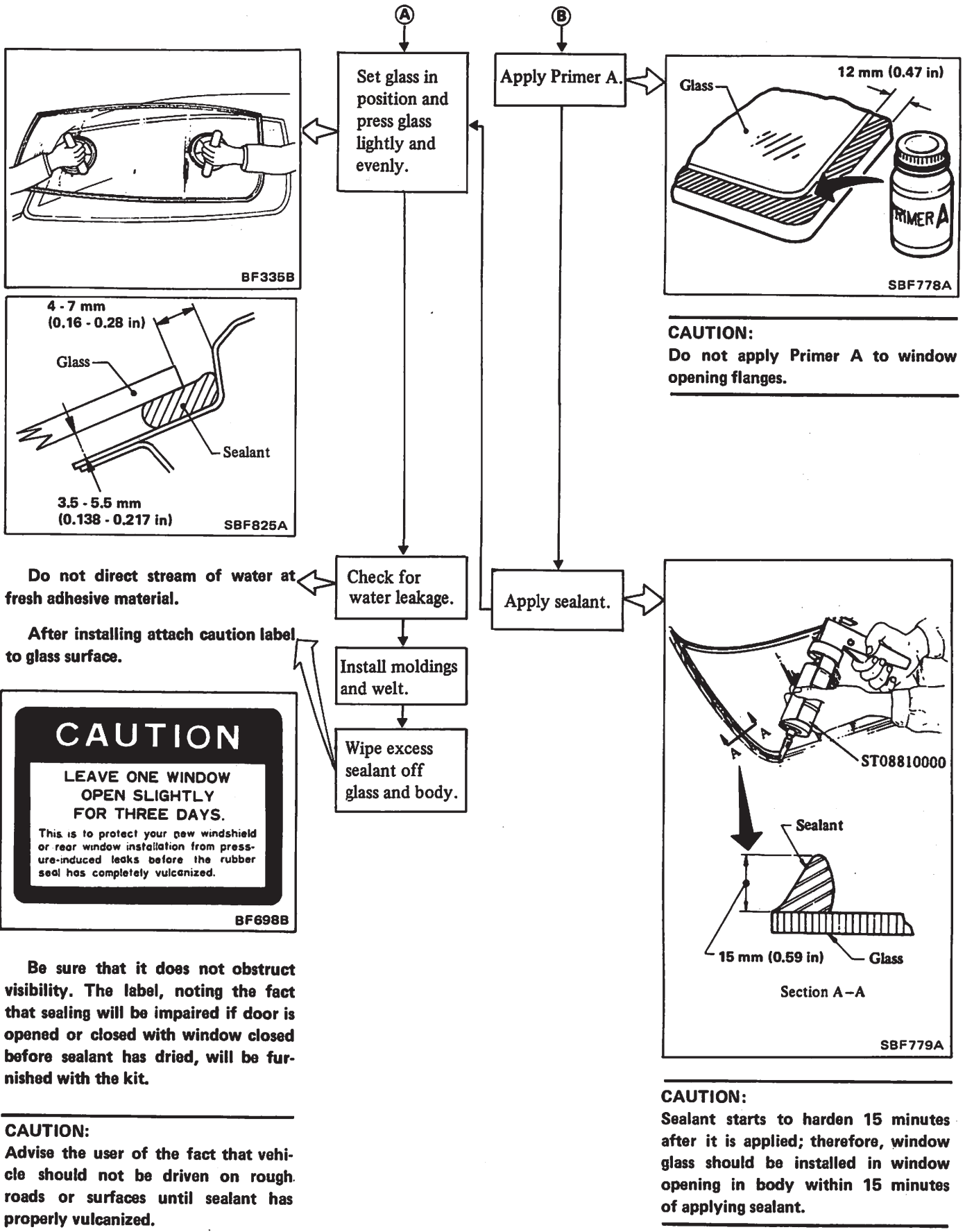
Keep heat or open flames away as Primers are flammable.



CAUTION:

Allow Primers to dry for 10 to 15 minutes before proceeding to the next step.

WINDSHIELD AND WINDOWS



WINDSHIELD AND WINDOWS

Reference: Period required for sealant to dry to desired hardness.

Unit: days

Relative humidity %	90	50	25
Temperature °C (°F)			
25 (77)	1.5	2.5	6
10 (50)	3	5.3	10
-10 (14)	10	17	34

REPAIRING LEAKS

Leaks can be repaired without removing and reinstalling glass in the following manner:

1. To stop leaks, first remove moldings in area of leak.
2. Mark location of leak.

If water is leaking between sealant and body or between glass and sealant, determine extent of leak by pushing glass outwards.

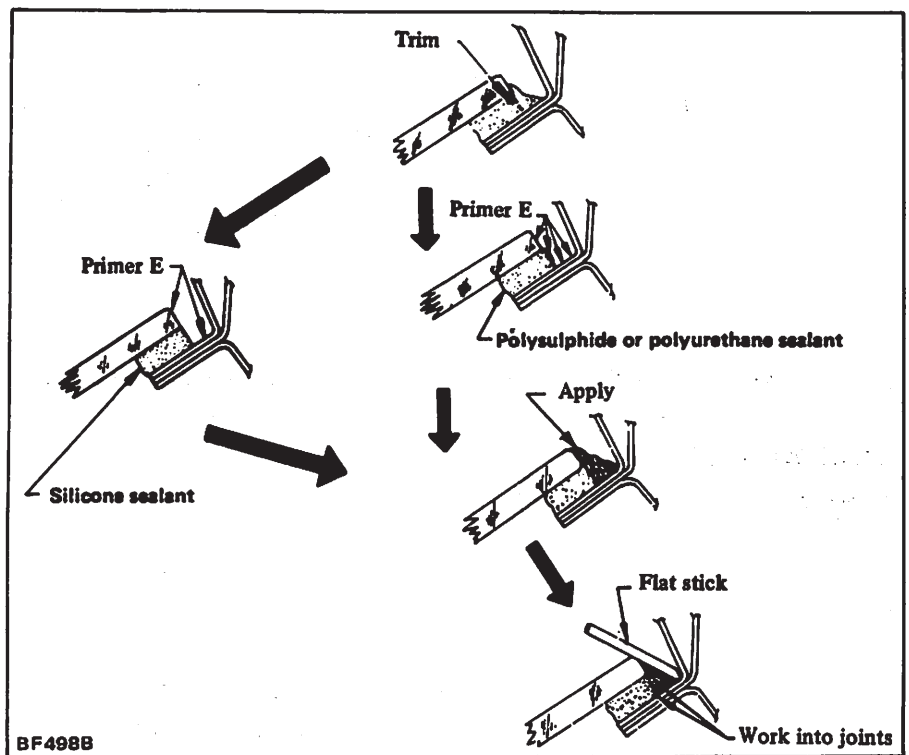
Apply water to leak area while pushing on glass.

Mark extent of leak point.

3. Apply Primer and then sealant to leak points, following procedures shown below.

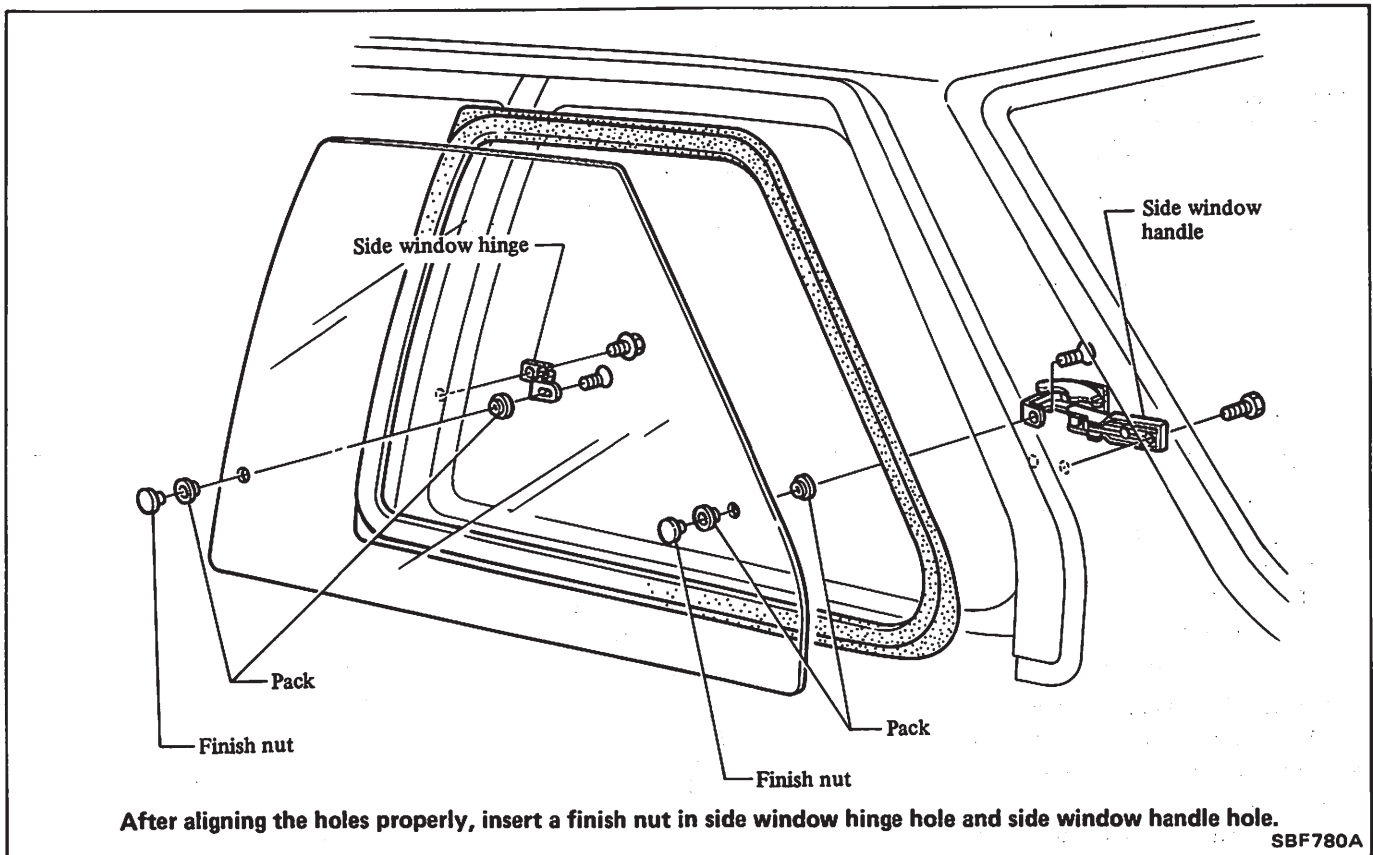
CAUTION:

Do not apply Primer to old silicone sealant.

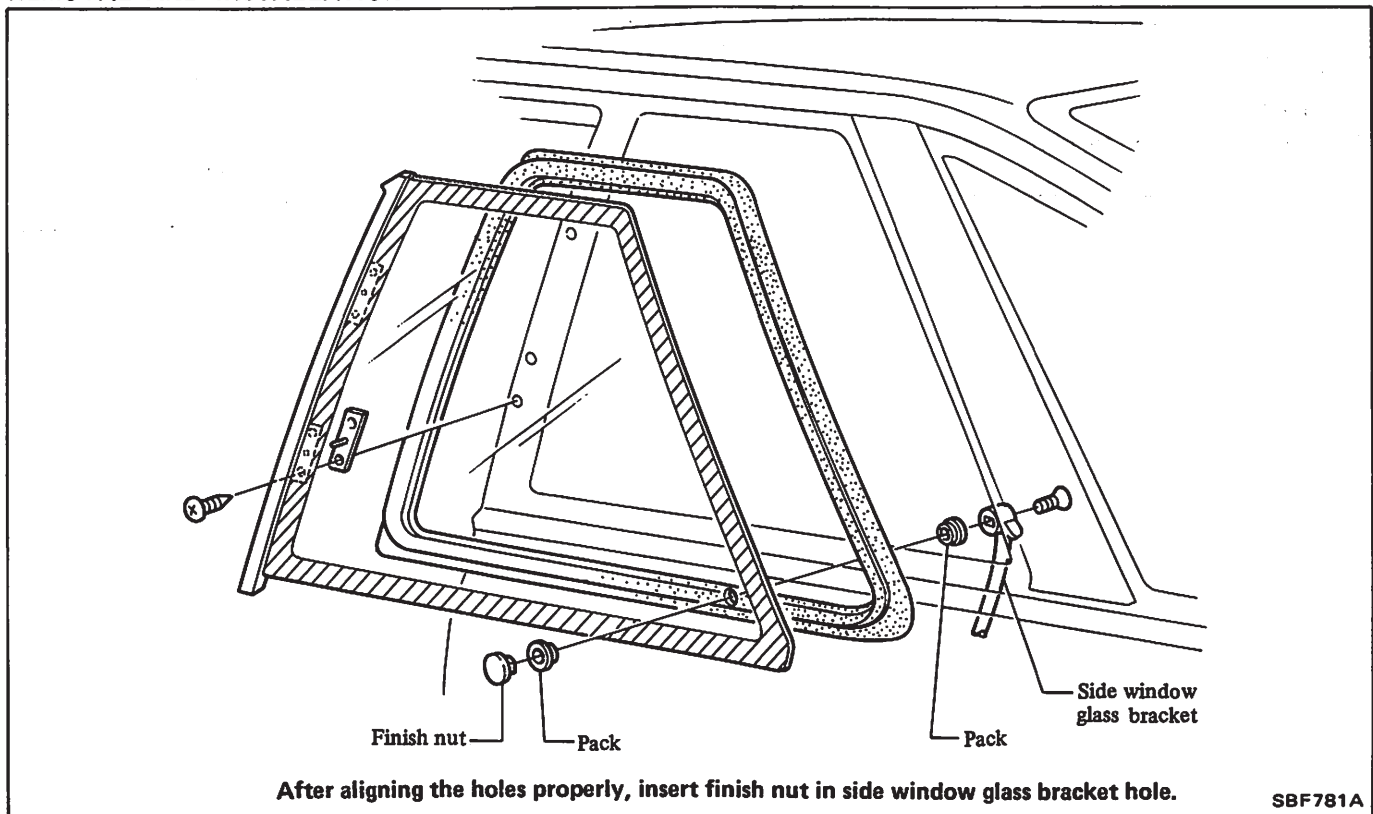


WINDSHIELD AND WINDOWS

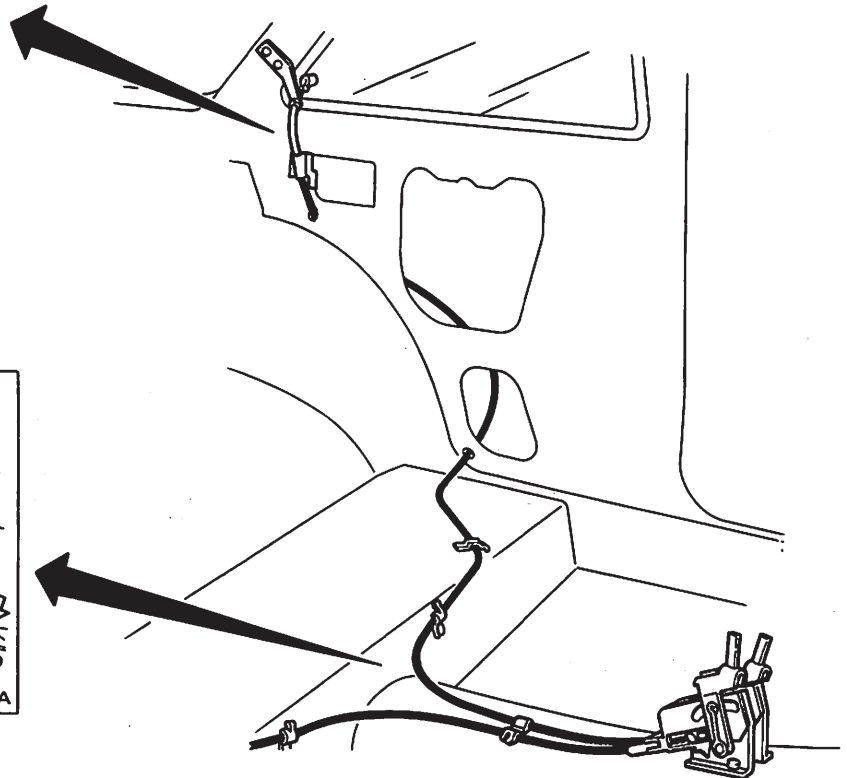
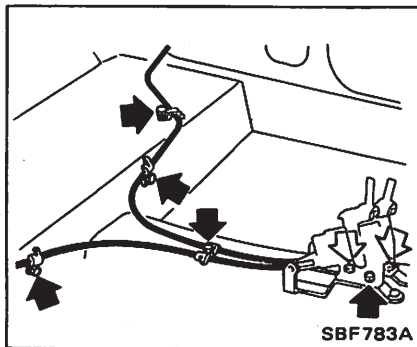
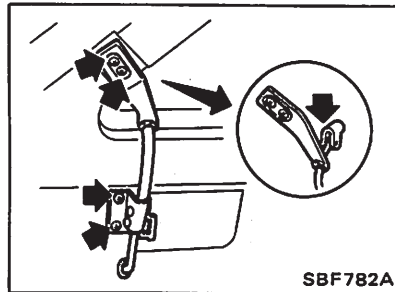
SIDE WINDOW (2-door Sedan) REMOVAL AND INSTALLATION



SIDE WINDOW (Coupe) REMOVAL AND INSTALLATION



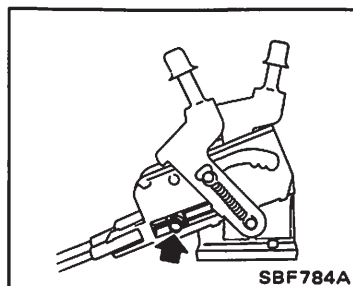
SIDE WINDOW OPENER REMOVAL AND INSTALLATION



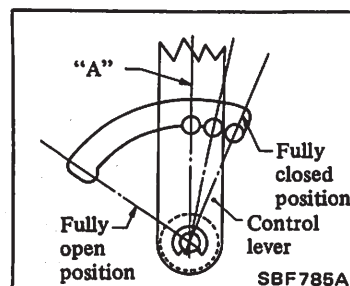
SBF786A

Adjustment

1. Loosen screw securing control wire end.



2. Set control lever to position "A" while side window is lightly touching weatherstrip, then tighten screw to secure control wire end.

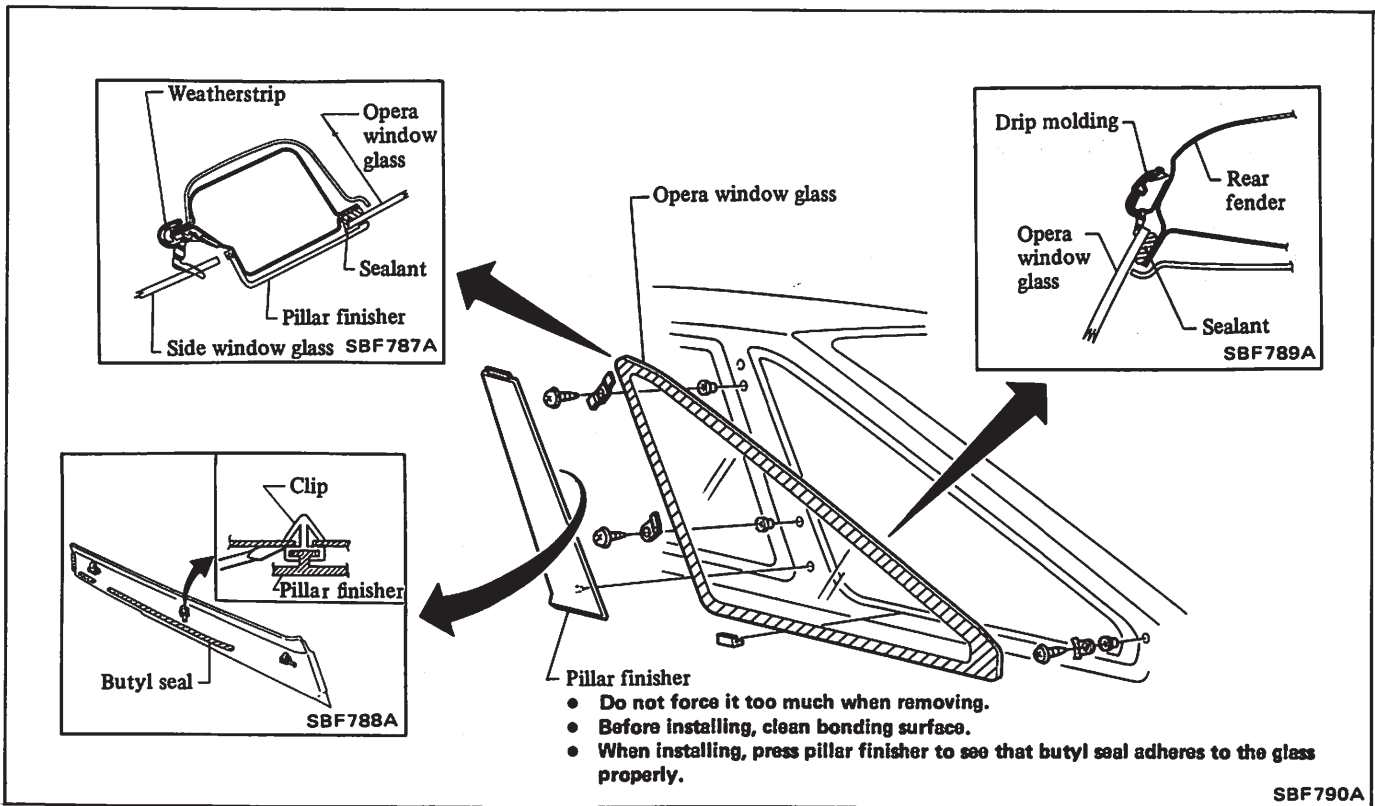


WINDSHIELD AND WINDOWS

OPERA WINDOW (Coupe)

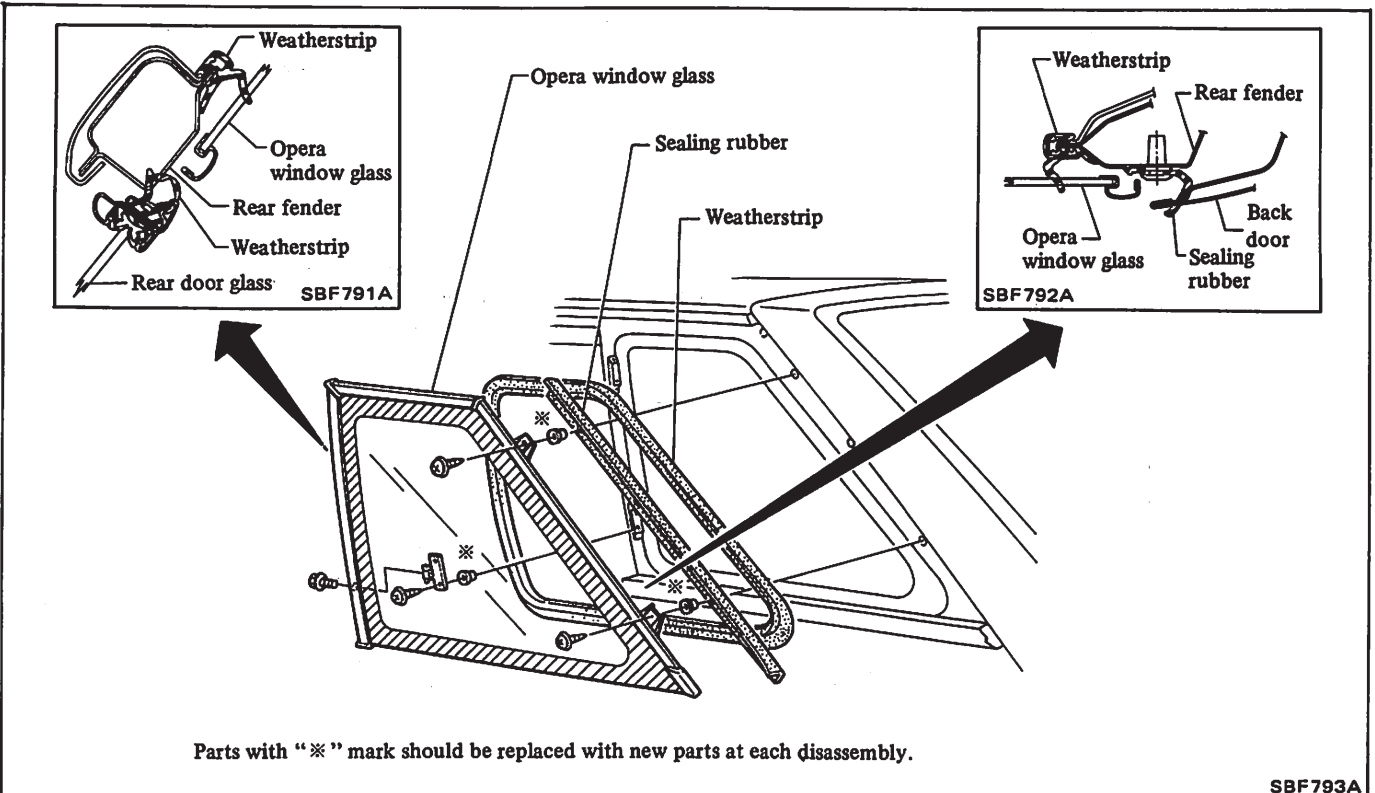
REMOVAL AND INSTALLATION

Remove and install opera window in the same way as back door window (Wagon).



OPERA WINDOW (Wagon)

REMOVAL AND INSTALLATION



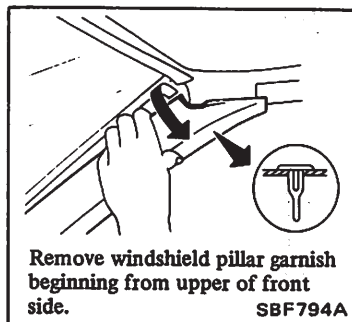
TRIM AND MOLDING

TRIM AND MOLDING

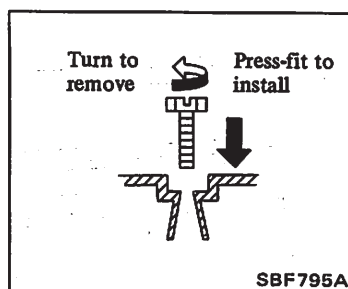
BODY SIDE TRIM

CAUTION: Body side trim is made of plastic so do not use excessive force.

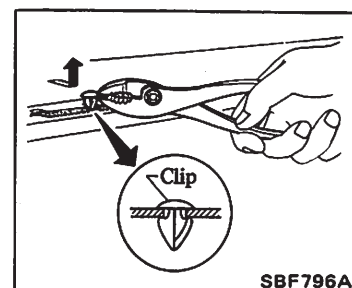
REMOVAL AND INSTALLATION



SBF794A



SBF795A



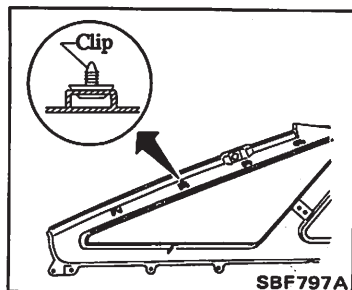
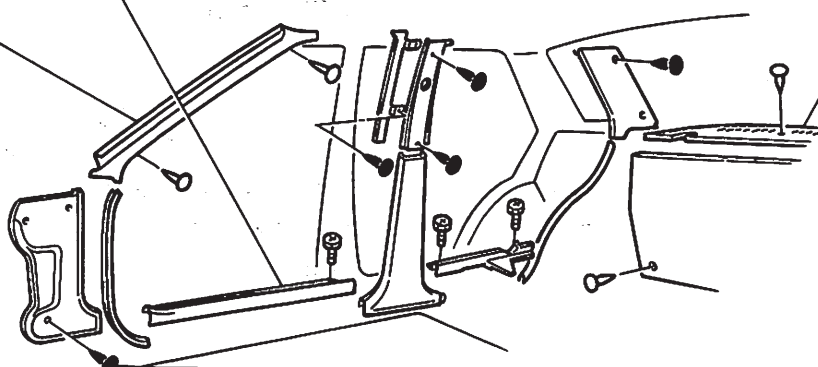
SBF796A

Windshield pillar garnish

Kicking plate

Sedan

Rear parcel trim

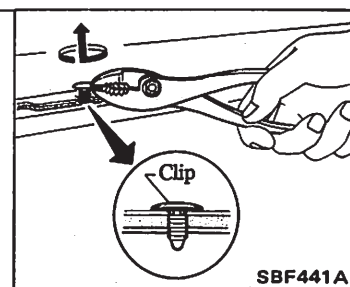


SBF797A

Luggage upper finisher

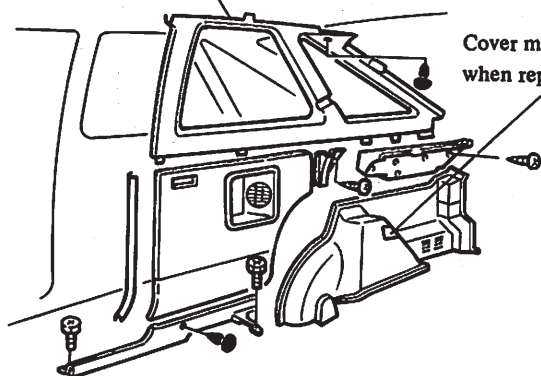
Coupe

Wagon

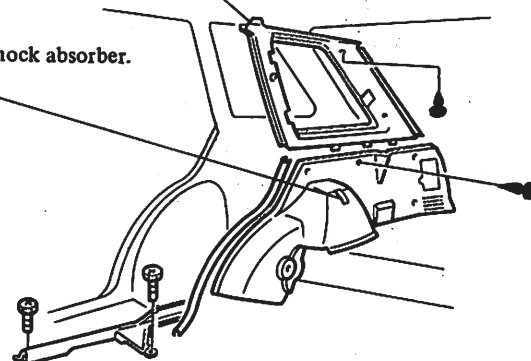


SBF441A

Luggage upper finisher



Cover mask used when replacing shock absorber.

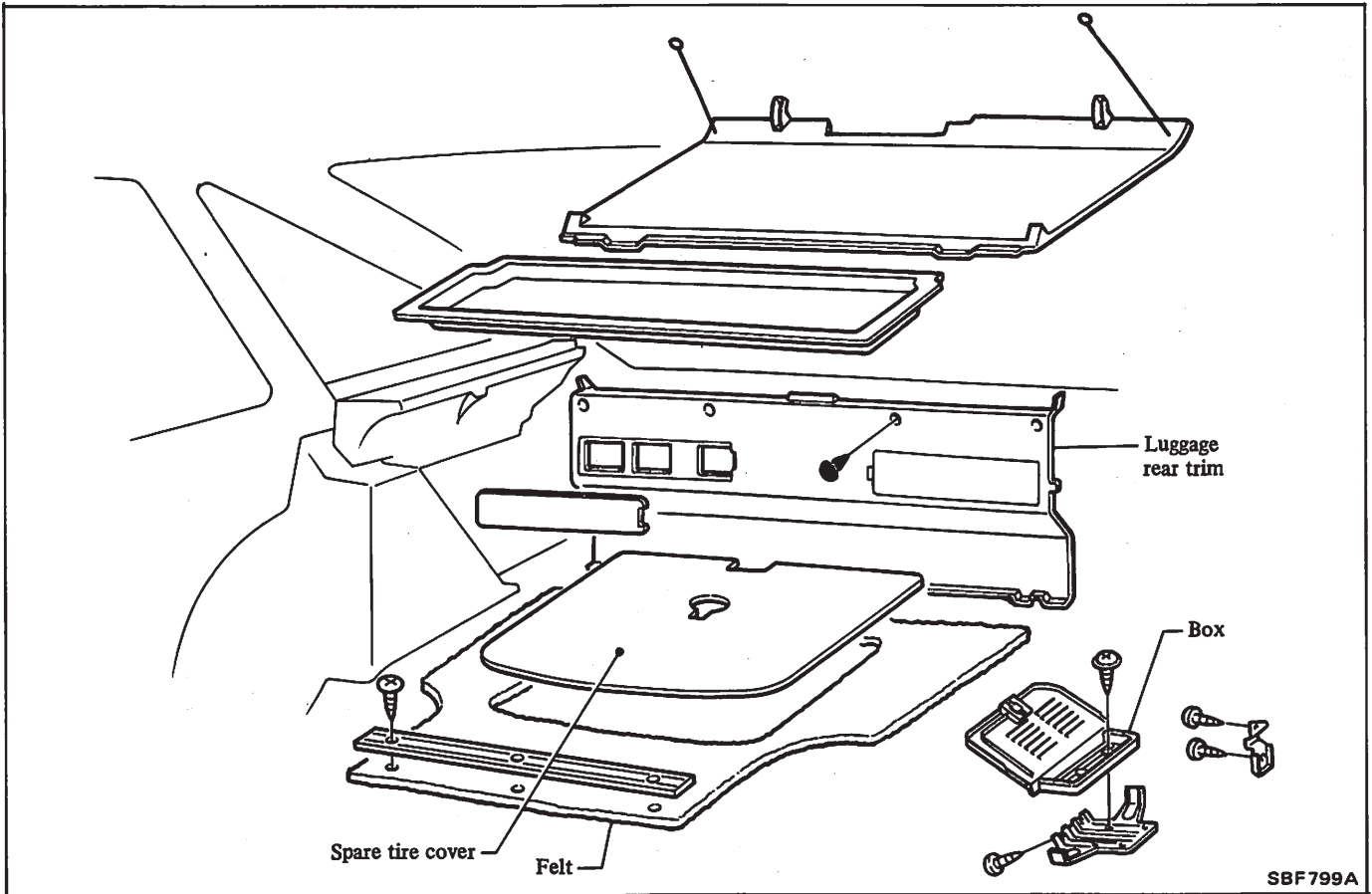


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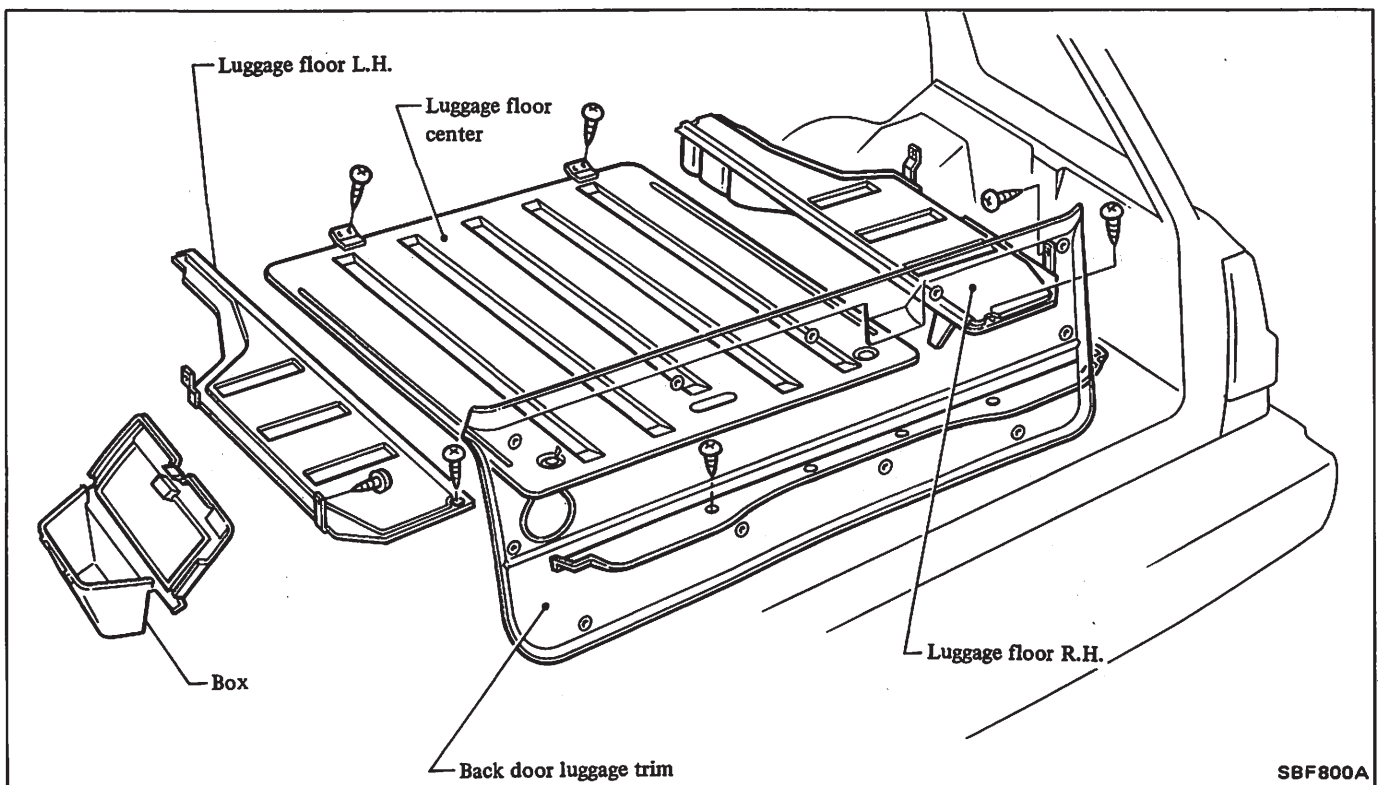
TRIM AND MOLDING

LUGGAGE ROOM TRIM REMOVAL AND INSTALLATION

Coupe



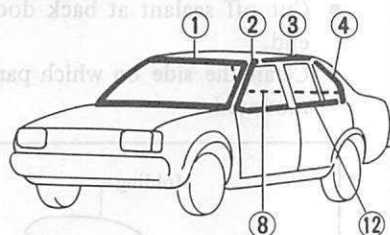
Wagon



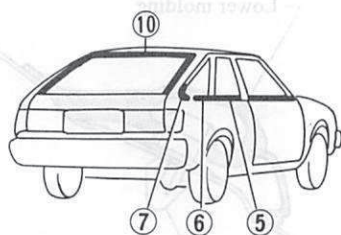
TRIM AND MOLDING

MOLDING

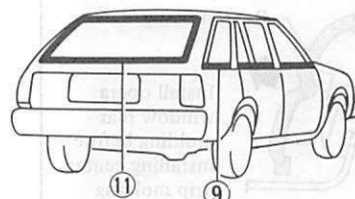
REMOVAL AND INSTALLATION



Sedan



Coupe

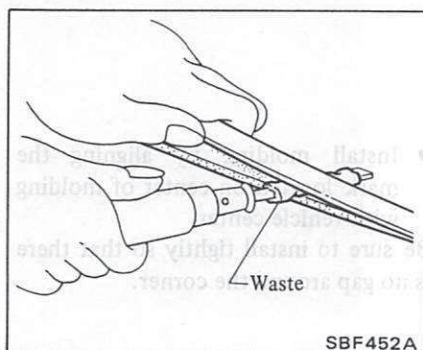


Wagon

SBF801A

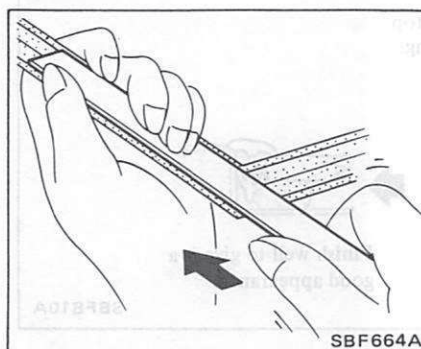
① Windshield molding

Removal



SBF452A

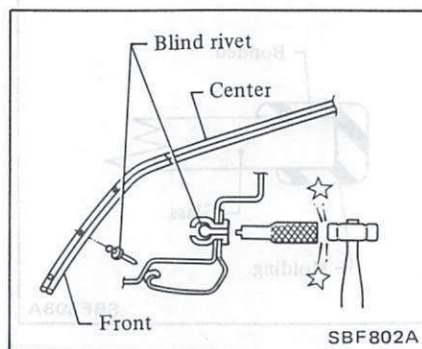
Installation



SBF664A

- It is preferable to install glass after mounting molding on weatherstrip.
- When replacing molding with glass attached, be careful not to deform molding or scratch weatherstrip.
- To make installation easier, apply soapy water to the groove in the weatherstrip molding.

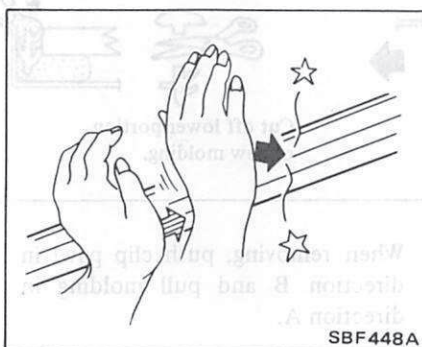
② Front drip molding



SBF802A

- If rivet projects out after installing molding, file it down with a file or suitable tool.

③ Center drip molding



SBF448A

Sedan:

- Install center drip molding by aligning drip channel cutout on the body with front end of molding.

Coupe:

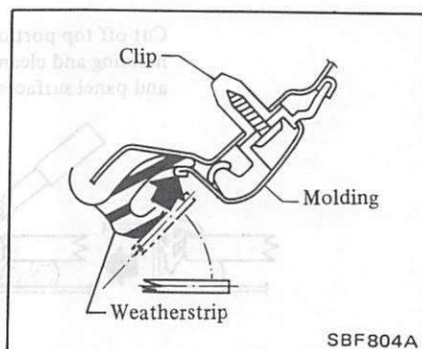
- Install center drip molding by aligning end of opera window rear molding and rear end of center drip molding.

Wagon:

- Install center drip molding starting from molding rear end by keeping enough clearance between back door and molding.

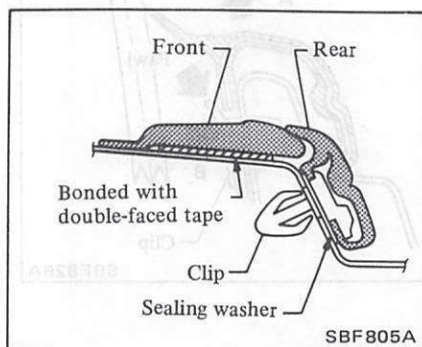
④ Rear drip molding

- For 4-door Sedan, follow the same procedures as for "Front drip molding".
- 2-Door sedan.



SBF804A

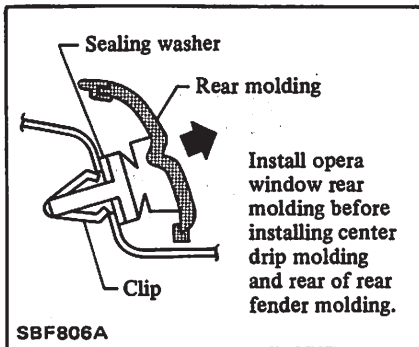
⑤ ⑥ Front and rear of rear fender molding



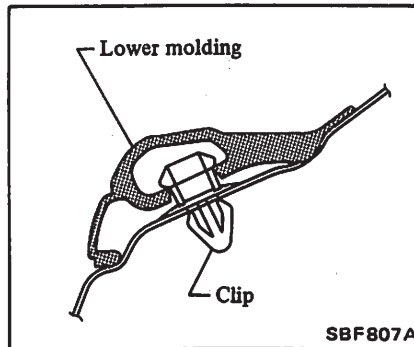
SBF805A

TRIM AND MOLDING

⑦ Opera window rear molding

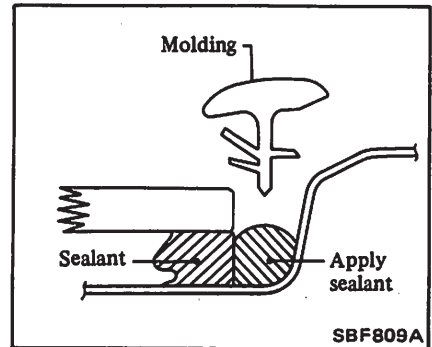


⑨ Opera window lower molding



⑪ Back door window molding (Wagon) — Method 1

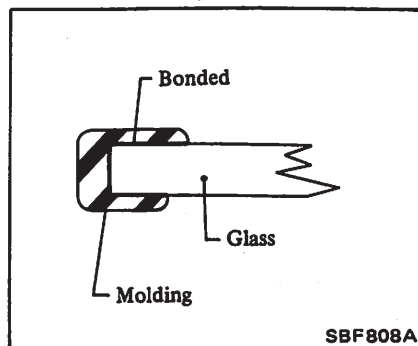
- Cut off sealant at back door glass end.
- Clean the side on which panel was mounted.



⑧ Rear window molding

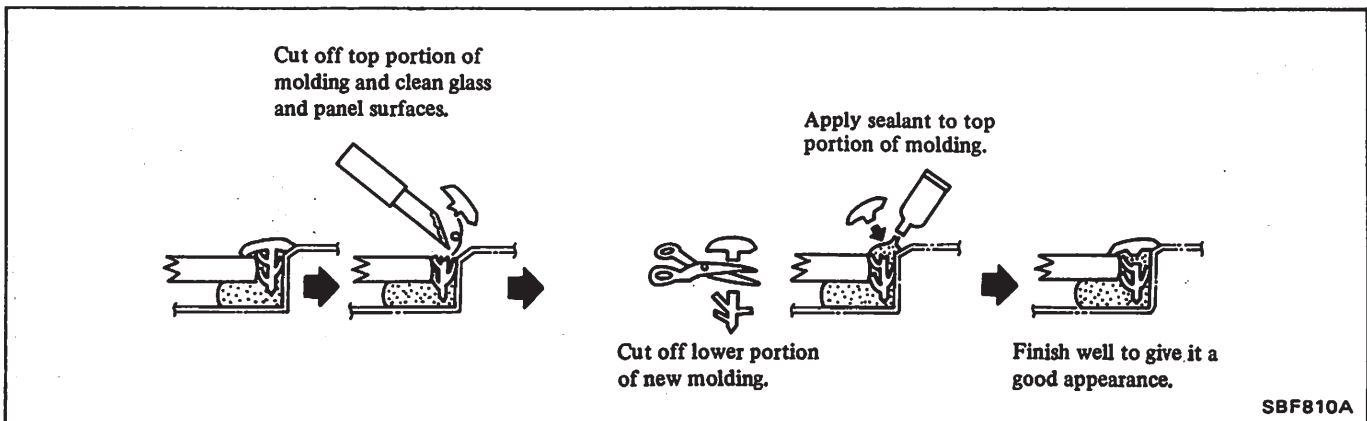
- Follow the same procedures as for "Windshield molding".

⑩ Back door window molding (Coupe)

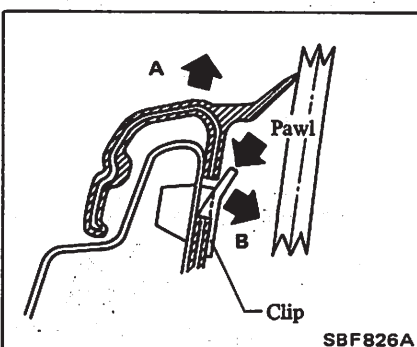


- Install molding by aligning the mark located on center of molding with vehicle center. Be sure to install tightly so that there is no gap around the corner.

Method 2



⑫ Door molding

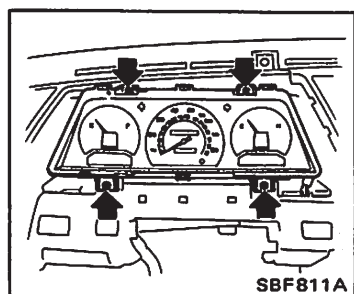


- When removing, push clip pawl in direction B and pull molding in direction A.

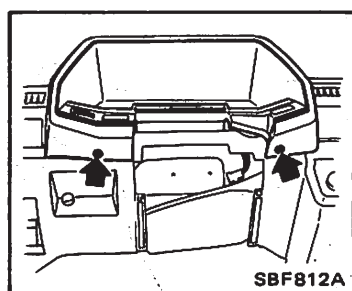
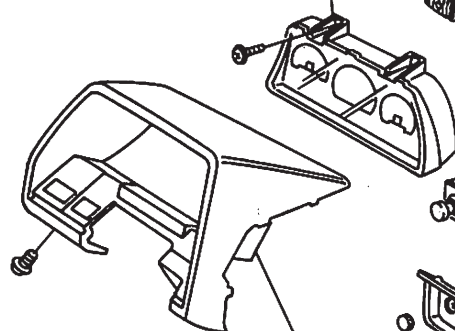
INSTRUMENT AND SEAT

INSTRUMENT

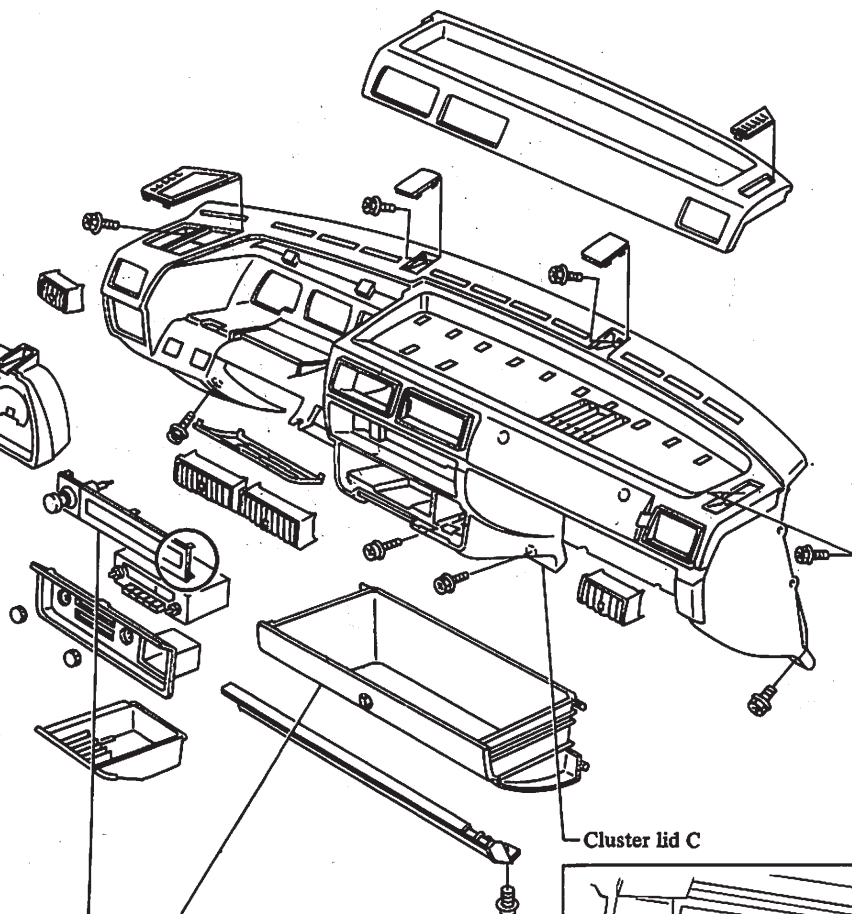
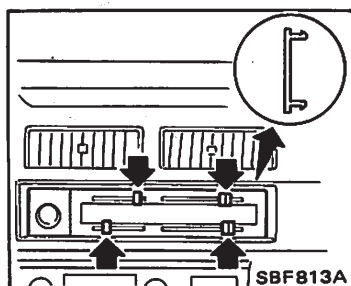
REMOVAL AND INSTALLATION



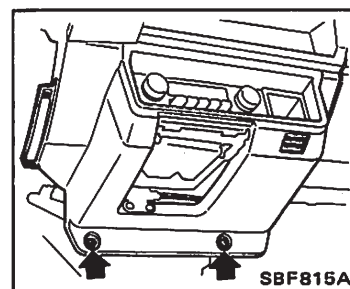
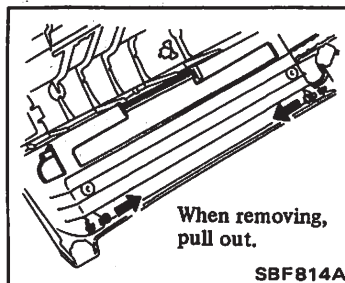
Combination meter



Heater control



Glove box



Be sure to remove the following parts.

- Choke control cable
- Harness connectors
- Hood lock control cable
- Speedometer cable
- Radio feeder cable

SBF816A

INSTRUMENT AND SEAT

SEAT

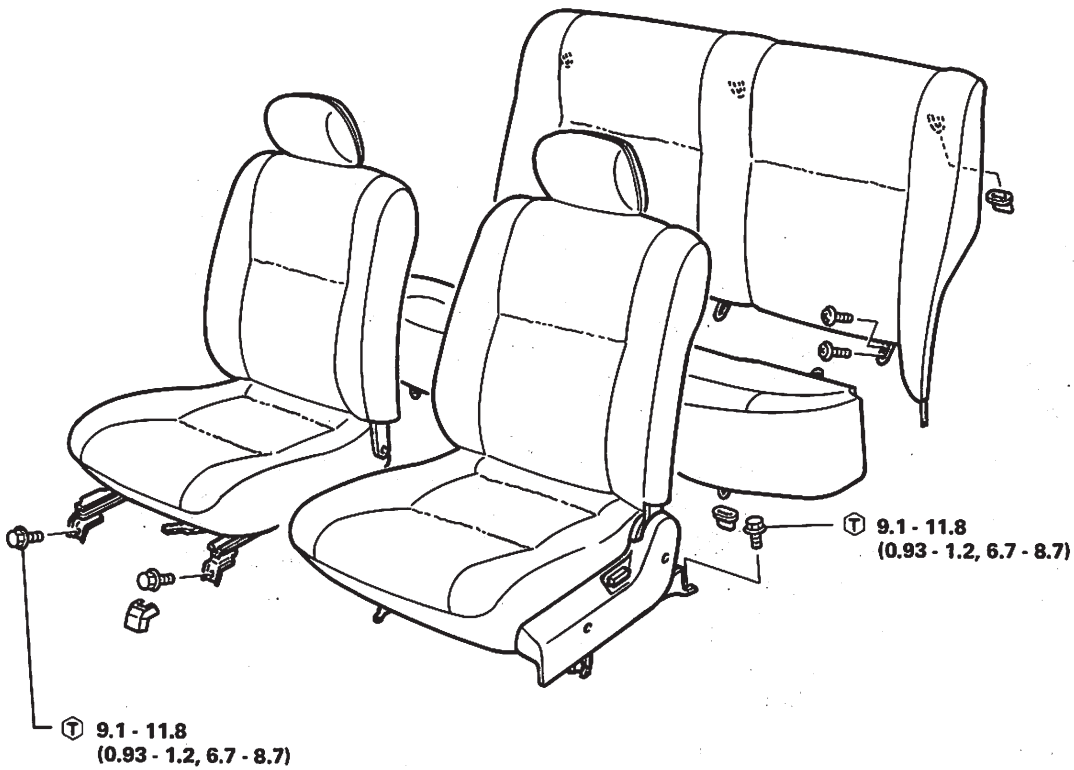
REMOVAL AND INSTALLATION

CAUTION:

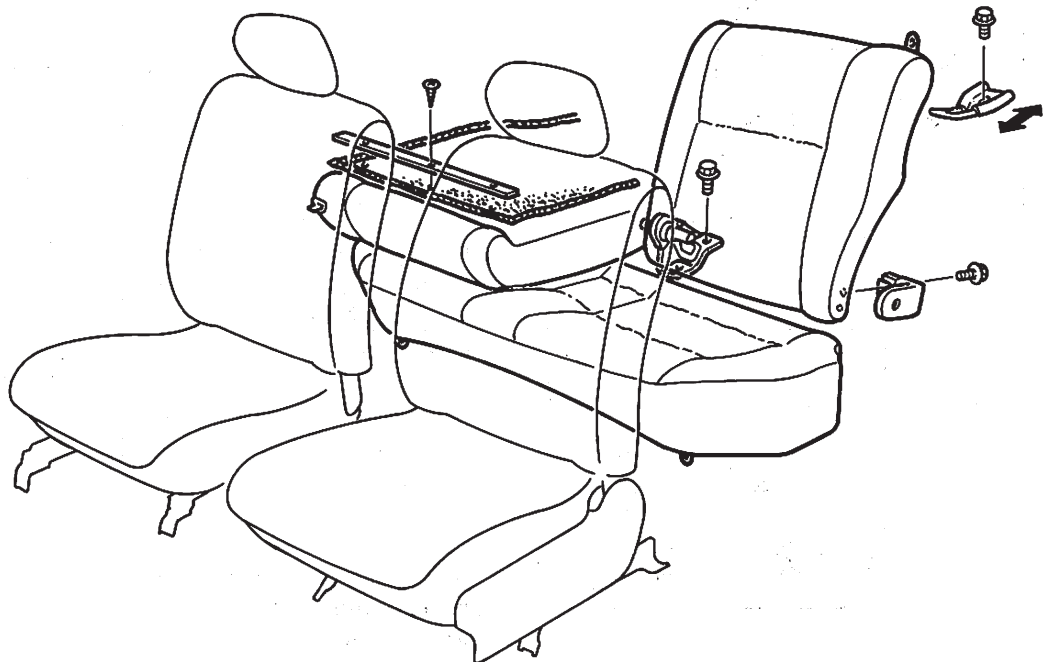
Be sure to remove the thin polyethylene covers:

- 1) Pre-delivery service
- 2) Parts replacements

Sedan



Coupe and Wagon



Ⓙ : N·m (kg·m, ft·lb)

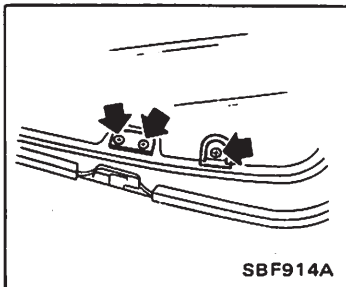
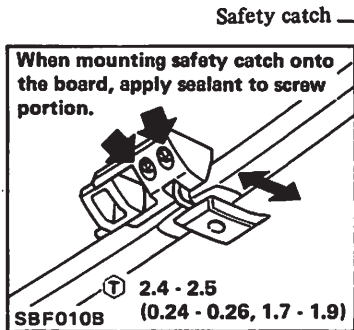
SBF817A

SUN ROOF

SUN ROOF

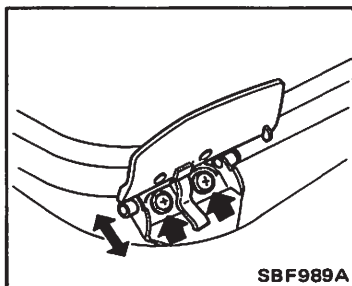
SUN ROOF

REMOVAL AND INSTALLATION

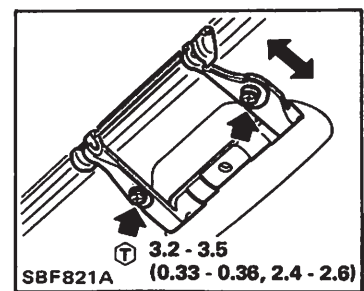


Hinge

Air deflector



Ⓙ : N·m (kg·m, ft·lb)



Drain hose

After installation of drain hoses, make sure water drains smoothly.

Handle

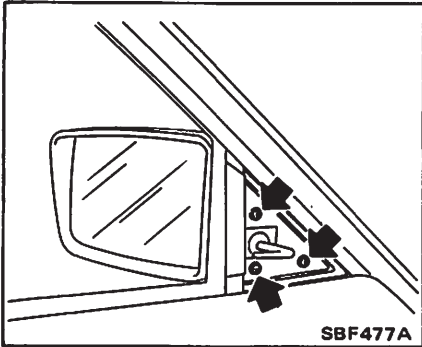
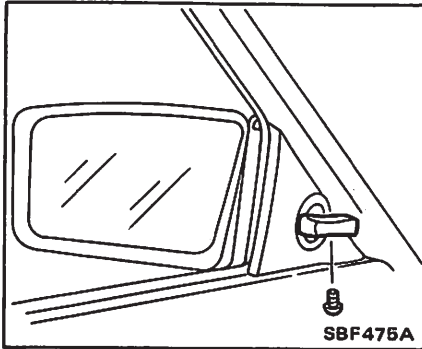
SBF009B

MIRROR

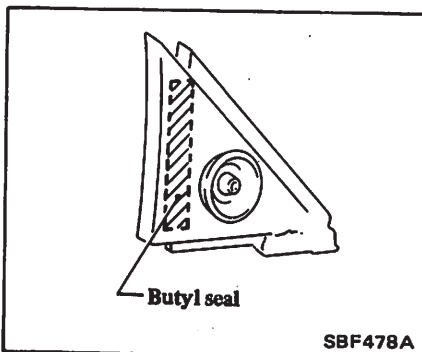
MIRROR

DOOR MIRROR

REMOVAL AND INSTALLATION



Apply a coat butyl seal to rear surface of finisher door corner during installation to prevent water leakage.

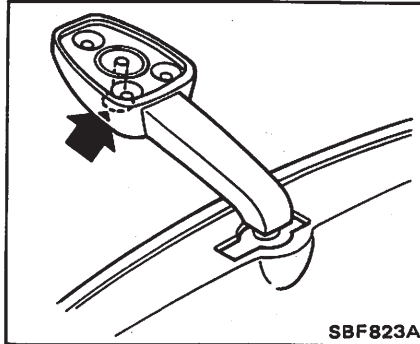


INSIDE MIRROR

STANDARD MODEL

Replacement of broken mirror base:

1. Remove all broken pieces of base from roof rail.
2. Clean any pieces of base from stay.

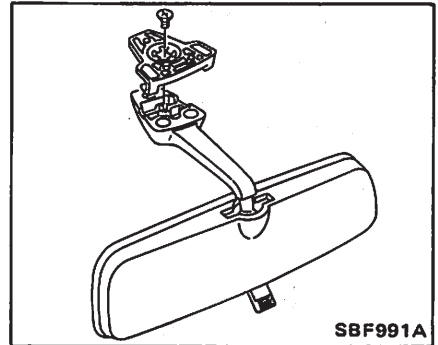


3. Position new base on stay.
4. Install inside mirror assembly on roof rail.

DELUXE MODEL

When spring plate of mirror base can be used

1. Remove mirror base from roof rail.
2. Remove connecting screw from stay.
3. Assemble mirror base and stay.



4. Install inside mirror assembly on roof rail.

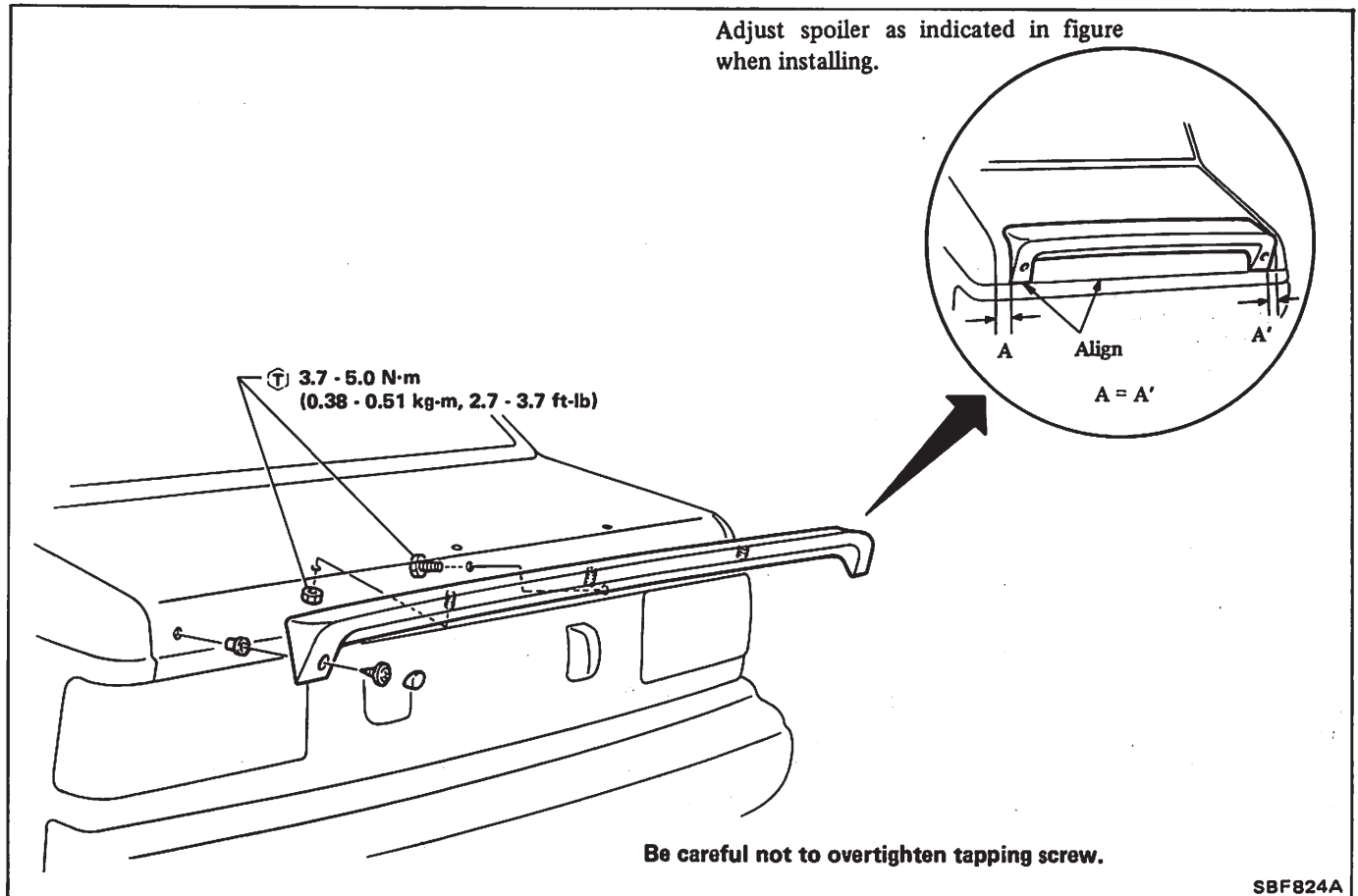
When spring plate of mirror base cannot be used

Replace mirror base.

REAR SPOILER

REAR SPOILER

REMOVAL AND INSTALLATION



BODY ALIGNMENT

DESCRIPTION

DIMENSION LINES

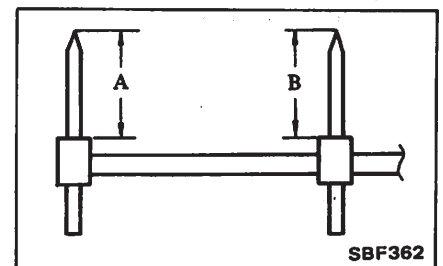
All dimensions indicated in the drawings/illustrations are the standard design values.

1. Thin dimension line — Indicates a distance from a phantom line of the vehicle body to a point to be measured and cannot be measured with a measuring tape or tram tracking gauge.
2. Thick dimension line — Indicates a direct (or an actual) distance or length between two points and can be measured with a measuring tape or tram tracking gauge.

MEASUREMENT OPERATIONS

When vehicle body measurements are taken in accordance with the thick line, careful consideration should be given to the following points.

1. Measurement method
 - (1) When a tram tracking gauge is used, adjust pointers (A) and (B) to equal lengths as shown in the figure below. Check the pointers and gauge itself to make sure there is no free play.



- (2) When a measuring tape is used, check to be sure there is no elongation, twisting or bending.

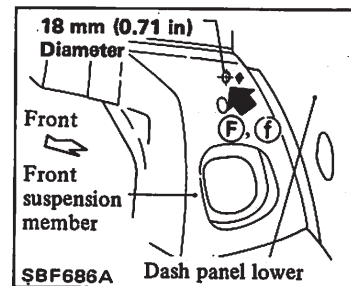
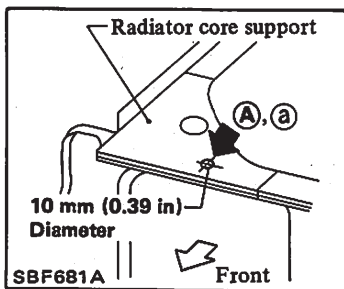
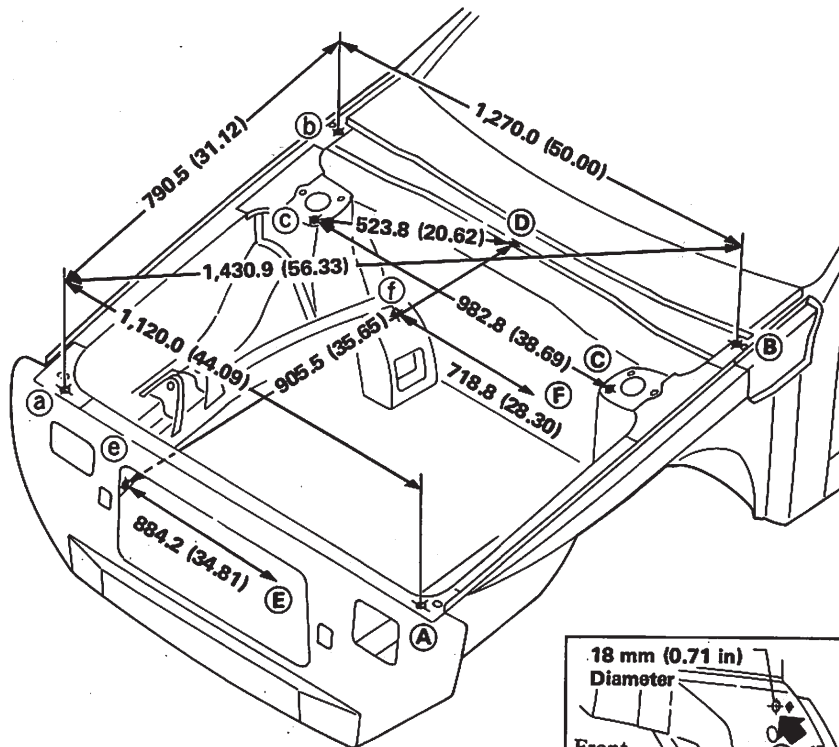
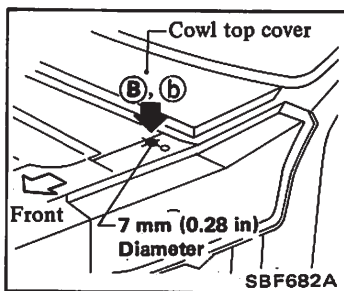
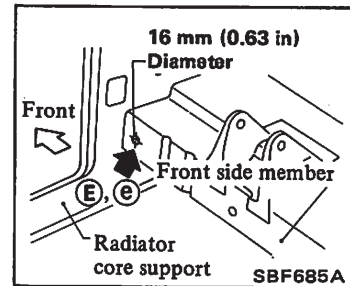
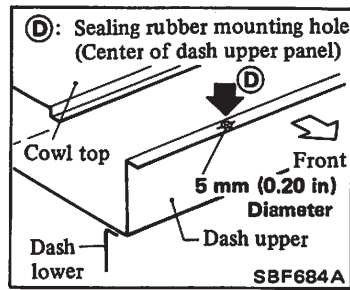
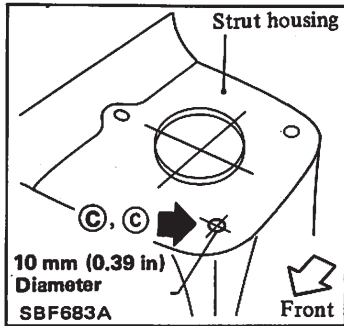
If a part or parts of the vehicle body interferes with measurement when using the measuring tape, you cannot measure the distance of length accurately.

2. Measurement point

Measurements should be taken at the center of mounting holes.

BODY ALIGNMENT

ENGINE COMPARTMENT



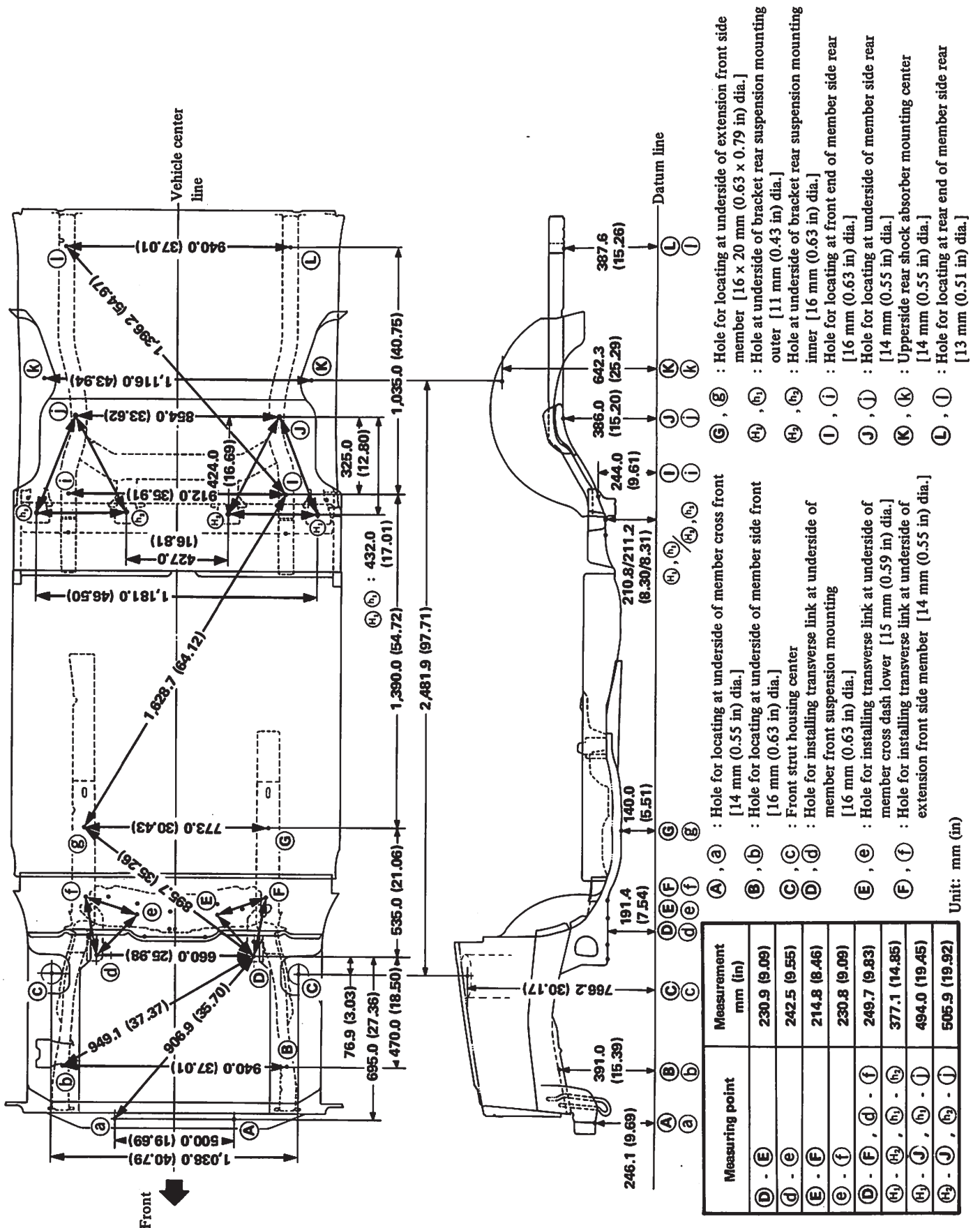
Measuring points	Measurement	
	mm	in
① - ② , ① - ③	520.5	20.49
④ - ⑤ , ④ - ⑥	668.9	26.33
④ - ⑥ , ④ - ③	1,040.7	40.97

Unit: mm (in)

SBF680A

BODY ALIGNMENT

UNDERBODY



HEATER & AIR CONDITIONER

SECTION HA

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HEATER

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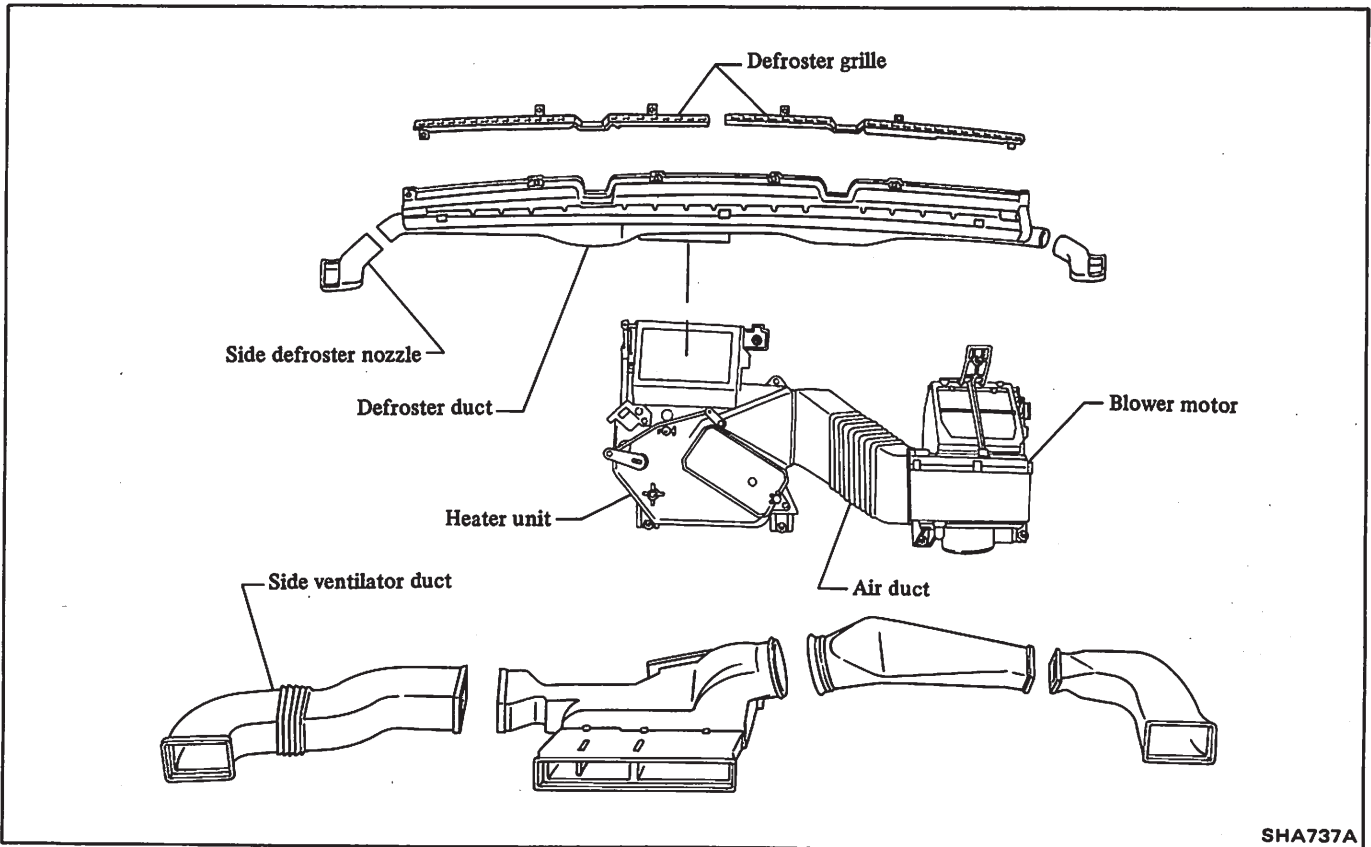
SPECIAL SERVICE TOOLS

Refer to section MA (Basic Mechanical System) for:

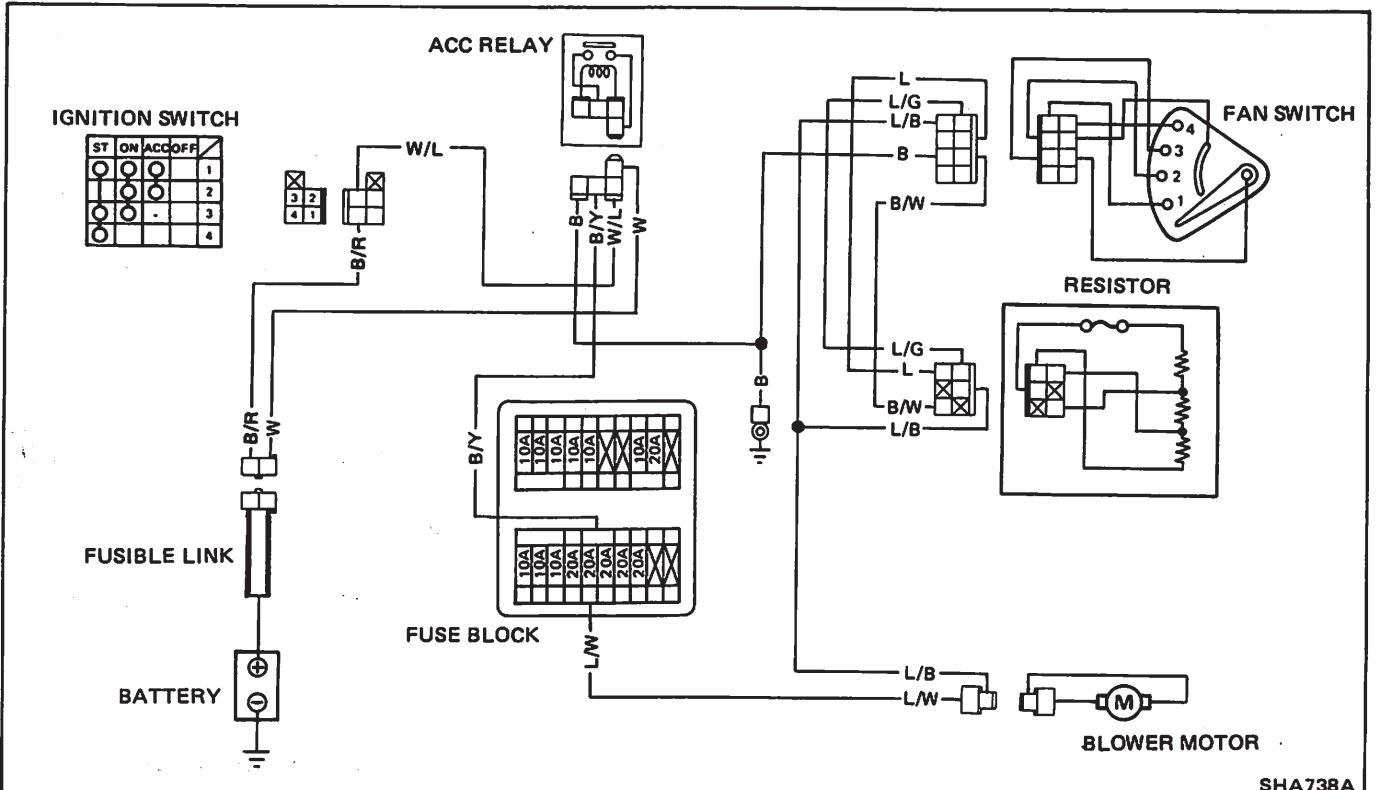
- CHECKING AND ADJUSTING DRIVE BELTS

DESCRIPTION (Heater)

HEATER COMPONENTS



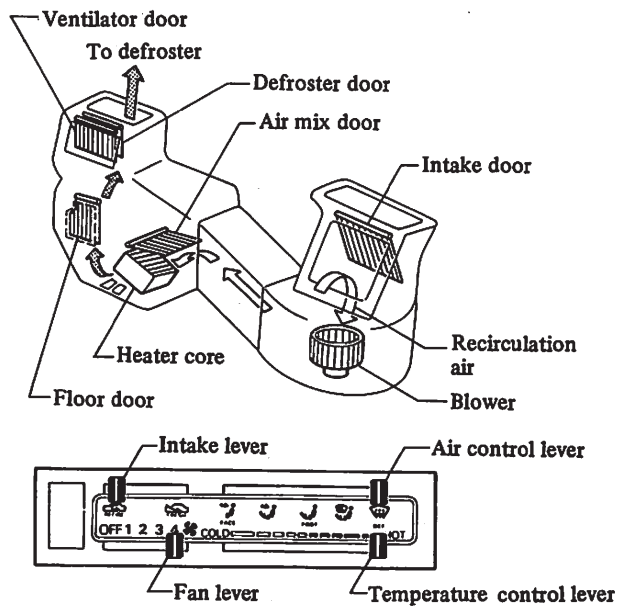
ELECTRICAL DIAGRAM



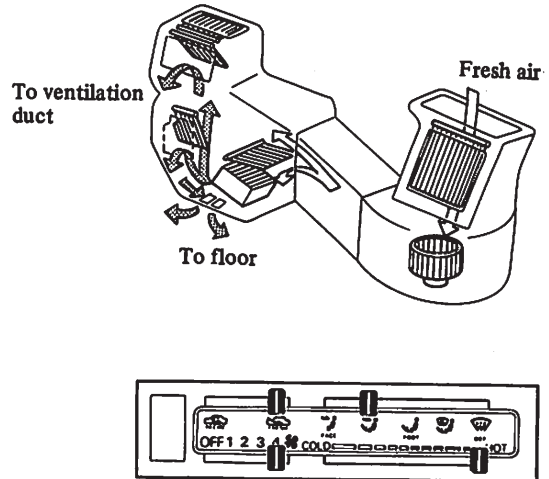
DESCRIPTION – Heater

AIR FLOW

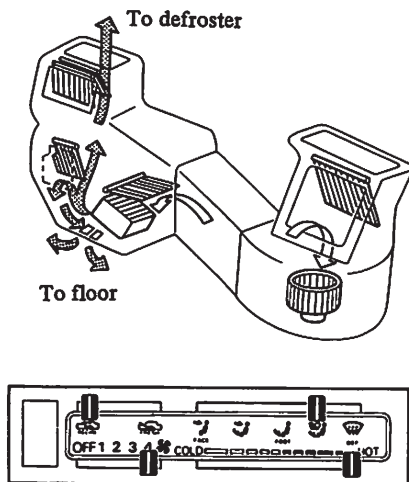
Defroster



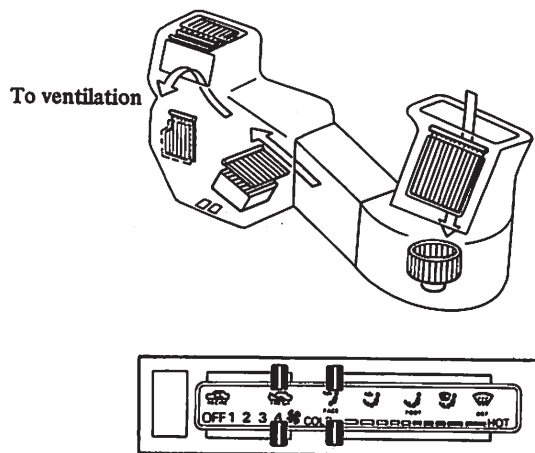
Ventilation and Floor



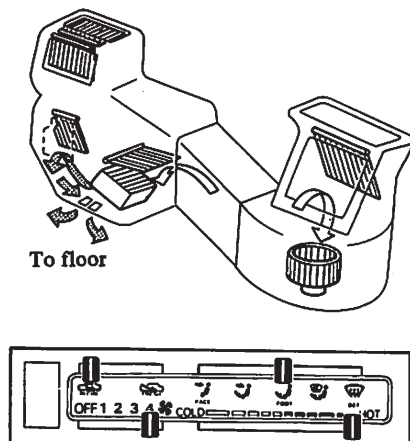
Defroster and Floor



Ventilation



Floor

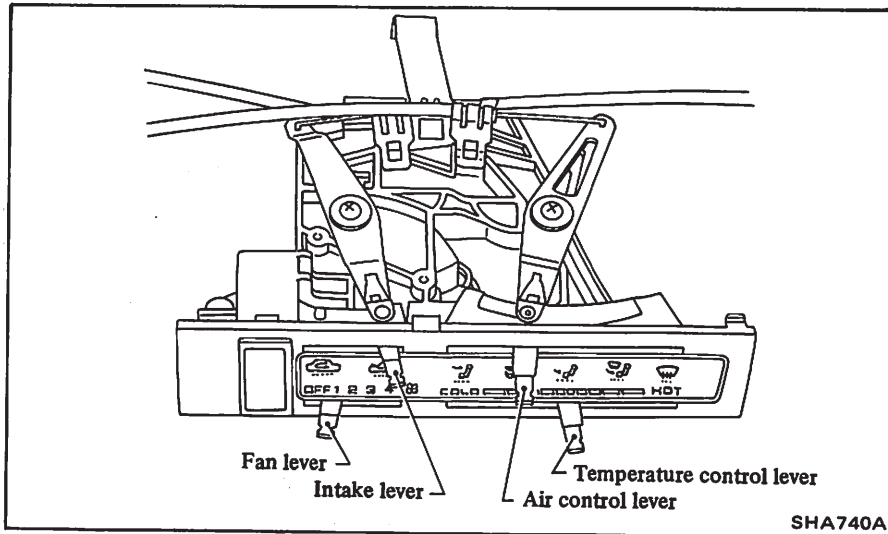


TROUBLE DIAGNOSES AND CORRECTIONS (Heater)

Condition	Probable cause	Corrective action
Insufficient heating performance. No heated air discharged.	Cooling water temperature too low. Heater core plugged. Insufficient cooling water level. Malfunctioning air mix door. Malfunctioning heater cock.	Check thermostat. Replace as necessary. Clean. Refill. Adjust control cable. Adjust control cable. Check heater cock. Replace as necessary.
Insufficient air flow to floor.	Blower motor speed too low. Malfunctioning floor door. Malfunctioning door control cable and lever.	Check motor terminal voltage. Repair poor connection and discontinuity. Replace motor if necessary. Adjust control cable. Replace as necessary.
Insufficient defrosting performance. Cold air discharged.	Refer to "No heated air discharged".	
Insufficient air flow to defroster.	Malfunctioning defroster door (or faulty seal). Malfunctioning door control cable and lever. Defroster nozzle plugged. Leak at defroster duct-to-nozzle connection.	Adjust control cable. Replace as necessary. Clean. Correct.
Air does not discharge from correct outlets.	Defroster, vent or floor door sticking.	Repair.
Blower motor does not operate.	Refer to Trouble Diagnoses and Corrections (Air conditioner).	
Control lever drags.	Inner wire rubbing against outer case end. Control cable bent excessively. Malfunctioning doors, door levers, etc.	Adjust control cable. Correct. Check and correct.
Outside air comes in with REC position.	Air intake door not operating properly. Malfunctioning door control cable and lever. Control cable out of adjustment.	Repair or replace. Replace as necessary. Adjust control cable.
Noise from blower motor.	Loose bolt in blower motor. Broken fan blade(s).	Check and tighten. Replace fan.

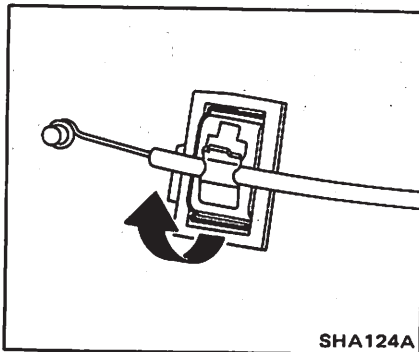
SERVICE PROCEDURES (Heater)

HEATER CONTROL ASSEMBLY

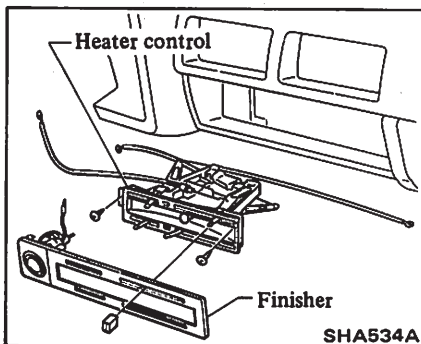


REMOVAL AND INSTALLATION

1. Remove control cables by unfastening clamps at door levers.



2. Disconnect harness connector.
3. Remove heater control finisher and mounting bolts, and remove heater control assembly.

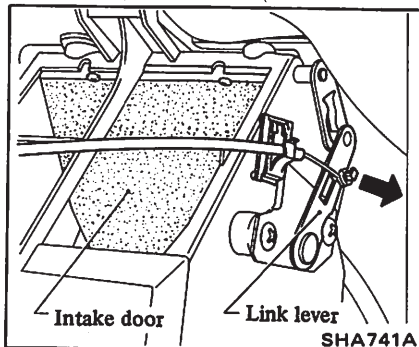


4. Installation is in the reverse order of removal.

ADJUSTMENT

Intake door control cable

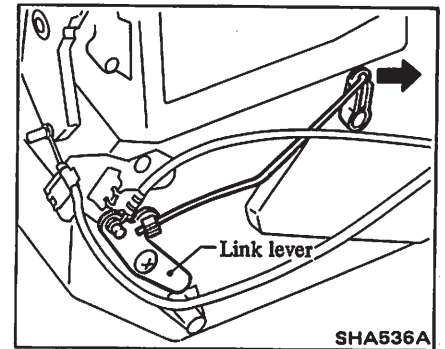
1. Set intake lever at "RECIRC" position.
2. Set intake door at recirculation position.
3. Connect control cable to link lever and securely clamp the cable.



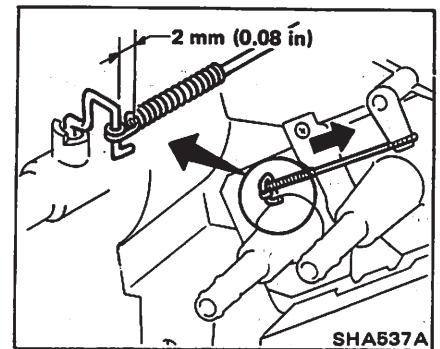
4. Check knob to see if it moves smoothly.

TEMP. control cable

1. Set TEMP. control lever at max. "COLD POSITION".
2. With air mix door knob moved in direction of arrow, connect TEMP. control rod to link lever.
3. Connect control cable to link lever and clamp the cable.



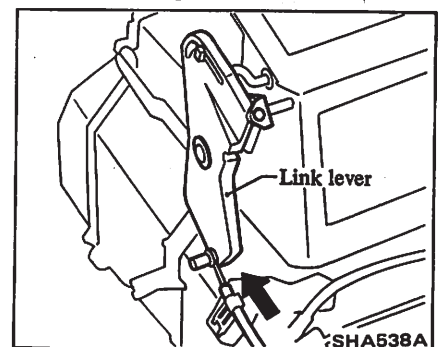
4. Pull control rod of water cock in direction of arrow so as to make clearance of about 2 mm (0.08 in) between ends of rod and link lever and connect the rod to door lever.



5. Check knob to see if it moves smoothly.

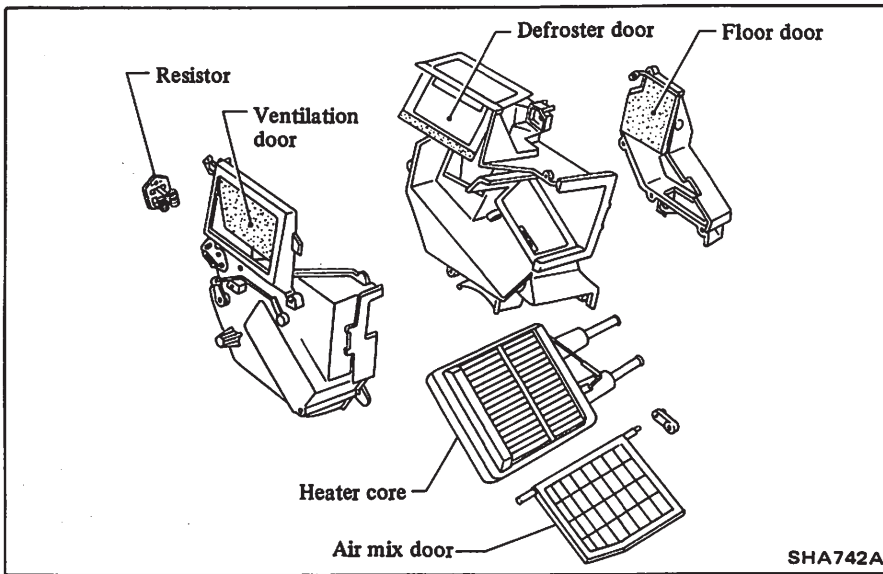
Air control cable

1. Set air control lever at "DEF" position.
2. Move link lever in direction of arrow.
3. Connect air control cable to link lever and clamp the cable.



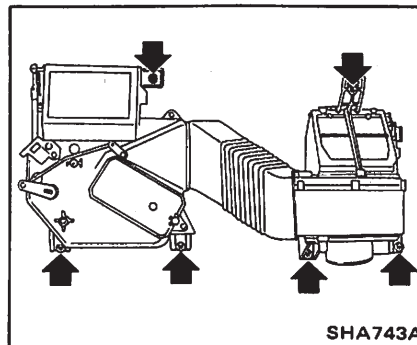
4. Check knob to see if it moves smoothly.

HEATER UNIT



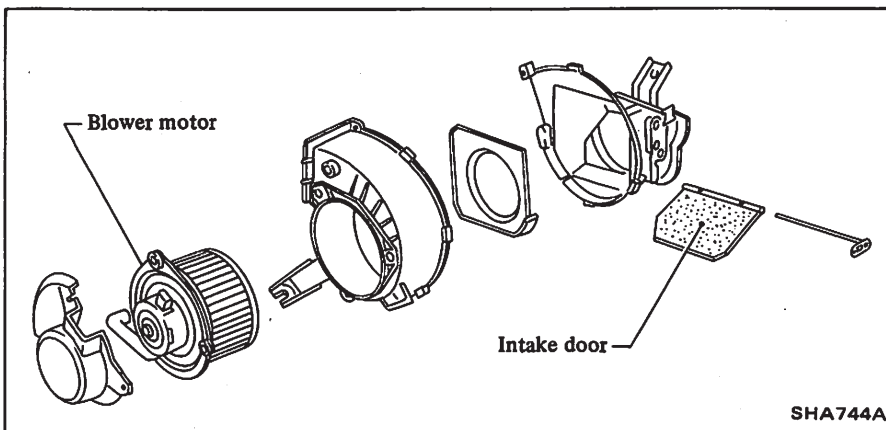
REMOVAL AND INSTALLATION

1. Set TEMP. lever to max. "HOT" position and drain engine coolant.
2. Disconnect heater hoses at engine compartment.
3. Remove instrument assembly. Refer to BF section.
4. Remove heater control assembly.
5. Remove heater unit assembly.

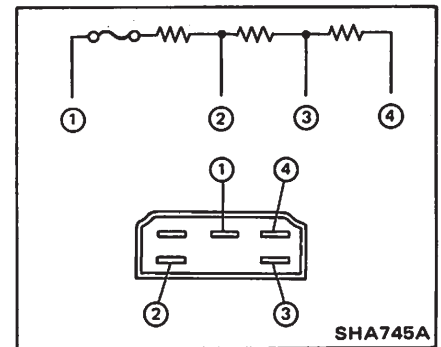


6. Installation is in the reverse order of removal.

BLOWER MOTOR

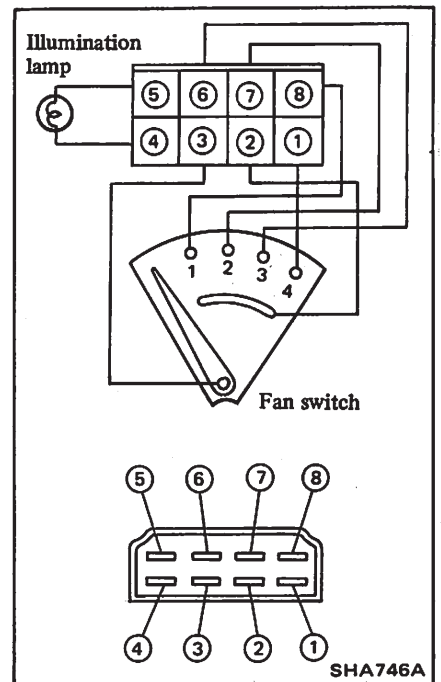


RESISTOR INSPECTION



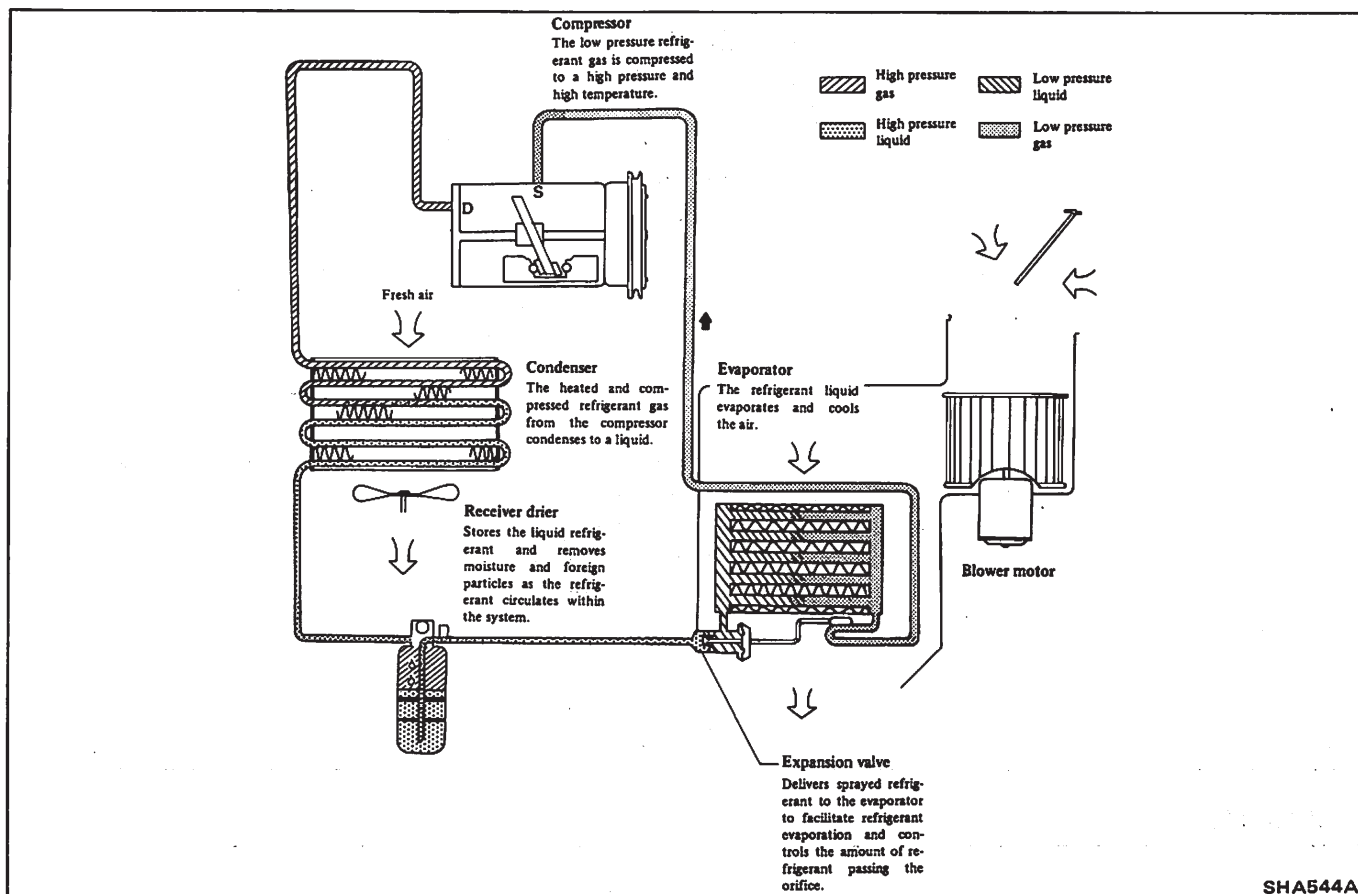
FAN SWITCH INSPECTION

Check to make sure that continuity exists at each position of fan switch.

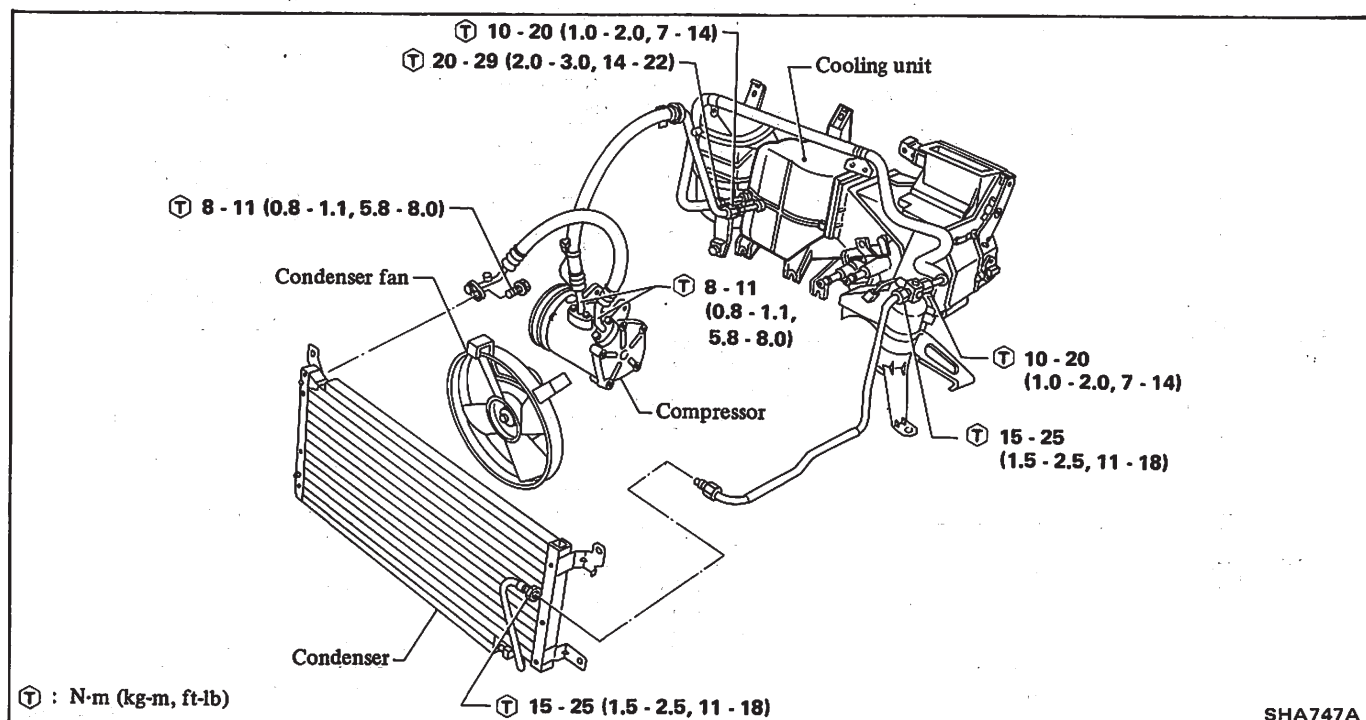


DESCRIPTION

REFRIGERATION CYCLE

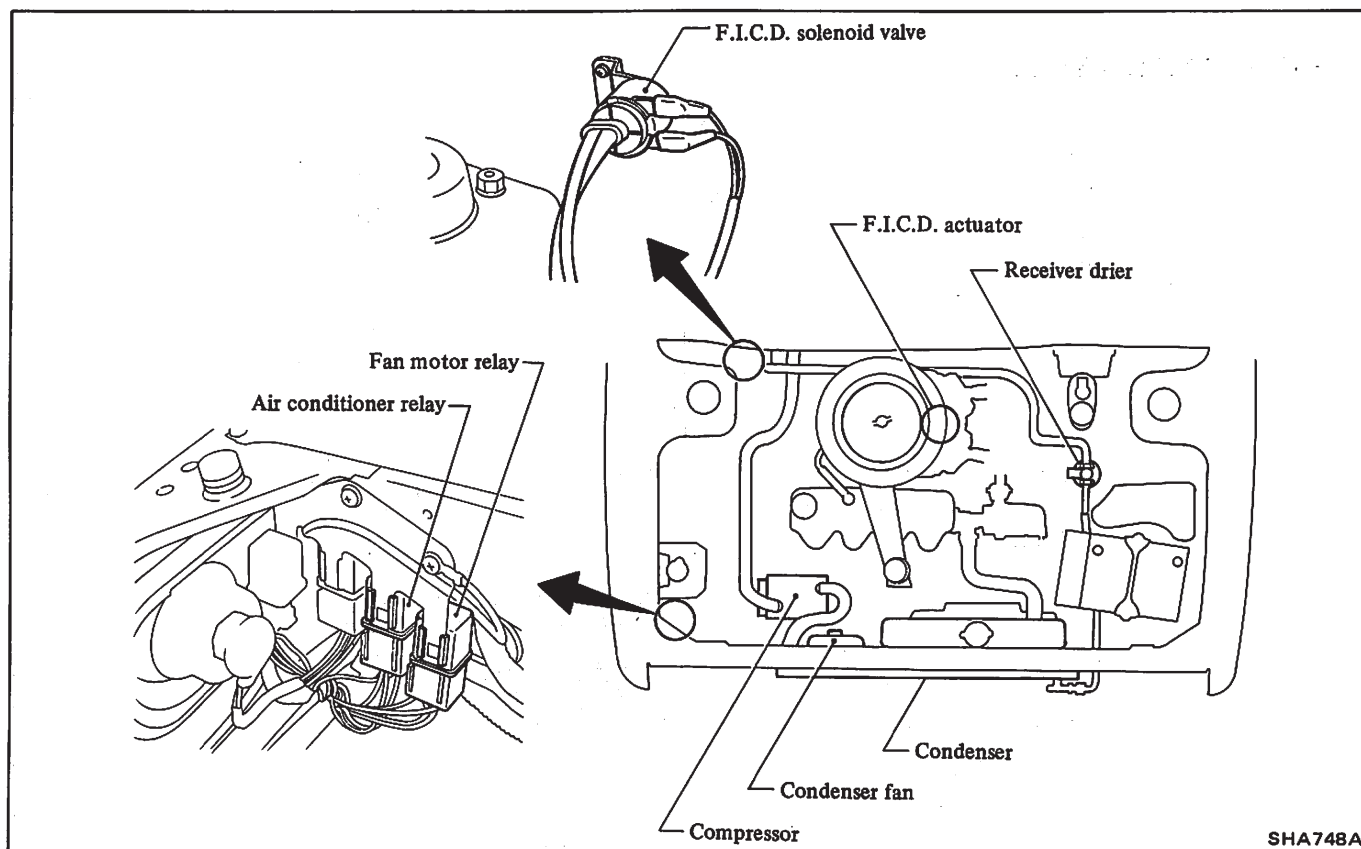


AIR CONDITIONER COMPONENTS

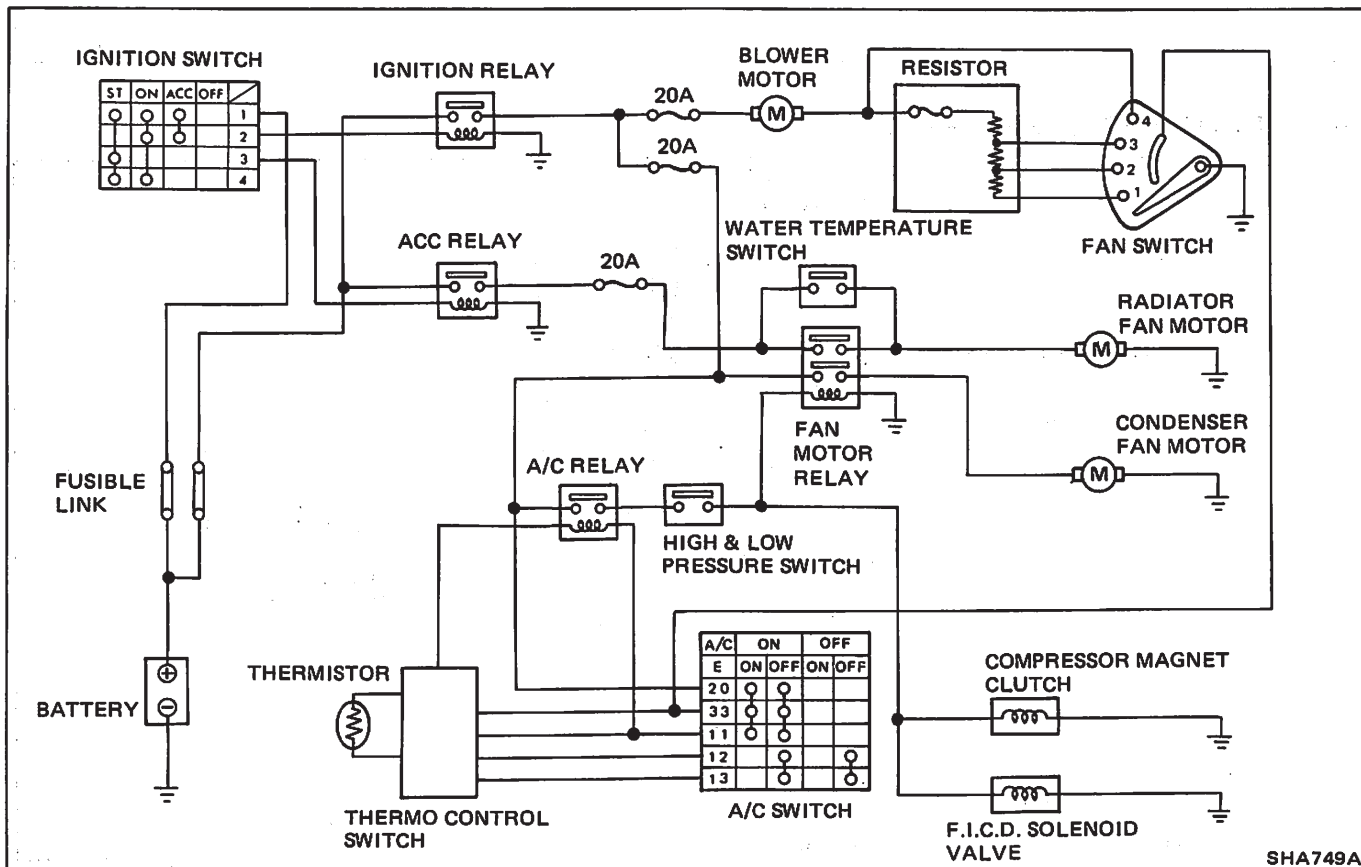


DESCRIPTION – Air conditioner

LOCATION OF COMPONENT PARTS



SCHEMATIC



WIRING DIAGRAM



GENERAL SERVICE

PRECAUTIONS

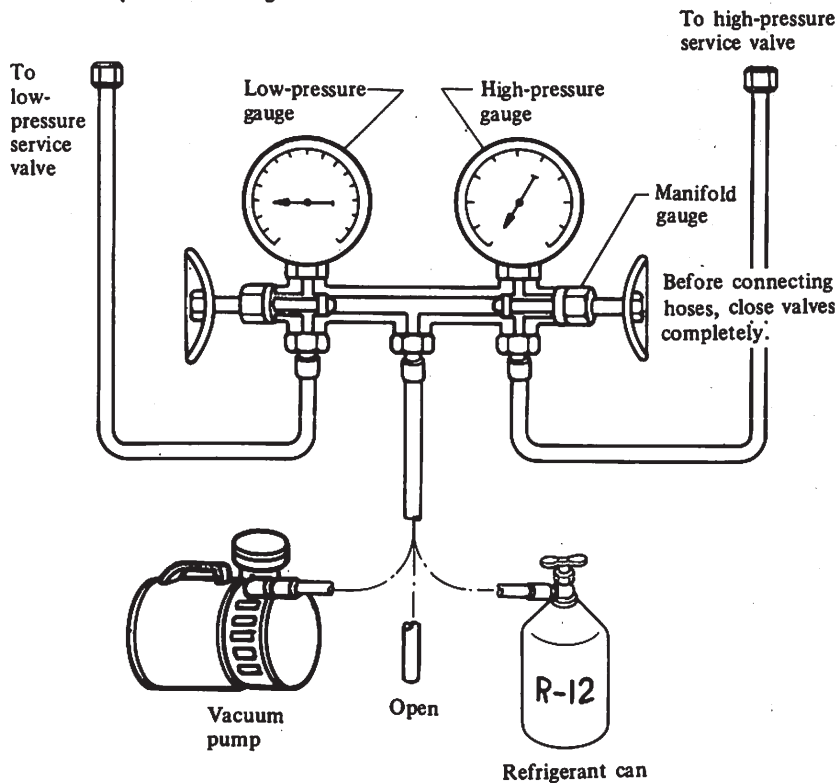
WARNING:

1. Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Always wear goggles to protect your eyes when working around the system.
2. The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never store it in a hot location [above 52°C (126°F)] or drop it from a high height.
3. The refrigerant gas is odorless and colorless and breathing may become difficult due to the lack of oxygen. Since the refrigerant gas is heavier than air and will lay close to the floor, be especially careful when handling it in small, confined spaces.
4. The refrigerant itself is nonflammable. However, a toxic gas (phosgene gas) is produced when it contacts fire and special care is therefore required when checking for leaks in the system with a halide torch.
5. Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.

INSTALLING MANIFOLD GAUGE

Hoses for the low-pressure service valve (suction valve) and high-pressure service valve (discharge valve) should be connected securely to "high" and "low" connection, respectively, on the manifold gauge.

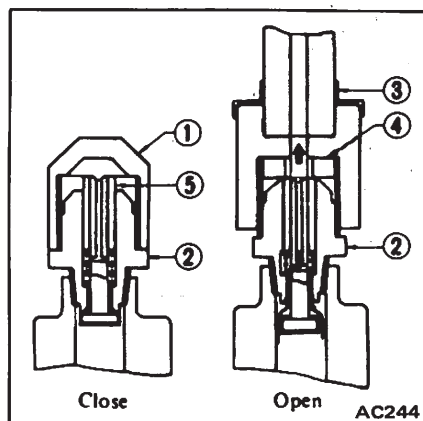
Refer to identification marks ("S": Suction side or "D": Discharge side) on compressor or Refrigerant Lines.



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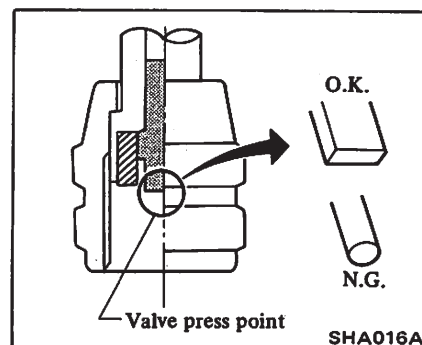
Connection to service valve

1. Fully close both valves of manifold gauge. Connect high- and low-pressure charging hoses to manifold gauge.
2. Remove caps from service valves. Connect high- and low-pressure charging hoses to service valves in system.



- 1 Cap
- 2 Service valve
- 3 Charging hose
- 4 Packing
- 5 Check valve

Be careful not to use manifold gauge valve with other similar-looking press point, or insufficient evacuating may occur.

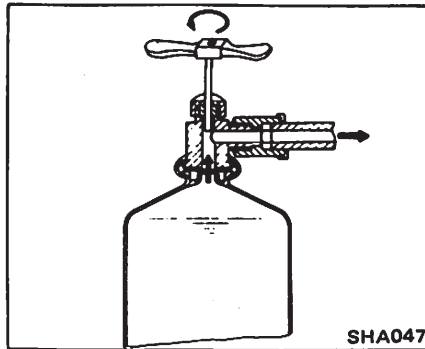


Disconnection from service valve

1. Fully close both valves of manifold gauge.
2. Quickly disconnect two charging hoses from service valves and install caps on service valves.

CAUTION:

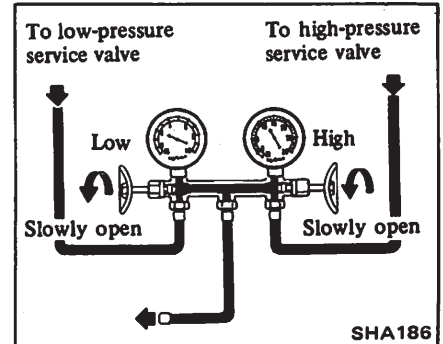
Do not over-tighten valve cap.



6. Purge air from charging hose by loosening charging hose nut at manifold gauge.

3. Open both manifold gauge valves and discharge refrigerant from system.

Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.

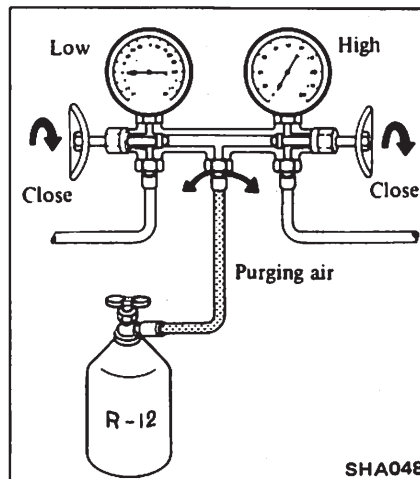


HANDLING REFRIGERANT SERVICE CAN TAP

The following procedures apply to conventional can taps.

For correct usage, refer to the manufacturer's instructions.

1. Connect charging hose between manifold gauge and can tap.
2. Fully turn in (close) valve stem of manifold gauge.
3. Attach can tap to refrigerant can by turning can tap handle fully counterclockwise.
4. Make a hole in refrigerant can by turning can tap handle clockwise.



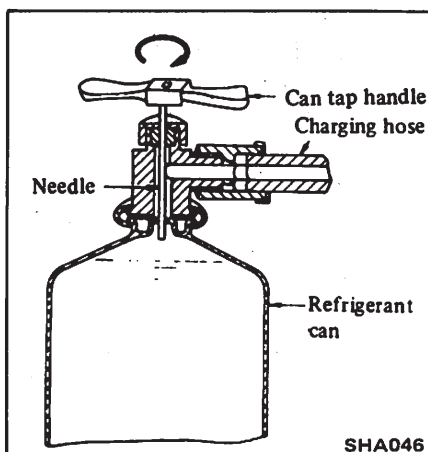
EVACUATING AND CHARGING REFRIGERANT SYSTEM

EVACUATING REFRIGERANT SYSTEM

1. Install manifold gauge on system and discharge refrigerant from system until pressure reaches atmospheric pressure.

WARNING:

Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge.



DISCHARGING REFRIGERANT

The pressurized refrigerant gas inside the system must be discharged at a pressure approaching atmospheric pressure prior to evacuating refrigerant inside the system.

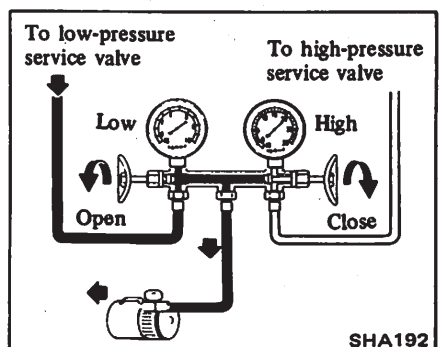
1. Close high- and low-pressure valves of manifold gauge fully.
2. Connect two charging hoses of manifold gauge to their respective service valves.

WARNING:

Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge.

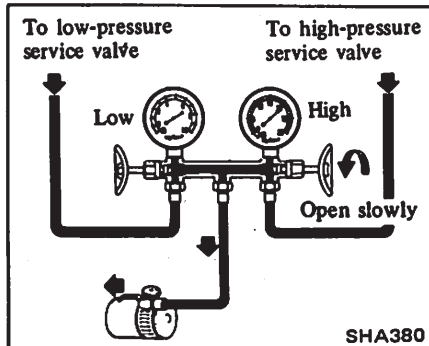
5. Turn the handle fully counterclockwise to raise the needle. Refrigerant gas will flow up to the manifold gauge.

2. Connect center charging hose to vacuum pump.
3. Close both valves of manifold gauge fully. Then start vacuum pump.
4. Open low-pressure valve and suck old refrigerant from system.



GENERAL SERVICE — Air conditioner

5. When low-pressure gauge reading has reached to approximately 66.7 kPa (500 mmHg, 19.69 inHg), slowly open, high-pressure valve.



6. When pressure inside system has dropped to 94.6 kPa (710 mmHg, 27.95 inHg), fully close both valves of manifold gauge and stop vacuum pump. Let it stand for 5 to 10 minutes in this state and confirm that the reading does not rise.

a. The low-pressure gauge reads lower by 3.3 kPa (25 mmHg, 0.98 inHg) per 300 m (1,000 ft) elevation. Perform evacuation according to the following table.

Elevation m (ft)	Vacuum of system* kPa (mmHg, inHg)
0 (0)	94.6 (710, 27.95)
300 (1,000)	91.3 (685, 26.97)
600 (2,000)	88.0 (660, 25.98)
900 (3,000)	84.6 (635, 25.00)

*: Values show reading of the low-pressure gauge.

b. The rate of ascension of the low-pressure gauge should be less than 3.3 kPa (25 mmHg, 0.98 inHg) in five minutes.

If the pressure rises or the specified negative pressure can not be obtained, there is a leak in the system. In this case, repair the leak as described in the following.

(1) Charge system with a can of refrigerant [about 0.4 kg (0.9 lb)]. Refer to Charging Refrigerant.

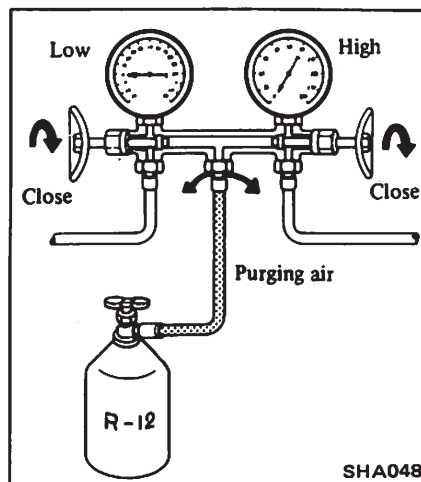
(2) Check for refrigerant leakage with a leak detector. Repair any leakages found. Refer to Checking for Leaks (MA section).

(3) Discharge refrigerant again, and then evacuate system.

CHARGING REFRIGERANT SYSTEM

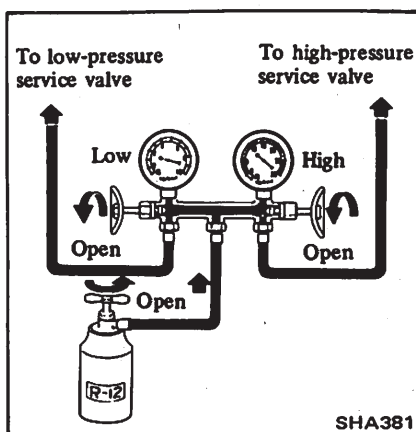
1. Evacuate refrigerant system.
2. Close manifold gauge valves securely and disconnect charging hose from vacuum pump.
3. Purge air from center charging hose.

- (1) Connect center charging hose to refrigerant can through can top.
- (2) Break seal of refrigerant can and purge air.



4. Charge refrigerant into system.

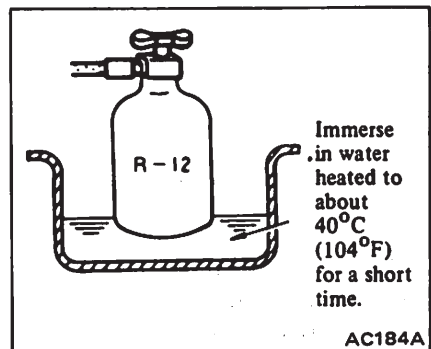
- (1) In case of charging refrigerant gas
Open high- and low-pressure valves of manifold gauge and charge refrigerant into system.



When refrigerant charging speed is slow, immerse refrigerant can in water, heated to a temperature of about 40°C (104°F), for a short time.

WARNING:

- a. Under no circumstances the refrigerant can be warmed in water heated to a temperature of over 52°C (126°F).
- b. A blow torch or stove must never be used to warm up the can.

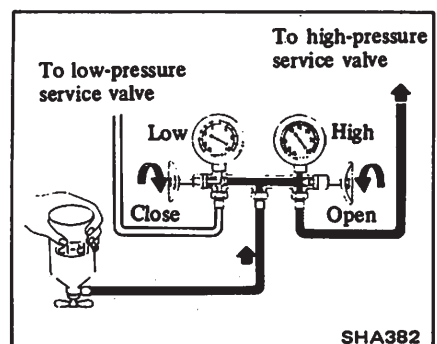


(2) In case of charging liquefied refrigerant

Open high pressure valve of manifold gauge and charge liquefied refrigerant into system with can upside down.

CAUTION:

When charging liquefied refrigerant into the system with the can turned upside down to reduce charging time, charge it only through high pressure (discharge) service valve. After completion of charging, the compressor should always be turned several times manually.

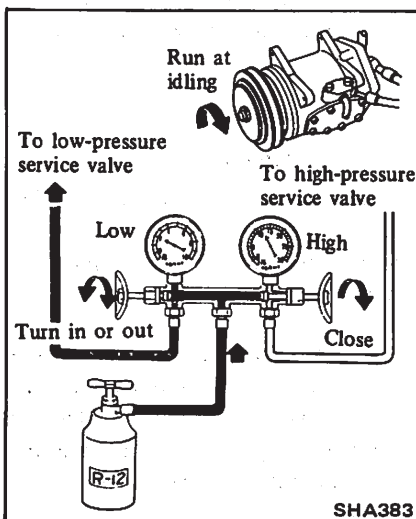


5. When refrigerant charging speed slows down, charge it while running the compressor for ease of charging. After having taken the steps up to 3 above, proceed with charging in the following order.

- (1) Shut off high pressure valve of manifold gauge.
- (2) Run the engine at idling speeds below 1,500 rpm.
- (3) Set mode dial, temperature dial and fan lever at maximum cool and speed respectively.
- (4) Charge refrigerant while controlling low-pressure gauge reading at 275 kPa (2.8 kg/cm², 40 psi) or less by turning in or out low-pressure valve of manifold gauge.

WARNING:

Never charge refrigerant through high pressure side (discharge side) of system since this will force refrigerant back into refrigerant can and can may explode.

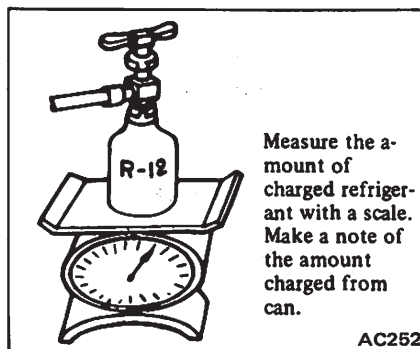


6. When refrigerant can is empty, fully close both valves of manifold gauge and replace refrigerant can with a new one.

Before charging refrigerant from new can, purge air from inside charging hose.

7. Charge the specified amount of refrigerant into system by weighing charged refrigerant with scale. Overcharging will cause discharge pressure to rise.

Refrigerant capacity:
0.8 - 1.0 kg (1.8 - 2.2 lb)



The state of the bubbles in sight glass should only be used for checking whether the amount of charged refrigerant is small or not. Refer to Checking Refrigerant Level (Section MA). The amount of charged refrigerant can be correctly judged by means of discharge pressure.

8. Close manifold gauge valves. Then detach charging hoses from service valves of system. Be sure to install valve cap on service valve.

9. Confirm that there are no leaks in system by checking with a leak detector.

Refer to Checking for Leaks (MA section).

Conducting a performance test prior to removing manifold gauge is a good service operation. Refer to Performance Test.

COMPRESSOR OIL LEVEL CHECK

Almost all compressor oil is circulating in the system together with refrigerant. If an excessive quantity of oil is charged into the system, most of the oil goes around the system and stays in the condenser or in the evaporator, thus causing considerable reduction in the cooling capacity of the system. Insufficient compressor oil leads to poor lubrication of the compressor. Whenever replacing any component of the refrigeration system, the original total oil charge must always be maintained.

Amount of oil in the system:
150 ml
(5.1 US fl oz, 5.3 Imp fl oz)

Check and adjust the quantity of oil according to the following procedures.

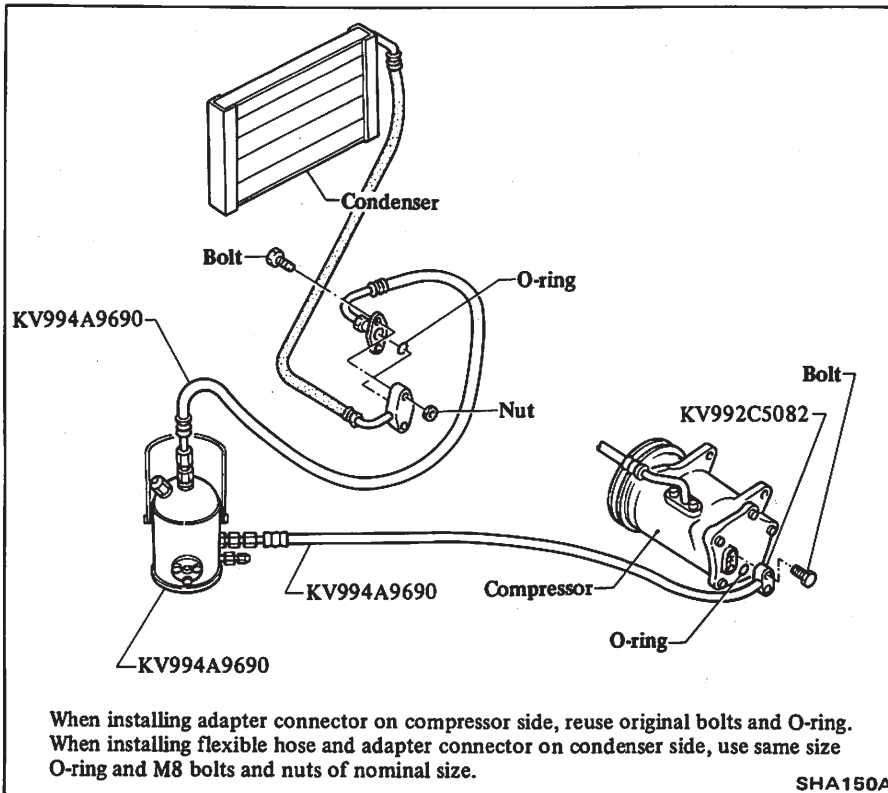
CAUTION:

- a. The oil should not be transfused from a container into another, as the failure will possibly cause moisture to mix with the oil.
- b. The used oil should not be returned into a container.
- c. The oil should not be used if its state of preservation is not clear enough.

Checking and adjusting (Using oil separator)

The Tool KV994A9690 is used to efficiently withdraw the oil in the refrigeration system (that is, to separate oil and refrigerant). If an excessive quantity of oil is charged in the system, or if the quantity of oil in the system is unknown, adjust the quantity of oil in the system to specification, proceeding as follows:

1. Discharge air conditioning system. Refer to Discharging System.
2. Using two special flexible hoses in Tool KV994A9690 and adapter connectors in Tools KV992C5081 and KV992C5082 (MJS170), connect oil separator between compressor discharge side and condenser.



3. Evacuate and charge system. Refer to General Service for evacuating and charging system.

4. Fully open all windows or all doors of car.

5. Operate compressor at engine idling with air conditioner set for maximum cooling and high fan speed.

Never allow engine speed to exceed idling speed.

6. Observe oil separator oil level gauge. If rise of oil level has stopped, immediately stop compressor operation. (This indicates that oil has been withdrawn.)

CAUTION:

Do not continue oil withdrawal operation more than 10 minutes.

In some case, fluid refrigerant may be mixed with oil, causing unusual rise of oil level. In such a case, stop compressor operation after ten minutes of withdrawal operation.

7. Discharge system. Refer to General Service for discharging system.

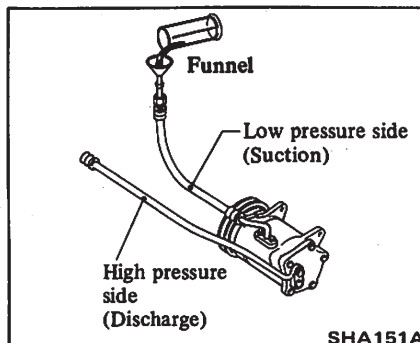
8. Disconnect oil separator.

9. Connect refrigerant lines to original positions.

10. Disconnect low flexible hose from compressor suction valve.

11. Add oil from compressor suction valve.

Amount of oil to be added:
120 ml
(4.1 US fl oz, 4.2 Imp fl oz)



a. Oil remains unremoved in the sys-

tem about 30 ml (1.0 US fl oz, 1.1 Imp fl oz)

b. To facilitate replenishment, it is a good practice to disconnect the low-pressure (flexible) hose to the evaporator and add oil to the compressor through the hose.

12. After charging, rotate compressor clutch with hand 5 to 10 turns.

13. Connect low flexible hose to compressor suction valve. Evacuate and charge system. Refer to General Service for evacuating system and charging refrigerant.

14. Conduct leak test and performance test.

15. Gradually loosen drain cap of oil separator to release residual pressure. Remove cap and drain oil.

16. To prevent formation of rust and intrusion of moisture or dust, perform the following before placing oil separator kit into storage.

(1) Cap each opening of flexible hose and double union securely.

(2) Cap oil separator, evacuate it from service valve, and charge refrigerant.

**Checking and adjusting
(Alternate method)**

If the oil Separator is not available, control the quantity of oil in accordance with the table below when charging compressor oil into the system.

a. When replacing two or more of the parts indicated in the chart below, follow each instruction under the proper charging method column for the correct amount of oil to be added.

b. The total amount of oil to be added must never exceed 150 ml (5.1 US fl oz, 5.3 Imp fl oz).

c. The method of adding oil is the same as in the case of using the oil separator. Oil is added into the compressor.

GENERAL SERVICE – Air conditioner

OIL CHARGE TABLE

Condition		Proper charging method	Amount of oil to be added mℓ (US fl oz, Imp fl oz)
Replacement of compressor		1. Remove all oil from new and old compressors.* 2. Charge new compressor with the same amount of oil as was in old compressor.	
Replacement of evaporator		Add amount of oil shown in right column.	70 (2.4, 2.5)
Replacement of condenser	There is no sign of oil leakage from condenser.	Oil need not be added.	—
	There are evidences of a large amount of oil leakage from condenser.	Add amount of oil shown in right column.	50 (1.7, 1.8)
Replacement of flexible hose or copper tube	There is no sign of oil leakage.	Oil need not be added.	—
	There are evidences of a large amount of oil leakage.	Add amount of oil shown in right column.	50 (1.7, 1.8)
Gas leakage	There is no sign of oil leakage.	Oil need not be added.	—
	There are evidences of a large amount of oil leakage.	Add amount of oil shown in right column.	50 (1.7, 1.8)

* Remove compressor oil as follows:

1. With the compressor upside down, completely drain the oil through the suction port (from the embos-

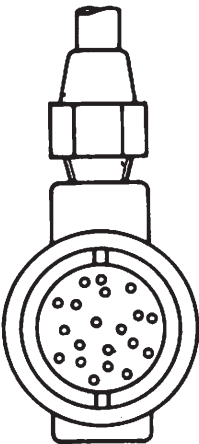
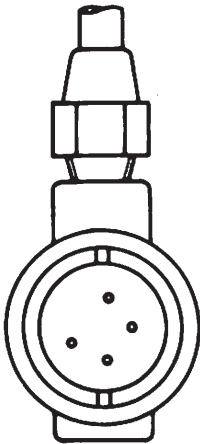
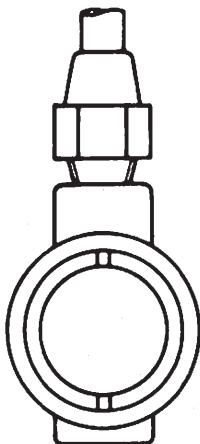
sed letter "s" mark side).
Be sure to use a clean container to receive the oil.

2. When the oil stops flowing out, rotate the clutch hub two or three times to completely drain the oil.

GENERAL SERVICE — Air conditioner

REFRIGERANT LEVEL CHECK

1. Open doors fully.
2. Start the engine.
3. Set air conditioner switch to "ON" position.
4. Set temperature lever to maximum cold position.
5. Set blower to maximum speed.
6. Check sight glass after the lapse of about five minutes. Judge according to the following table.

Amount of refrigerant Check item	Almost no refrigerant	Insufficient	Suitable	Too much refrigerant
Temperature of high pressure and low pressure lines.	Almost no difference between high pressure and low pressure side temperature.	High pressure side is warm and low pressure side is fairly cold.	High pressure side is hot and low pressure side is cold.	High pressure side is abnormally hot.
State in sight glass.	Bubbles flow continuously. Bubbles will disappear and something like mist will flow when refrigerant is nearly gone.  AC256	The bubbles are seen at intervals of 1 - 2 seconds.  AC257	Almost transparent. Bubbles may appear when engine speed is raised and lowered. No clear difference exists between these two conditions.  AC258	No bubbles can be seen.
Pressure of system.	High pressure side is abnormally low.	Both pressure on high and low pressure sides are slightly low.	Both pressures on high and low pressure sides are normal.	Both pressures on high and low pressure sides are abnormally high.
Repair.	Stop compressor immediately and conduct an overall check.	Check for gas leakage, repair as required, replenish and charge system.		Discharge refrigerant from service valve of low pressure side.

a. The bubbles seen through the sight glass are influenced by the ambient temperature. Since the bubbles are hard to show up in comparatively low temperatures below 20°C (68°F), it is possible that a slightly larger amount of refrigerant would be filled, if supplied according to the sight glass. Be sure to recheck

the amount when it exceeds 20°C (68°F). In higher temperature the bubbles are easy to show up.
b. When the screen in the receiver drier is clogged, the bubbles will appear even if the amount of refrigerant is normal. In this case, the outlet side pipe of the receiver drier becomes considerably cold.

CHECKING COMPRESSOR DRIVE BELT

Refer to Engine Maintenance for inspection and adjustment.

CHECKING HOSES AND PIPES

Check heater and air conditioner for damaged hoses or pipes due to interference or friction with adjoining parts. If damage is minor, repair those affected hose or pipes. If damage is major and if there is the possibility of encountering holes, replace the affected parts.

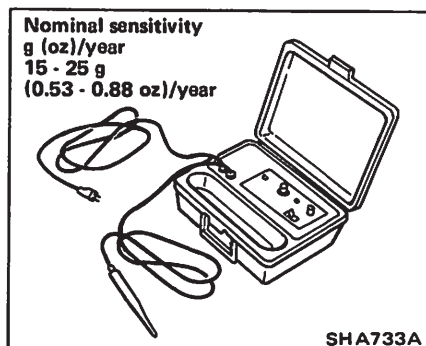
Carefully check hoses and pipes, especially those located close to moving parts or sharp edge of panel.

CHECKING REFRIGERANT LEAKS

Conduct a leak test with electric leak detector whenever leakage of refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening of connection fittings.

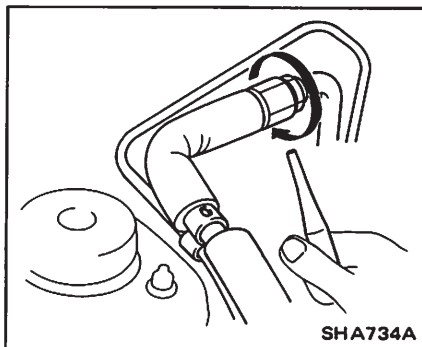
Electric leak-detector

The leak detector is a delicate device that detects small amounts of halogen. In order to use the device properly, read the manuals put out by each maker and perform the specified maintenance and inspections.

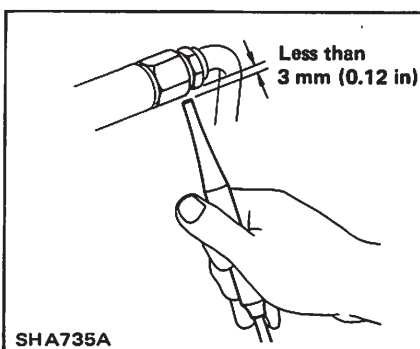


General precautions for handling leak detector

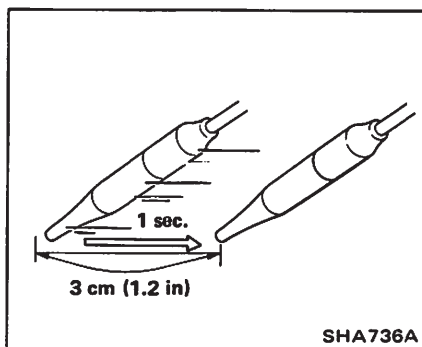
1. The probe must be correctly aimed at the point to be checked. Each fitting must be checked around its entire periphery. Refrigerant gas is heavier than air, so the underside of the fitting must also be checked.



2. The probe must be held as close as possible to the checking point, within 3 mm (0.12 in) of the object.



3. The detector requires a certain length of time to react to the gas. The moving speed of the probe must be maintained at less than 3 cm (1.2 in)/sec.



Measurement standard

If any reaction is noted using a detector having a nominal sensitivity of 15 to 25 g (0.53 to 0.88 oz)/year, that portion checked be found as leaking, and therefore must be repaired.

• The nominal sensitivity of the detector is determined under the assumption that all the leaking gas is collected by the detector. Accordingly, the quantity of gas actually leaking can amount to five to ten times the indicated value.

Generally speaking, leakage of 150 to 200 g (5.29 to 7.05 oz) of refrigerant can cause insufficient cooling.

- Oil deposited during assembling must be wiped off before inspection. Refrigerant easily dissolves in oil, and the presence of oil can cause an error in measurement. This precaution is important when checking a used car for refrigerant leakage.
- If any trace of oil is noted at and around connection fittings, it is a sure indication that refrigerant is leaking.

MAJOR CHECK POINTS

- (1) Compressor
 - Compressor shaft seal (rotate the compressor by hand)
 - Flexible hose connections
 - Front and rear head gaskets
 - Service valve
- (2) Condenser
 - Condenser pipe fitting
 - Condenser inlet and outlet pipe connections
- (3) Refrigerant lines
 - Line connections
- (4) Evaporator housing
 - Inlet and outlet line connections
 - Expansion valve

If a gas leak is detected, proceed as follows:

1. Check torque on the connection fitting and, if too loose, tighten to the proper torque. Refer to S.D.S. Check for gas leakage with a leak detector.
2. If leakage continues even after the fitting has been retightened, discharge refrigerant from system, disconnect the fittings, and check its seating face for damage. Always replace even if damage is slight.
3. Check compressor oil and add oil if required.
4. Charge refrigerant and recheck for gas leaks. If no leaks are found, evacuate and charge system.

OFF-SEASON MAINTENANCE


Even in the off-season, turn the compressor for 10 minutes at least once a month by running the engine at idling rpm.

PERFORMANCE TEST

PERFORMANCE CHART

TEST CONDITION

Testing must be performed as follows:

Car location:	Indoors or in the shade
Doors:	Closed
Door window:	Open
Hood:	Open
TEMP. lever position:	Max. COLD
Air control lever position:	 (Ventilation)
INTAKE lever position:	RECIRC
FAN lever position:	4
Engine speed:	1,500 rpm
Time required before starting testing after air conditioner starts operating:	More than 10 minutes

PERFORMANCE TEST – Air conditioner

TEST READING

Recirculating-to-discharge air temperature table

Relative humidity %	Inside air (Recirculating air at blower inlet)	
	Air temperature °C (°F)	Discharge air temperature at center ventilator °C (°F)
40 - 60	25 (77)	6.0 - 8.5 (43 - 47)
	30 (86)	9.0 - 12.5 (48 - 55)
	35 (95)	13.0 - 18.5 (55 - 65)
60 - 80	25 (77)	8.5 - 12.8 (47 - 55)
	30 (86)	12.5 - 18.4 (55 - 65)
	35 (95)	18.5 - 26.7 (65 - 80)

Ambient air temperature-to-compressor pressure table

Ambient air		Air temperature °C (°F)	High pressure (Discharge side) kPa (kg/cm ² , psi)	Low pressure (Suction side) kPa (kg/cm ² , psi)
Relative humidity %				
40 - 80	25 (77)	1,118 - 1,353 (11.4 - 13.8, 162 - 196)		127 - 206 (1.3 - 2.1, 18 - 30)
	30 (86)	1,353 - 1,657 (13.8 - 16.9, 196 - 240)		157 - 255 (1.6 - 2.6, 23 - 37)
	35 (95)	1,638 - 2,040 (16.7 - 20.8, 237 - 296)		186 - 304 (1.9 - 3.1, 27 - 44)

- The pressure will change in the following manner with changes in conditions:
 - When blower speed is low, discharge pressure will drop.
 - When the relative humidity of intake air is low, discharge pressure will drop.
 - The temperature will change in the following manner with changes in conditions:
 - When the ambient air temperature is low, the outlet air temperature will become low.
- If the test reveals that there is any abnormality in system pressure, isolate the cause and repair. Refer to Performance Test Diagnoses.

PERFORMANCE TEST – Air conditioner

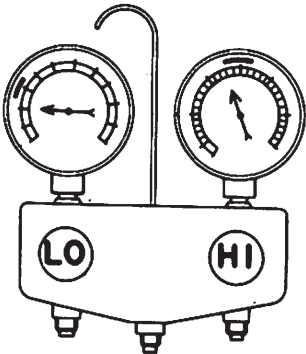
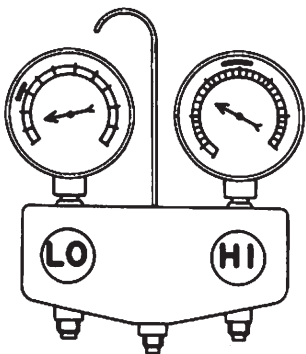
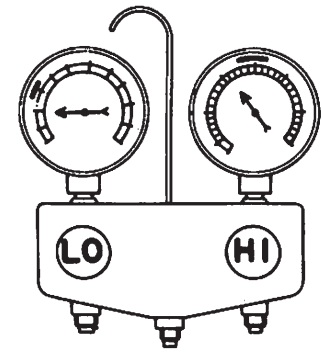
PERFORMANCE TEST DIAGNOSES

Characteristics revealed on the manifold gauge reading for the air conditioning system are shown in the following.

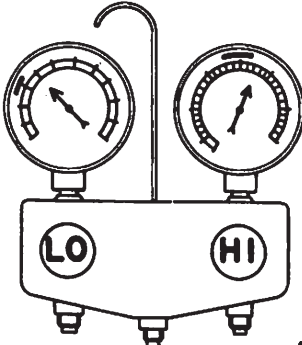
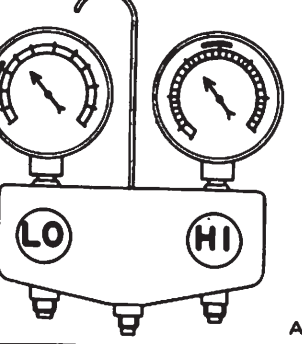
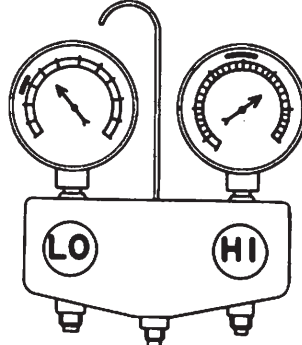
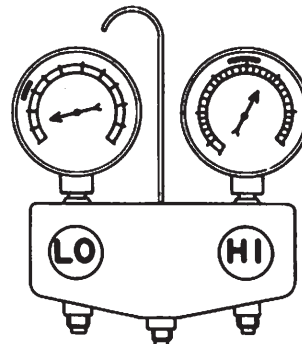
As to the method of a performance test, refer to the item of "Performance Test".

In the following table, the portion smeared with ink on each gauge scale

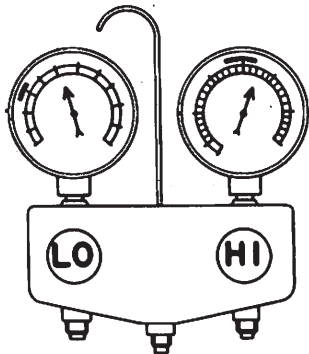
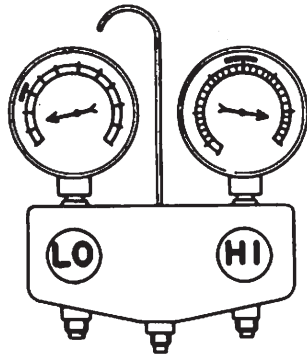
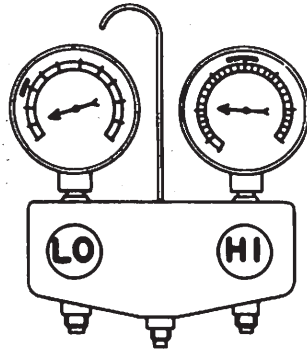
indicates a range based on the assumption that the air conditioning system is in good order. This range is described in PERFORMANCE CHART.

Condition	Probable cause	Corrective action
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">INSUFFICIENT REFRIGERANT CHARGE</div>  <p style="text-align: right; margin-right: 50px;">AC352A</p>	<p>Insufficient cooling. Bubbles appear in sight glass.</p> <p>Refrigerant is small, or leaking a little.</p>	<ol style="list-style-type: none"> 1. Leak test. 2. Repair leak. 3. Charge system. <p>Evacuate, as necessary, and recharge system.</p>
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">ALMOST NO REFRIGERANT</div>  <p style="text-align: right; margin-right: 50px;">AC353A</p>	<p>No cooling action. In sight glass appear a lot of bubbles or something like mist.</p> <p>Serious refrigerant leak.</p>	<p>Stop compressor immediately.</p> <ol style="list-style-type: none"> 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">FAULTY EXPANSION VALVE</div>  <p style="text-align: right; margin-right: 50px;">AC354A</p>	<p>Slight cooling. Sweating or frosted expansion valve inlet.</p> <p>Expansion valve restricts refrigerant flow.</p> <ul style="list-style-type: none"> • Expansion valve is clogged. • Expansion valve is inoperative. <p style="margin-left: 40px;">Valve stuck closed. Thermal bulb has lost charge.</p>	<p>If valve inlet reveals sweat or frost:</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. <p>If valve does not operate:</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

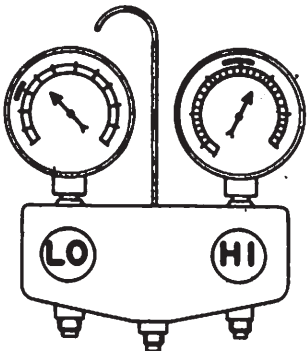
PERFORMANCE TEST – Air conditioner

Condition	Probable cause	Corrective action
 <p>AC355A</p>	<p>Insufficient cooling. Sweated suction line.</p>	<p>Expansion valve allows too much refrigerant through evaporator.</p> <p>Check valve for operation. If suction side does not show a pressure decrease, replace valve.</p>
 <p>AC356A</p>	<p>No cooling. Sweating or frosted suction line.</p>	<p>Faulty expansion valve.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace valve. 3. Evacuate and replace system.
<p>AIR IN SYSTEM</p>  <p>AC359A</p>	<p>Insufficient cooling. Sight glass shows occasional bubbles.</p>	<p>Air mixed with refrigerant in system.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.
<p>MOISTURE IN SYSTEM</p>  <p>AC360A</p>	<p>After operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As a warning of this, reading shows 39 kPa (0.4 kg/cm², 6 psi) vibration.</p>	<p>Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely. (Repeat 30-minute evacuating three times.) 4. Recharge system.

PERFORMANCE TEST — Air conditioner

Condition	Probable cause	Corrective action
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">FAULTY CONDENSER</div> <div style="display: flex;"> <div style="flex: 1;">  <p style="text-align: center;">AC361A</p> </div> <div style="flex: 2; padding-left: 10px;"> <p>No cooling action: engine may overheat. Bubbles appear in sight glass of drier. Suction line is very hot.</p> </div> </div>	Usually a malfunctioning condenser.	<ul style="list-style-type: none"> ● Check fan belt and fluid coupling. ● Check condenser for dirt accumulation. ● Check engine cooling system for overheat. ● Check for refrigerant overcharge. <p>If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.</p>
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">HIGH PRESSURE LINE BLOCKED</div> <div style="display: flex;"> <div style="flex: 1;">  <p style="text-align: center;">AC362A</p> </div> <div style="flex: 2; padding-left: 10px;"> <p>Insufficient cooling. Frosted high pressure liquid line.</p> </div> </div>	Drier clogged, or restriction in high pressure line.	<ol style="list-style-type: none"> 1. Discharge system. 2. Remove receiver drier or strainer and replace it. 3. Evacuate and charge system.
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">FAULTY COMPRESSOR</div> <div style="display: flex;"> <div style="flex: 1;">  <p style="text-align: center;">AC363A</p> </div> <div style="flex: 2; padding-left: 10px;"> <p>Insufficient cooling.</p> </div> </div>	Internal problem in compressor, or damaged gasket and valve.	<ol style="list-style-type: none"> 1. Discharge system. 2. Remove and check compressor. 3. Repair or replace compressor. 4. Check oil level. 5. Replace receiver drier. 6. Evacuate and charge system.

PERFORMANCE TEST – Air conditioner

Condition	Probable cause	Corrective action
<div data-bbox="156 322 421 398" style="border: 1px solid black; padding: 2px; width: fit-content;"> TOO MUCH OIL IN SYSTEM (Excessive) </div> <div data-bbox="177 465 485 815" style="text-align: center;">  </div> <div data-bbox="453 824 536 846" style="text-align: right; margin-top: 10px;"> AC364A </div>	<p>Insufficient cooling.</p> <p>Too much oil circulates with refrigerant, causing the cooling capacity of the system to be reduced.</p>	<p>Refer to Oil Level Check for correcting oil level.</p>

SERVICE PROCEDURES

PRECAUTIONS FOR REMOVAL AND INSTALLATION

When replacing refrigerant cycle components, observe the following:

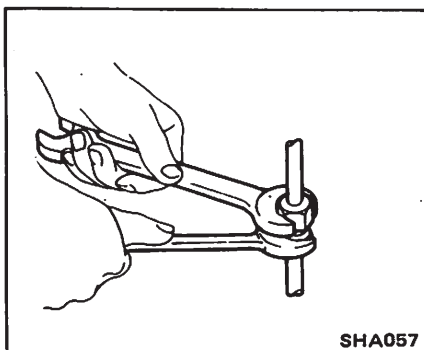
1. Disconnect battery ground cable.
2. Before starting work, be sure to discharge system.

WARNING:

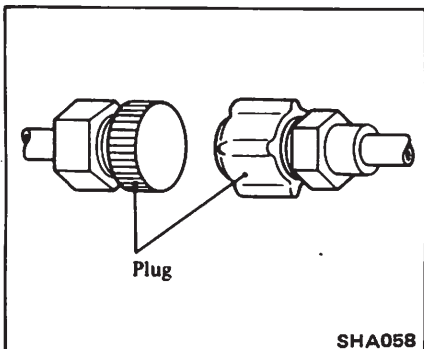
Gradually loosen discharge side hose fitting, and remove it after remaining pressure has been released.

CAUTION:

- When disconnecting or connecting tubes, be sure to use two wrenches on both tubes.

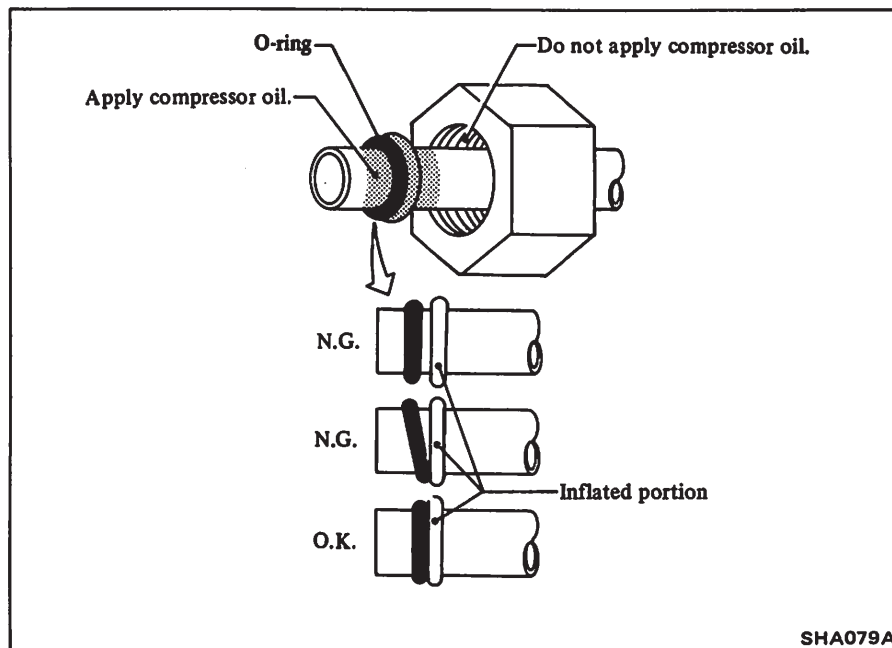


- After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.

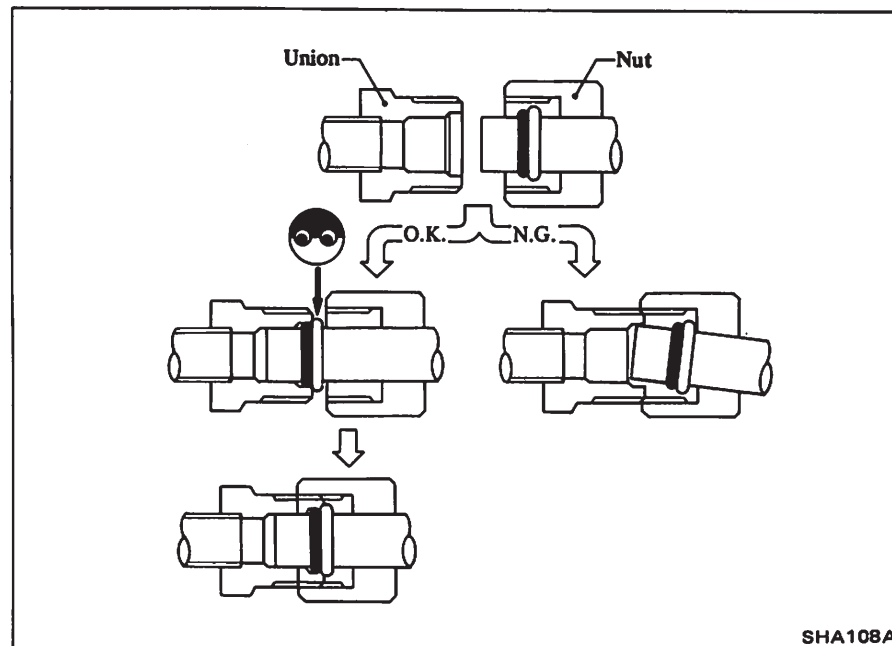


- Compressed air must never be used to clean dirty line. Clean with refrigerant gas.
- Do not reuse used O-ring.

- When connecting tube, apply compressor oil to portions shown in illustration. Be careful not to apply oil to threaded portion.
- O-ring must be closely attached to inflated portion of tube.



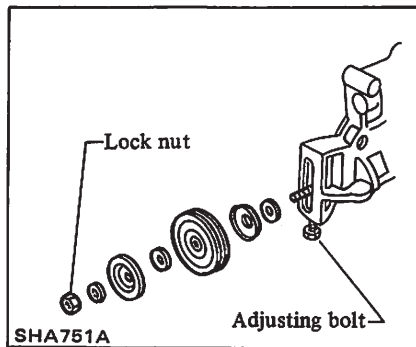
- After inserting tube into union until O-ring is no more visible, tighten nut to specified torque.



COMPRESSOR IDLER PULLEY

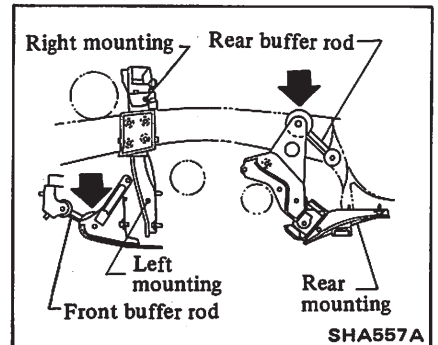
REMOVAL AND INSTALLATION

1. Loosen idler pulley lock nut and fully loosen adjusting bolt.
2. Remove drive belt.
3. Remove idler pulley assembly.
4. Installation is in the reverse order of removal.

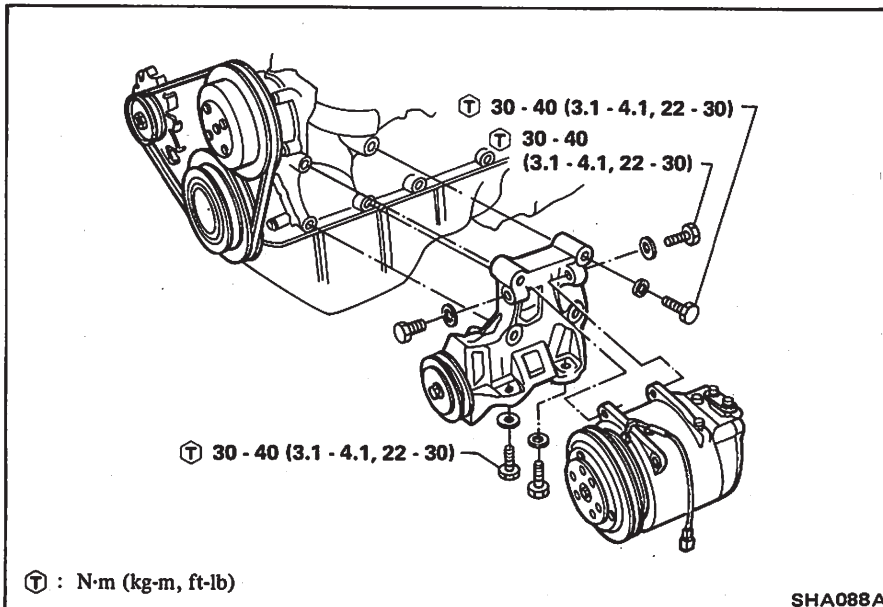


Refer to Checking and Adjusting Drive Belts (Section MA) for drive belt tension.

After installing compressor on engine, loosen bolts securing front and rear buffer rods on engine side and tighten them again. When tightening bolts, be careful not to place your hand or any other object on engine.



COMPRESSOR



Ⓙ : Front and rear buffer rods
39 - 49 N-m
(4.0 - 5.0 kg-m,
29 - 36 ft-lb)

CONDENSER

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Discharge refrigerant from system. Refer to General Service.
3. Remove radiator grille.
4. Disconnect refrigerant lines from condenser.
5. Remove condenser cooling fan.
6. Remove radiator fixing bolts and nuts.
7. Remove condenser fixing bolts, then remove condenser pushing away radiator in the direction of engine side.

INSPECTION

Inspect joints of inlet and outlet pipes for cracks and scratches. Upon finding any problem which may cause gas to leak, repair or replace condenser. Condenser fins or air passages clogged with dirt, insects or leaves will reduce cooling efficiency of condenser. In such a case, clean fins or air passages with compressed air.

CAUTION:

- a. Do not clean condenser with steam. Be sure to use cold water or compressed air.
- b. Plug all openings to prevent entrance of dirt and moisture into receiver drier.

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Discharge refrigerant from system. Refer to General Service.
3. Block rear wheels with chocks and raise front of car, and then support it with safety stands. Refer to section GI for Lifting Points and Towing.
4. Remove compressor drive belt.
5. Disconnect compressor clutch harness.
6. Disconnect high and low flexible hoses from compressor.
7. Remove compressor.

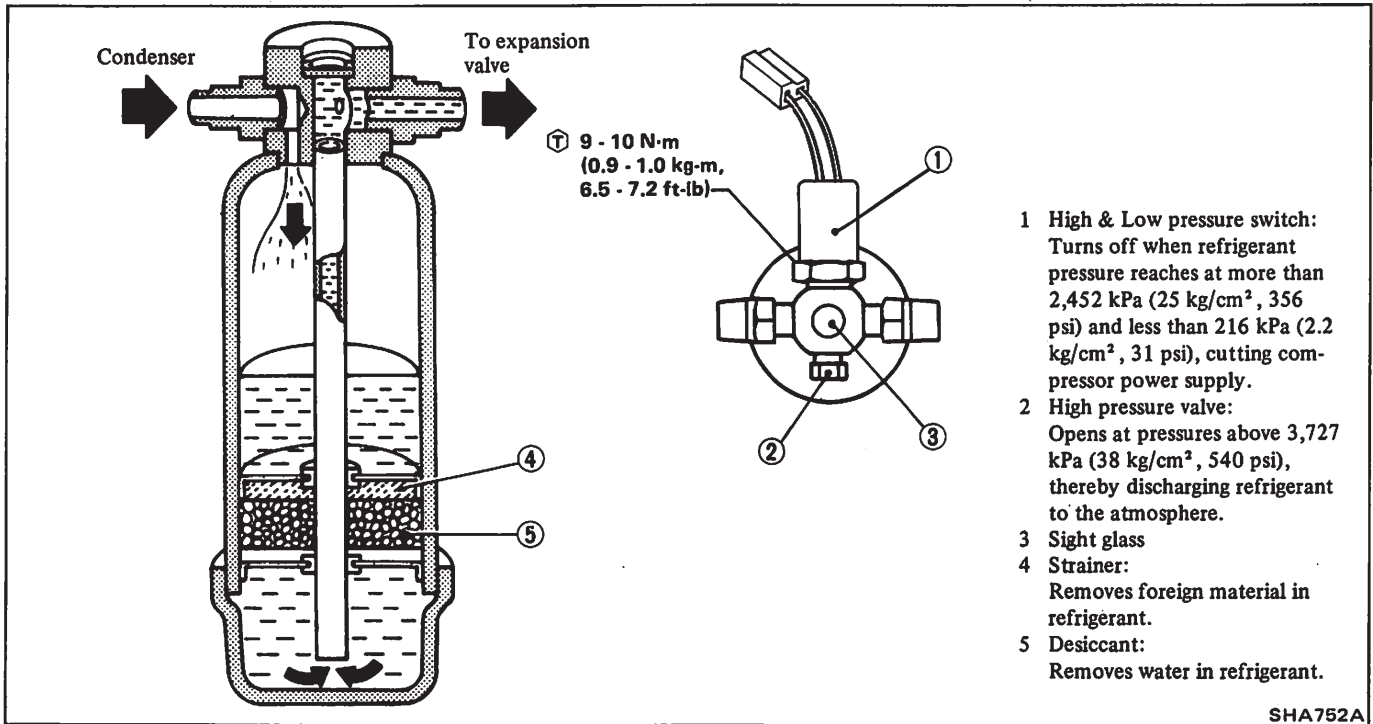
CAUTION:

Do not attempt to leave the compressor on its side or upside down for more than 10 minutes, as the compressor oil will enter the low pressure chambers. If, under that condition, compressor should be operated suddenly, internal damage would result. To expel oil from chambers, hand-crank compressor several times in its installed condition.

8. Installation is in the reverse order of removal.

When connecting high and low flexible hoses to compressor, install new O-ring into connection.

RECEIVER DRIER



CAUTION:

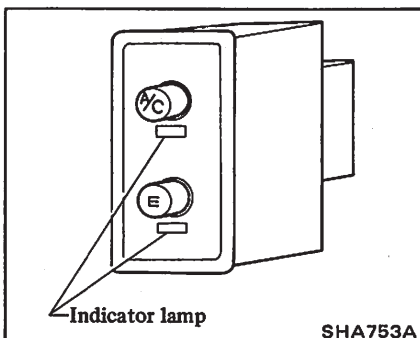
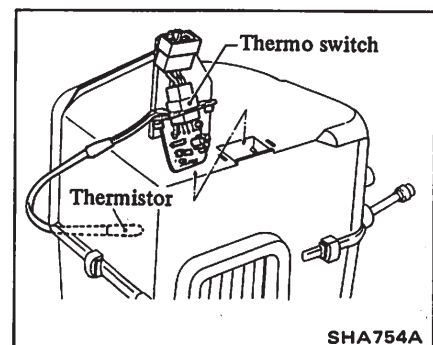
Plug all openings to prevent entrance of dirt and moisture into receiver drier.

"A/C" switch		ON	ON	OFF	OFF
"E" switch		OFF	ON	ON	OFF
Indicator lamp	"A/C" side	ON	ON	OFF	OFF
	"E" side	OFF	ON	OFF	OFF
Air conditioner		Operated (Max.)	Operated (Economy)	Not operated	Not operated

AIR CONDITIONER SWITCH AND THERMO SWITCH

The air conditioner switch consists of "A/C" and "E" push buttons and sets the Max. or Economy condition on the air conditioner. The specified temperature in the evaporator which turns the air conditioner on or off is different for Max. and Economy modes.

The thermistor detects the evaporator temperature and the thermo switch turns the compressor on or off. The thermo switch has a variable thermo control design for greater fuel economy.



Maximum/Economy	Evaporator temperature °C (°F)	Compressor
Maximum	Below 0 - 1 (32 - 34)	OFF
	Above 2.5 - 3.5 (37 - 38)	ON
Economy	Below 4 - 6 (39 - 43)	OFF
	Above 7 - 8.5 (45 - 47)	ON

COOLING UNIT

REMOVAL AND INSTALLATION

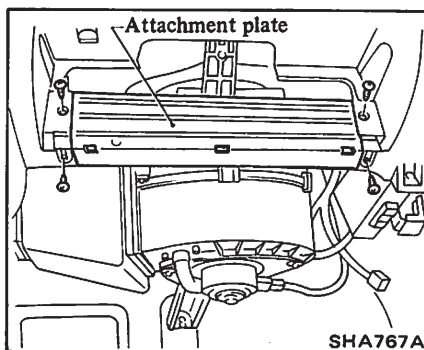
1. Disconnect battery ground cable.
2. Discharge refrigerant from system.
3. Disconnect refrigerant lines from evaporator.

Remove piping grommet and cover.

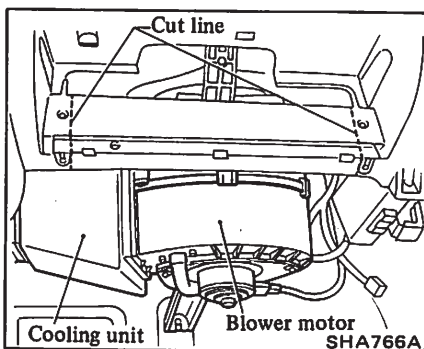
CAUTION:

Immediately plug up all openings to prevent entrance of dirt and moisture.

4. Remove passenger side instrument lower cover and glove box. (Refer to section BF.) Remove attachment plate from instrument panel.

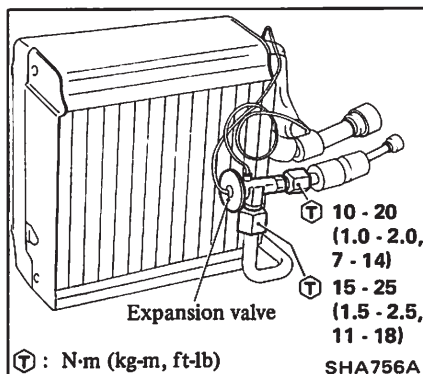


For vehicles with factory installed air conditioner, cut instrument panel with hacksaw blade on cut-lines. Before cutting, cover blower motor vent holes with tape. After cutting, brush the shavings away from the area around blower motor and remove tape.



5. Remove blower motor unit.
6. Remove cooling unit.
7. Installation is in the reverse order of removal. After reinstalling the cooling unit, install the attachment plate to the instrument panel.

EVAPORATOR



1. Clean fins and check for corrosion.

CAUTION:

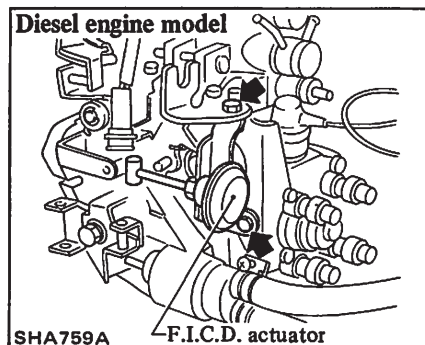
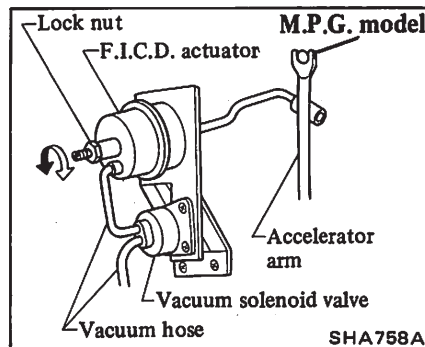
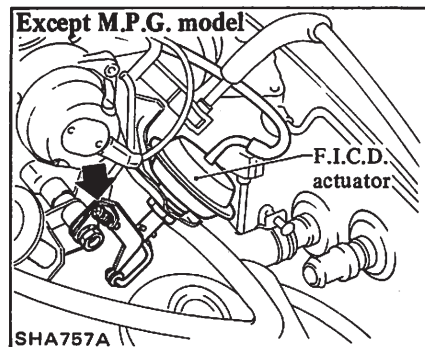
- a. Do not clean evaporator with steam. Be sure to use cold water or compressed air.
- b. Do not disassemble expansion valve. Replace as assembly if necessary.

2. Check for gas leaks at fins and expansion valve.
If there are leaks, retighten or replace.

FAST IDLE CONTROL DEVICE (F.I.C.D.)

ADJUSTMENT OF IDLE SPEED

1. Run engine until it reaches operating temperature.
2. With air conditioning system OFF (when compressor is not operated), make sure that engine is at correct idle speed.
3. With air conditioning system ON (Air conditioner switch at "A/C" position, fan control lever at "4" position), make sure that compressor, F.I.C.D. actuator and solenoid valve are functioning properly.
4. Set idle speed at the specified value.



Engine revolution:

Gasoline engine model

M/T 800±50 rpm

A/T 620±40 rpm

(Shift lever should be in "D" position.)

Diesel engine model

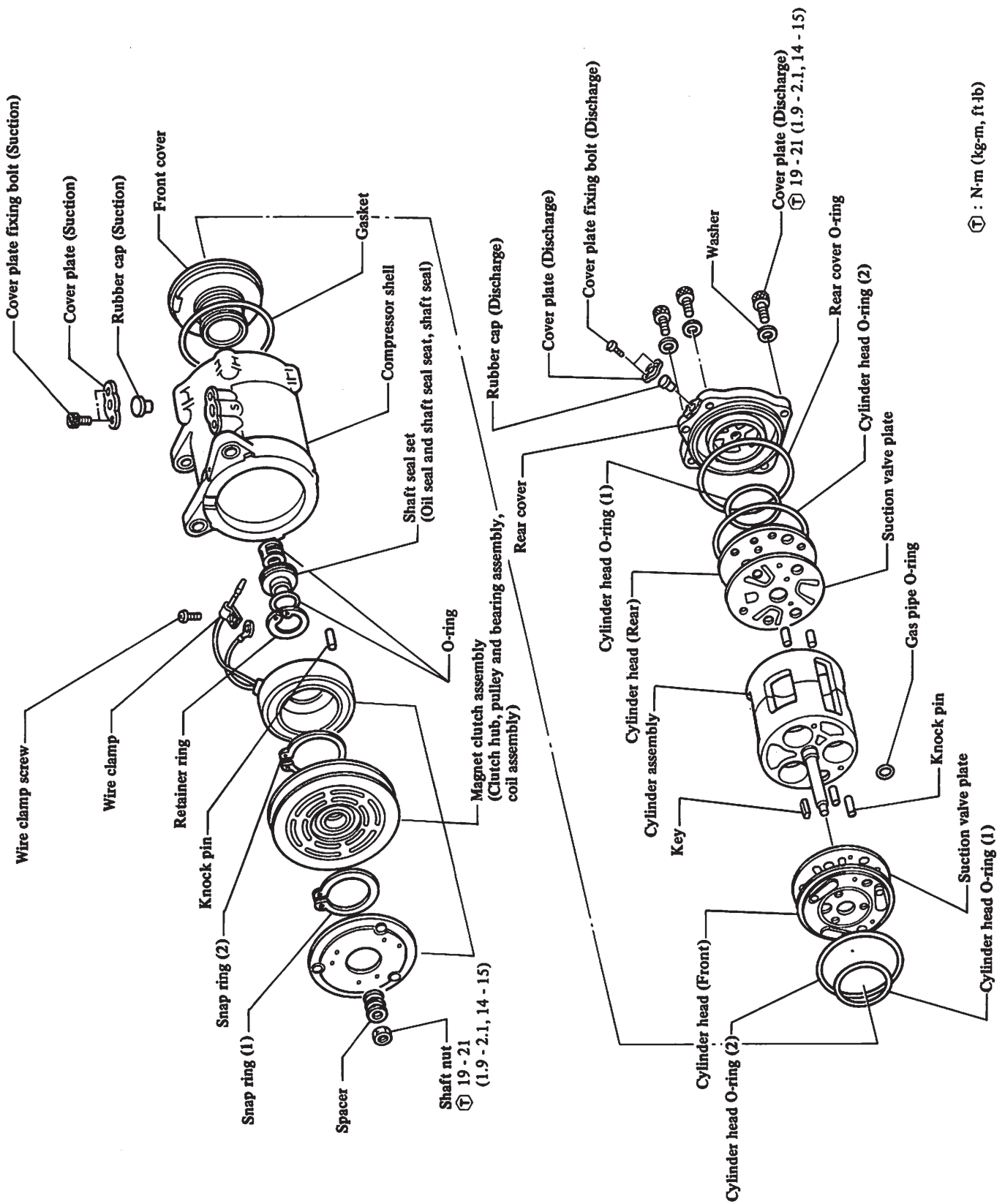
M/T 900±50 rpm

A/T 900±50 rpm

(Shift lever should be in "N" position.)

When adjusting engine revolution, apply parking brake and tire stoppers.

COMPRESSOR—Model MJS170



SHA029A

DESCRIPTION

The MJS170 compressor employs an oil-mist jet system in which some lubricant is mixed in the refrigerant and the mixture is sprayed directly to the sliding portions from the compressor suction side.

PRELIMINARY CLEANING

Before starting work, remove dirt from outside the detached compressor. Clean the workbench, tool, and your hands.

COMPRESSOR CLUTCH

The most likely source of problem is clutch slippage. Factors are listed here. Exercise ample care.

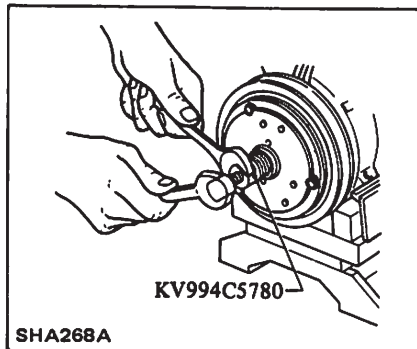
1. Clearance between clutch hub and pulley should be 0.5 to 0.8 mm (0.020 to 0.031 in) at all peripheral points.
2. Make sure that there is no oil or dirt on friction surfaces of clutch disc (clutch hub) and pulley. Remove any oil or dirt with a dry rag.
3. Make sure that terminal voltage at magnetic coil is above 10.5V.

REMOVAL

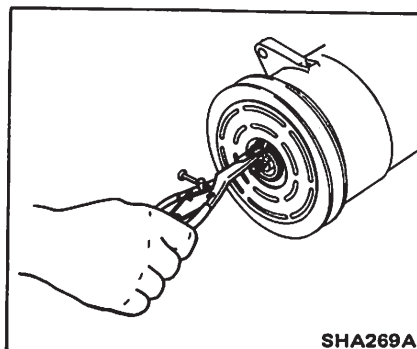
CAUTION:

Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.

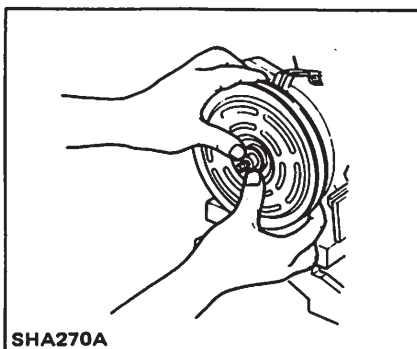
1. Using Tool KV99412302, hold clutch hub. With suitable socket wrench, remove shaft nut from shaft.
2. Using Tool KV994C5780, remove clutch hub. Thread tool into the bore of clutch hub, hold tool with wrench, and then thread in center bolt.



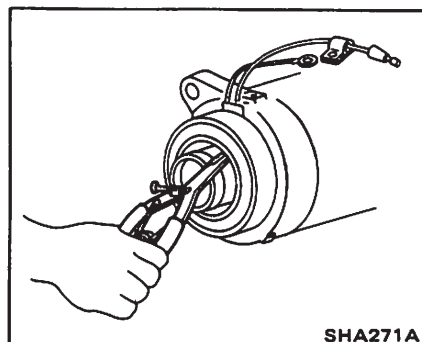
3. Pry inner snap ring off.



4. Remove pulley and bearing assembly. When the assembly can not be removed by hand, use Tools KV994C5781 and KV994C5782.



5. Remove clamping screws that secure coil assembly leads. Remove inner snap ring from coil assembly.



6. Remove coil assembly from front cover.

INSPECTION

1. Check friction surfaces of clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace coil, pulley and bearing assembly, and clutch hub as a set.
2. Oil or dirt on friction surfaces should be cleaned with a suitable solvent and a dry rag.
3. Check coil for shorted or opened binding leads.

INSTALLATION

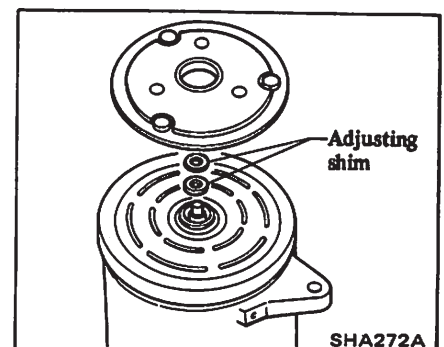
1. Install coil assembly on compressor, properly positioning terminals. Install snap ring, using snap ring plier.

Be careful not to confuse snap ring's outside and inside surfaces.

2. Using a plastic mallet, drive pulley and bearing assembly onto the neck of the front cover. Turn the pulley, making sure that there is no noise and that rotation is free. Also make sure that there is no pulley play.
3. Install inner snap ring, using snap ring plier.

Remove all oil from clutch pulley.

4. Fit key and clutch hub to shaft. Select adjusting spacer which gives the correct clearance between pulley and clutch hub.



COMPRESSOR—Model MJS170 — Air conditioner

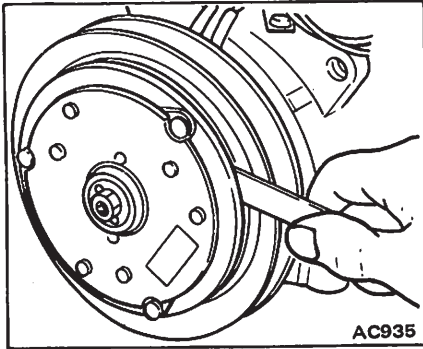
5. Coat shaft nut with Lockite.

Ⓣ : Shaft nut
19 - 21 N·m
(1.9 - 2.1 kg-m,
14 - 15 ft-lb)

6. Using a thickness gauge, measure the clutch hub-to-pulley clearance.

Hub-to-pulley clearance:
0.5 - 0.8 mm
(0.020 - 0.031 in)

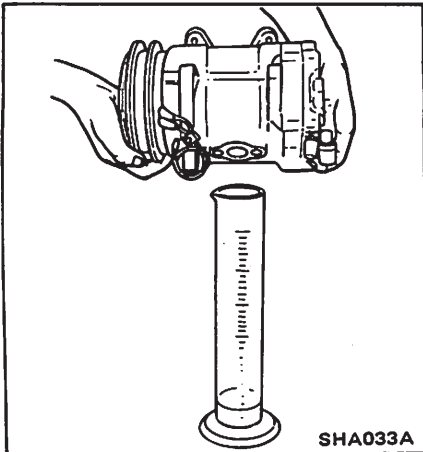
If the specified clearance is not obtained, replace adjusting spacer and readjust.



When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch some thirty times. Break-in operation raises the level of transmitted torque.

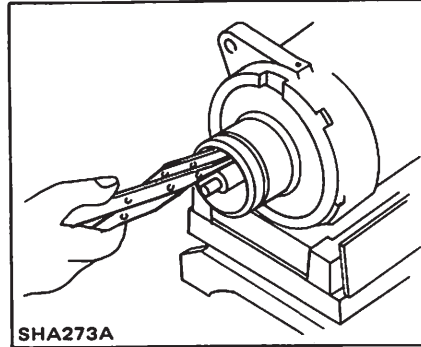
SHAFT SEAL REMOVAL

1. Turn compressor upside down, and drain oil from suction port.



2. Remove clutch hub, pulley and bearing assembly, and coil assembly. Refer to Compressor Clutch for removal.

3. Using snap ring plier, compress and remove retainer ring.



4. Remove key.

5.

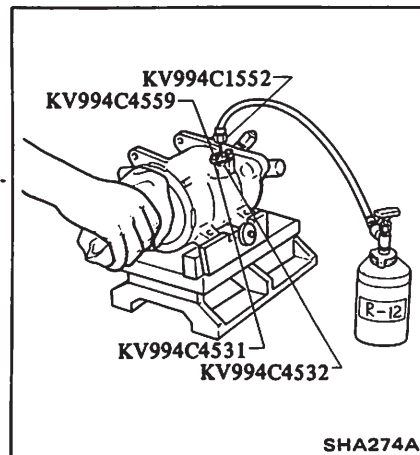
(1) Plug low and high pressure (suction and discharge) openings of compressor with Tools KV994C4531, KV994C4532 and KV994C4559.

(2) Insert Tool KV994C1552 into hole in middle of blind cover at low pressure side and connect Tool to refrigerant can.

(3) Wrap rag around shaft. Apply pressure 196 to 490 kPa (2 to 5 kg/cm², 28 to 71 psi) from low pressure (suction) service valve of compressor, and receive shaft seal seat in rag.

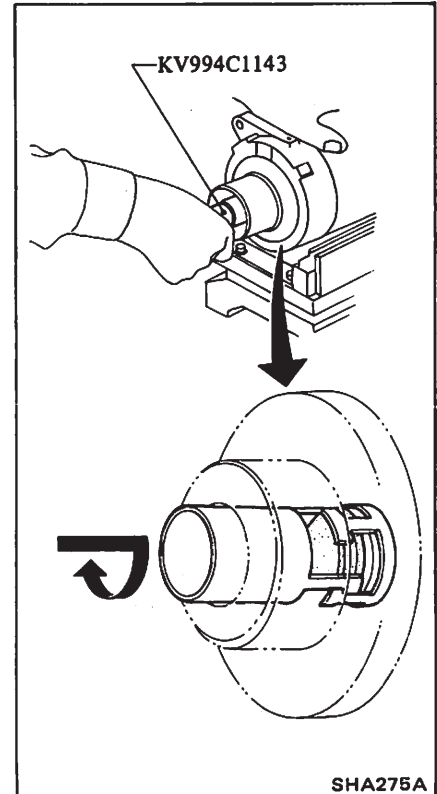
CAUTION:

Use refrigerant for pressurizing. Do not use compressed air as it involves moisture in the system.



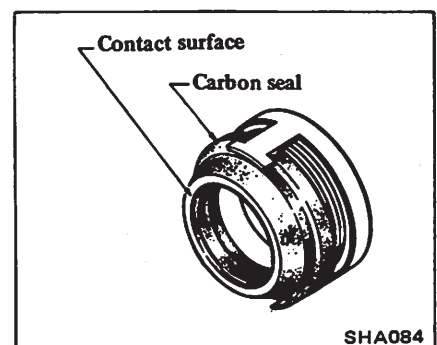
If shaft seal seat cannot be pulled out, reset it to its original position, and again try to pressurize.

6. Insert Shaft Seal Remover & Installer KV994C1143 through the open end of front cover. Depress carbon seal and hook tool at the case projection of shaft seal. Slowly pull out tool, thereby removing shaft seal.

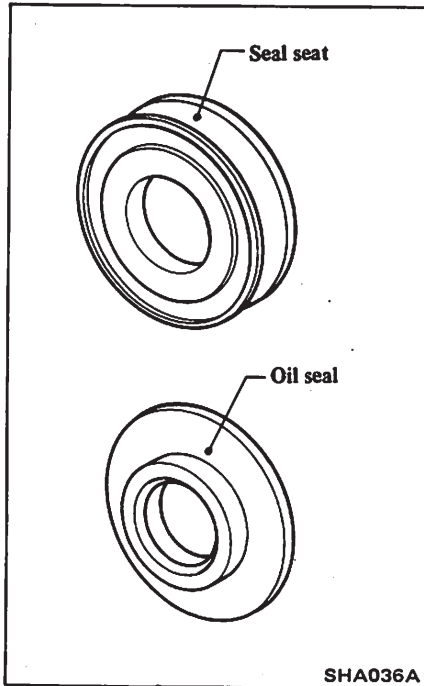


INSPECTION

1. Check carbon seal surface of shaft seal for damage. A very slight scratch on carbon seal's surface could cause gas leakage.



2. Check O-ring and the carbon seal contact surface of shaft seal seat for damage. Make sure that O-ring contact surface at front cover is not damaged. Make sure that grease is applied to oil seal in shaft seal seat.



INSTALLATION

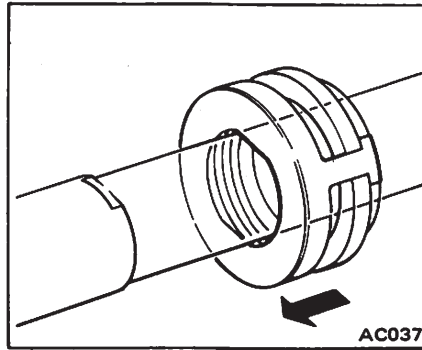
Do not reuse shaft seal and shaft seal seat.

CAUTION:

In placing a new seal kit on the workbench, make sure that the contact surface faces upward. Take necessary steps to avoid damage.

1. Make sure that the shaft seal contact surface is free of dirt and amply lubricated with compressor oil.
2. Cap Tool KV994C5784 to the top end of compressor shaft.
3. Using Tool KV994C1143, insert shaft seal with shaft seal case and shaft cutout aligned.

Apply force to turn the seal somewhat to the left and right. Insure that shaft seal seats properly in the shaft cutout.



4. Fit O-ring to the outside groove of shaft seal seat, making sure that it seats properly.
5. Apply quite a bit of compressor oil on contact surface and around shaft seal seat so that it can slide easily in front cover. Lightly coat surface of shaft with compressor oil. Following this, push in shaft seal seat and oil seal so that it seats properly at the land of front cover.
6. Install key.
7. Using snap ring pliers, compress retainer ring and fit it into front cover. Seat retainer ring firmly in the groove. Thoroughly wipe grease or oil from shaft surface.
8. Install Tool KV99412329 to the shaft of compressor, and turn the shaft 5 to 6 turns in the clockwise direction.
9. Then, check for gas leakage as follows.

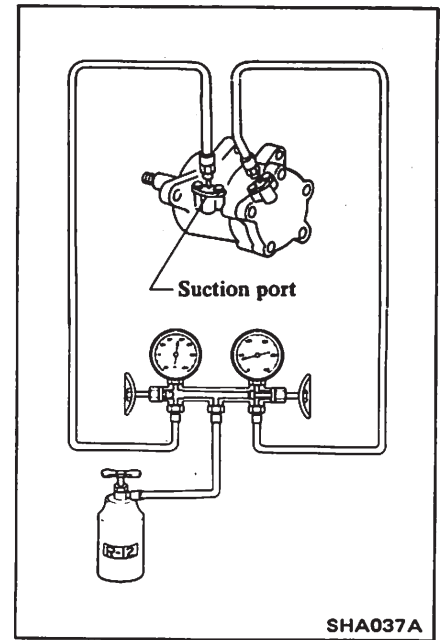
(1) Plug low and high pressure (suction and discharge) openings of compressor with Tool KV994C4531, KV994C4532 and KV994C4559.

(2) Install Tool KV994C1552, changing hose and refrigerant can to manifold gauge and insert Tool KV994C1552 into hole in middle of blind cover at low pressure side.

Connect refrigerant can to the middle hose of manifold gauge.

(3) Open valve of can tap, charge refrigerant through low pressure (suction) service side and purge air between high pressure hose and Tool KV994C1552.

(4) Conduct a leak test. If there is a leak, remove and then install parts again.



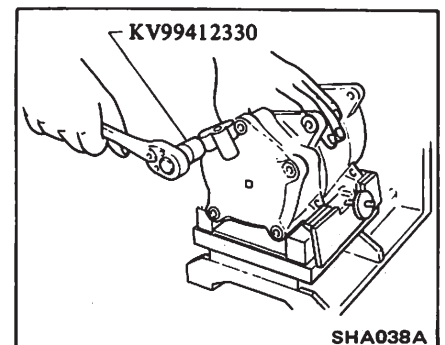
10. Install compressor clutch assembly. Refer to Compressor Clutch for installation.

11. From suction port, charge compressor with same amount of new oil as was drained before. Refer to Oil Level Check for required amount of oil.

REAR COVER AND REAR CYLINDER HEAD

REMOVAL

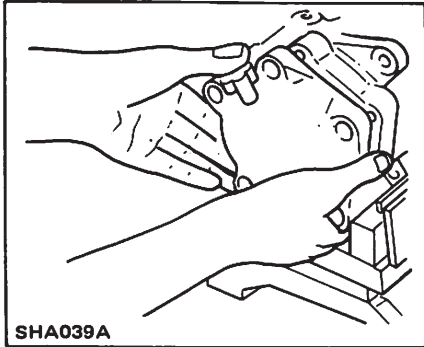
1. Turn compressor upside down, and drain oil from suction port.
2. Using Tool KV99412330, remove rear cover mounting bolts. Starting at the top, loosen all bolts one turn in an alternating pattern. Then remove bolts in turn.



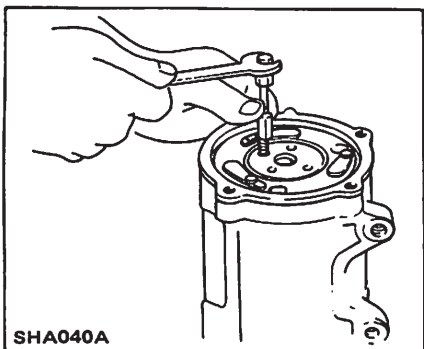
3. Grasp rear cover and carefully separate it from compressor. Tap flange lightly and alternately as required with a plastic mallet.

CAUTION:

Do not tap on compressor shaft.



4. Remove three O-rings. Discard used O-rings.
5. Remove rear cylinder head, suction valve plate, two pins and O-ring. Carefully remove suction valve plate, avoiding deformation.
6. When removal proves difficult, use Tool KV994C5785. Insert this tool into refrigerant passage (refer to page 10) in cylinder head. With nut in firm contact with the back side of cylinder head, tighten bolt slowly to break loose the head.



INSPECTION

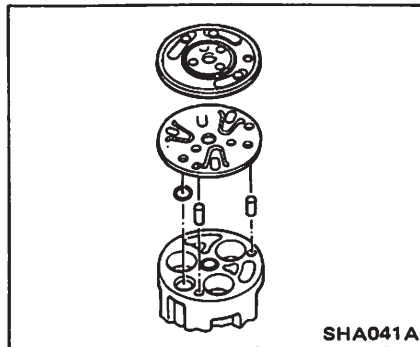
1. Make sure that the cylinder surface which comes into contact with suction valve plate is not scratched.
2. Check suction valve plate and cylinder head valve for signs of damage.

INSTALLATION

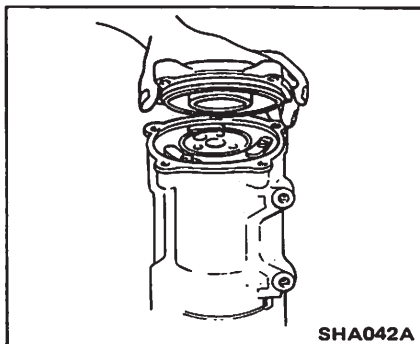
Do not reuse old gasket and O-ring.

Using clean compressor oil, remove dirt and other matter from rear cover, cylinder head and suction valve plate. Clean the workbench.

1. Using suitable blocks, position compressor with the front face downward and the rear upward.
2. Install two pins and gas pipe O-ring in the rear of cylinder. Coat O-ring beforehand with an ample amount of oil.
3. Apply a coat of compressor oil to cylinder surface.
4. Install suction valve plate, making sure that three valves properly align with cylinders.



5. Assemble cylinder head and install three O-rings in their respective positions. Coat O-rings with ample amount of oil before installation.
6. Carefully fit rear cover to the rear of compressor.



7. Using Allen Socket KV99412330, tighten up five bolts in an alternating pattern, starting at the top. Do not forget lock washers.

Ⓣ : Rear cover fixing bolt

19 - 21 N-m
(1.9 - 2.1 kg-m,
14 - 15 ft-lb)

From suction port, charge compressor with same amount of new oil as was drained before. Refer to Oil Level Check for required amount of oil.

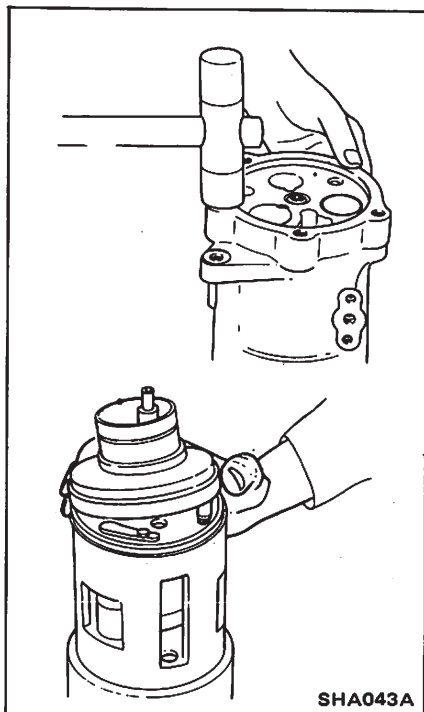
FRONT COVER, FRONT CYLINDER HEAD AND CYLINDER

REMOVAL

1. Turn compressor upside down, and drain oil from suction valve.
2. Remove compressor clutch assembly. Refer to Compressor Clutch.
3. Using snap ring pliers, remove shaft seal retainer ring. Then remove shaft seal seat. Refer to Shaft Seal. Removal of shaft seal is not absolutely necessary. It may be removed when cylinder assembly is removed from front cover. In fact, this approach facilitates work.
4. Remove rear cover, three O-rings, cylinder head, suction valve plate, two pins and O-ring in that order. Refer to Rear Cover and Rear Cylinder Head. This exposes the rear part of cylinder.
5. With the front facing downward, support compressor shell. Using a plastic mallet, tap at the rear end of the shell flange, driving shell straight downward. Discard front cover gasket.
6. Detach front cover from cylinder assembly.
7. Remove shaft seal from the shaft.
8. Remove two O-rings, cylinder head, suction valve plate, two pins and O-ring. In removing two pins, proceed carefully to avoid cylinder head damage. Discard old O-rings.

CAUTION:

Do not deform suction valve plate when removing it.



INSTALLATION

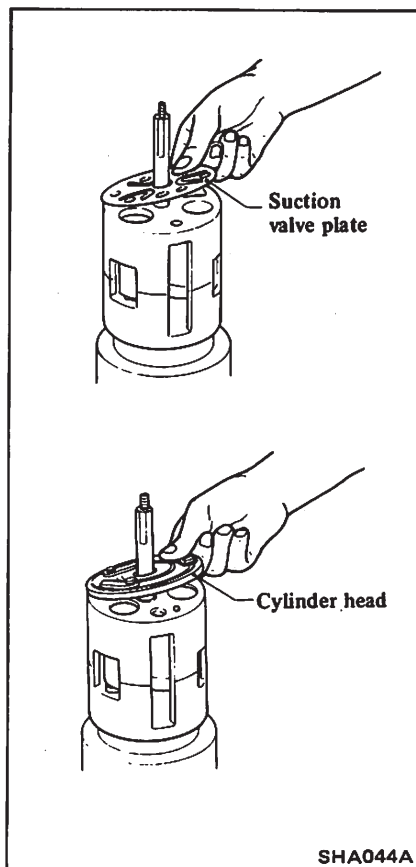
Note that designs of front and rear suction plates are identical but that designs of front and rear cylinder heads are not.

Discard old O-rings and install new ones.

1. Using suitable blocks, face cylinder assembly upward. Install two pins and O-ring. Lubricate O-ring before assembly.

2. Position suction valve plate in the order listed while making sure that three valves of suction valve plate are aligned with cylinder.

3. Apply a coat of oil on both suction plate's surfaces before assembling it.

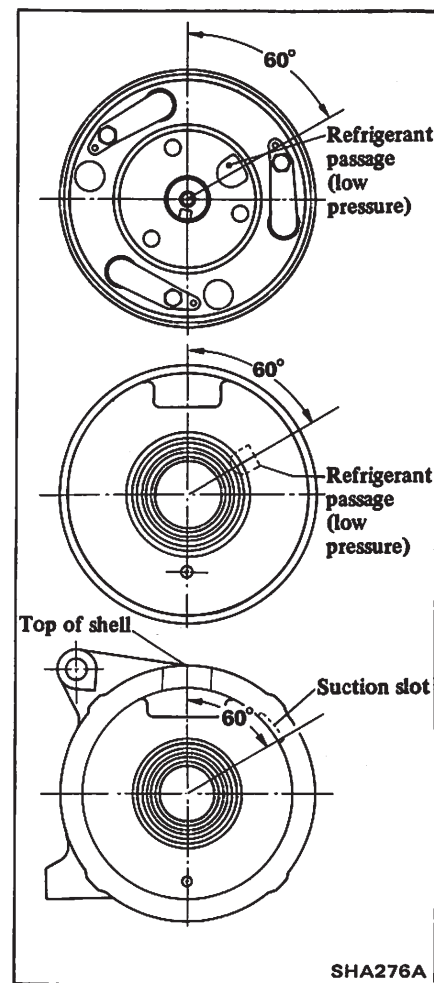


4. Align shaft seal with the shaft cut-away. Firmly seat shaft seal at the shaft land. Attempt to turn shaft seal to clockwise and counterclockwise, confirming that it is seated properly.

5. Install two O-rings on cylinder head. Coat O-rings with ample amount of oil before installation.

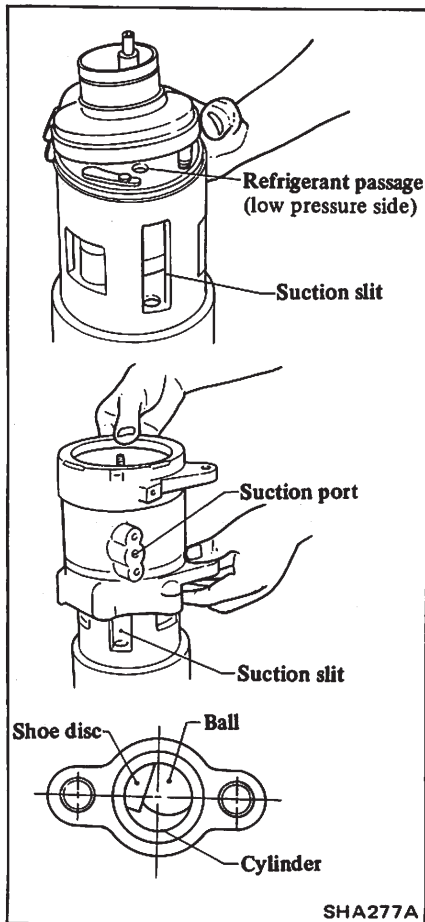
6. Install front cover as follows:

Front cover must be installed in such a manner that clutch terminal can be positioned in cut portion of shell when these three parts are assembled. For this purpose, install front cover on cylinder head so that angle between threaded hole in front cover and low pressure side refrigerant passage in cylinder head is about 60°.



COMPRESSOR—Model MJS170 — Air conditioner

7. Install gasket on front cover. Install shell on cylinder head. In this case, adjust position of shell so that suction inlet of shell opens in the same direction as suction slot of cylinder assembly. Then, make sure swash plate is visible in suction inlet by removing suction valve.



8. Turn over the assembled shell and cylinder, that is, with the front downward.

CAUTION:

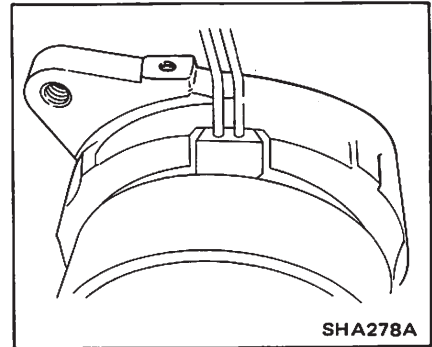
Hold securely with hand shell and cylinder assembly to prevent possible mismatching. Otherwise, O-ring will be deflected or moved.

9. Continue with work up to installation of rear cover. Refer to Rear Cover and Rear Cylinder Head for installation.

10. Install shaft seal seat. Refer to Shaft Seal for installation.

11. Install and adjust compressor clutch. Refer to Compressor Clutch for installation.

12. Make sure that clutch terminal is in cut portion provided on top of shell. If no coincidence is observed, repeat installation procedure starting from step 3.

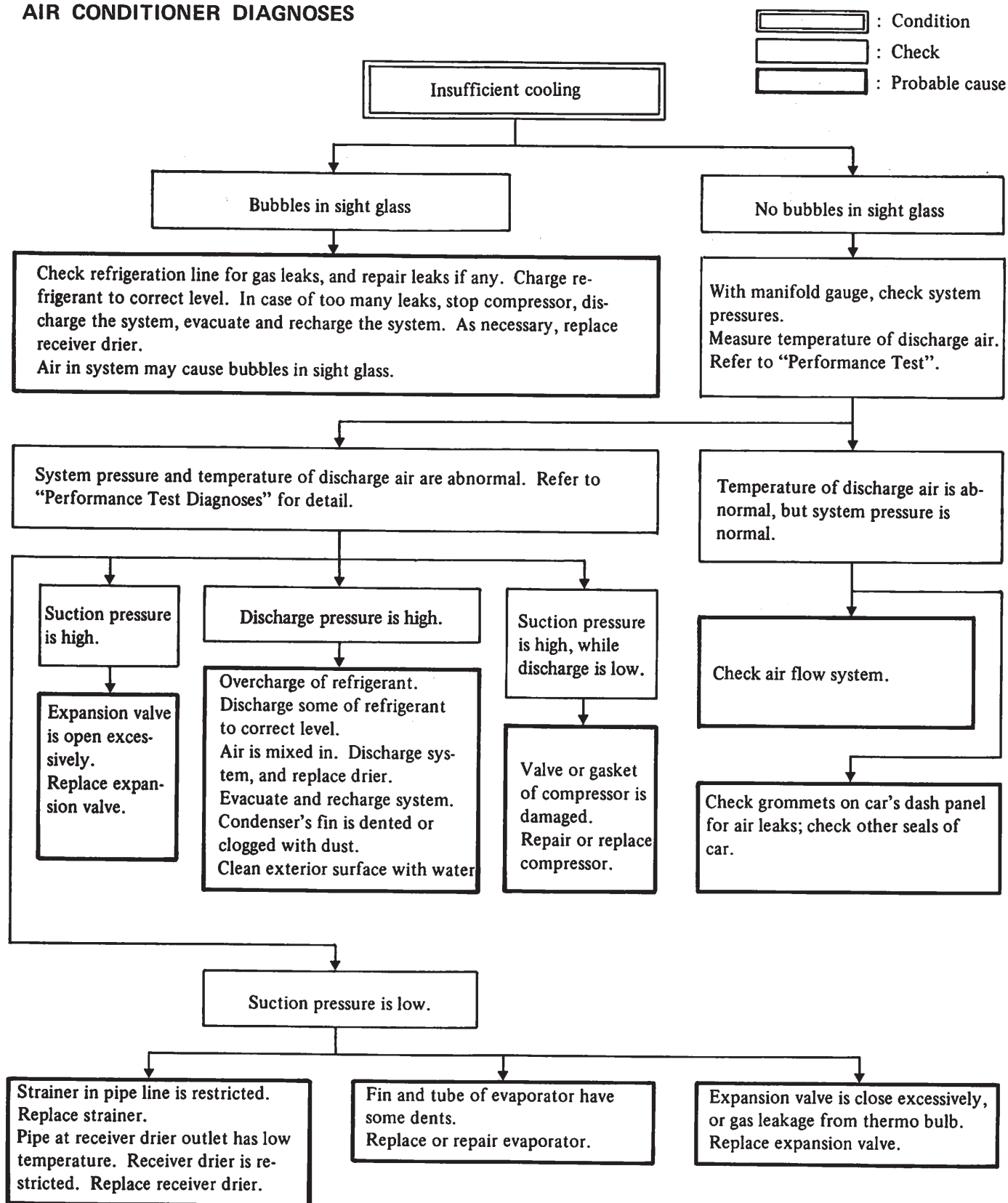


13. Conduct a leak test. Refer to Shaft Seal for gas leak test.

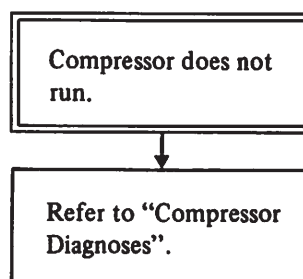
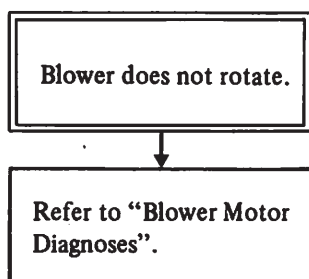
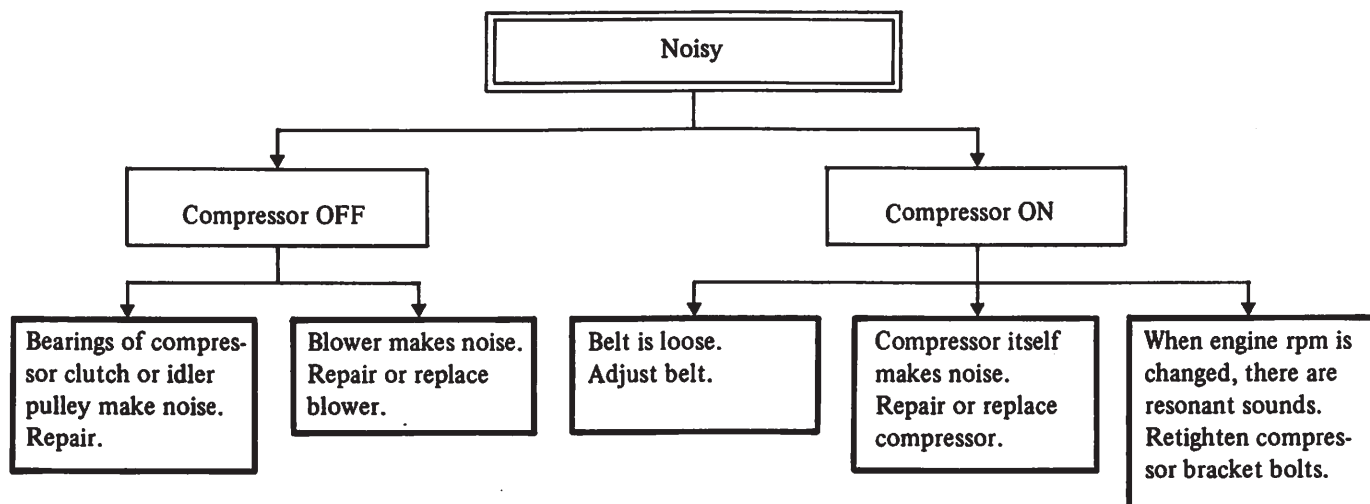
14. From suction port, charge compressor with same amount of new oil as was drained before. Refer to Oil Level Check for required amount of oil.

TROUBLE DIAGNOSES AND CORRECTIONS

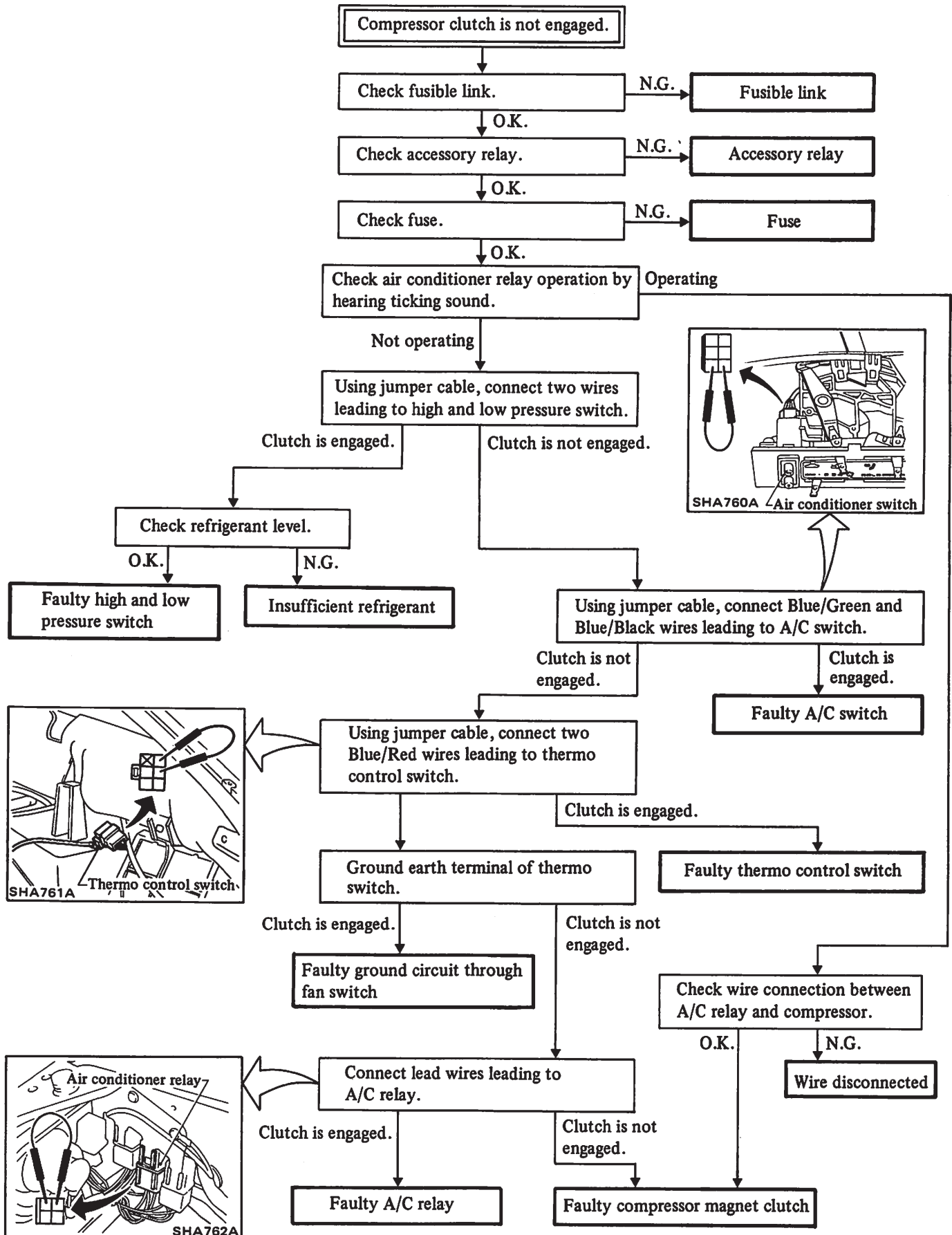
AIR CONDITIONER DIAGNOSES



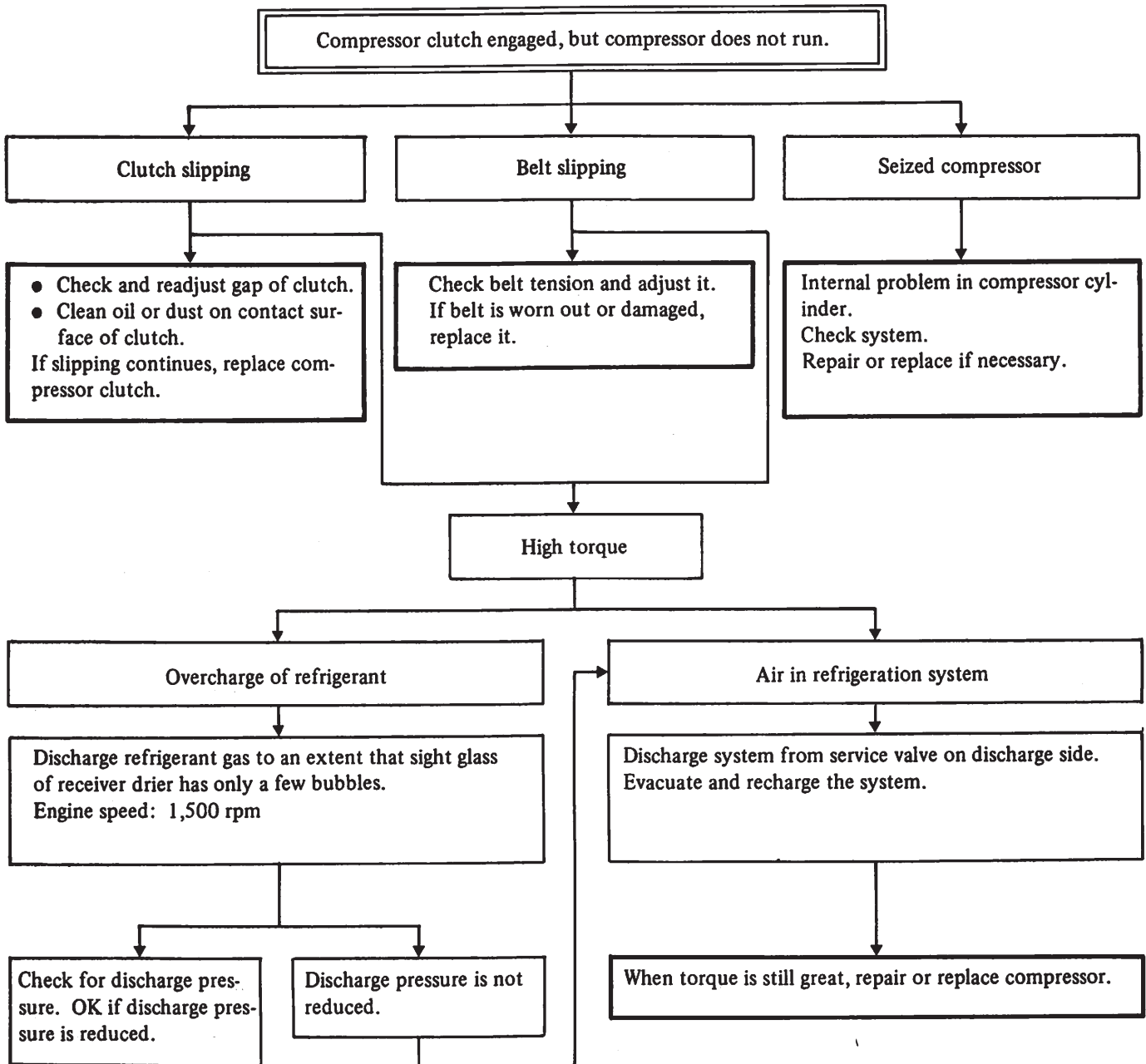
TROUBLE DIAGNOSES AND CORRECTIONS – Air conditioner



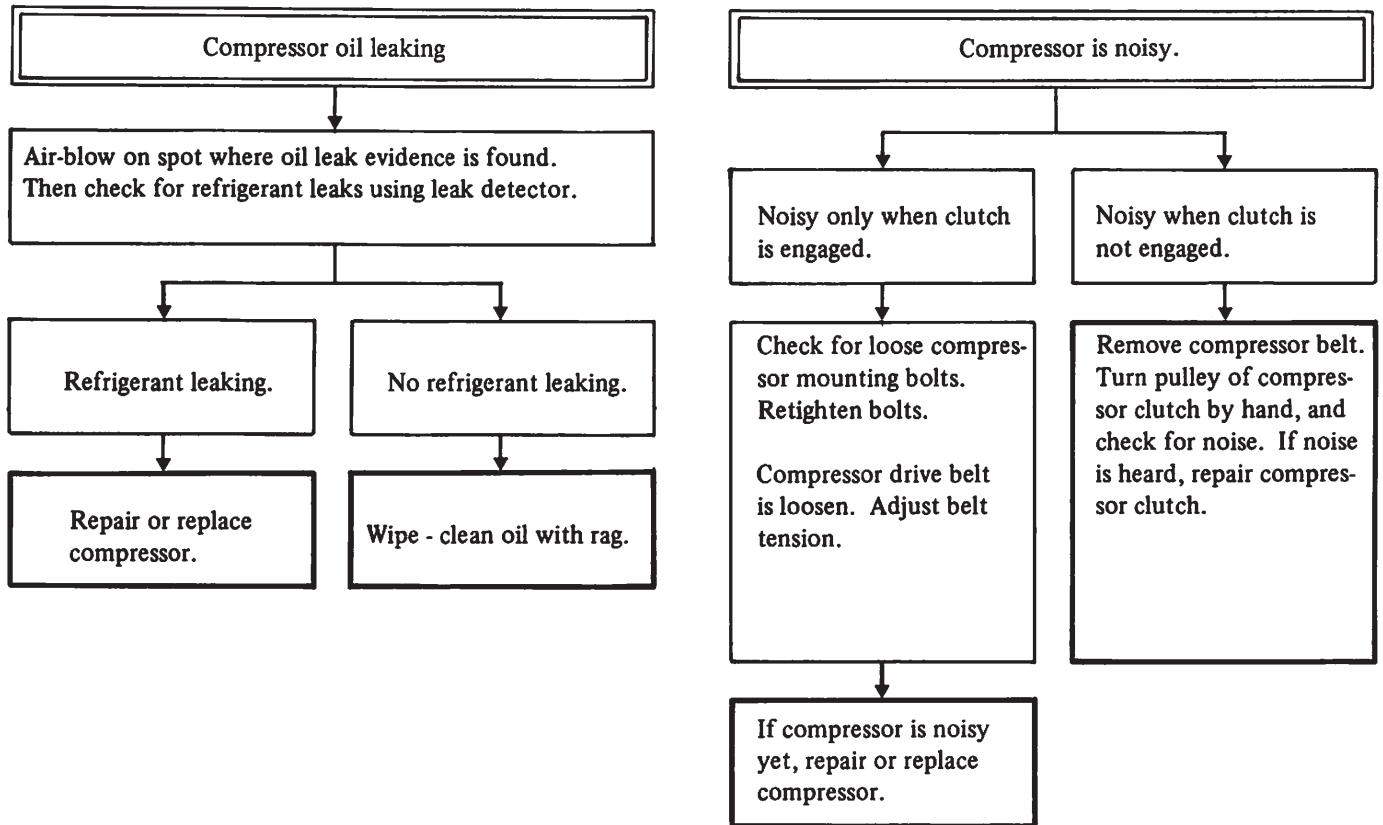
COMPRESSOR CLUTCH DIAGNOSES



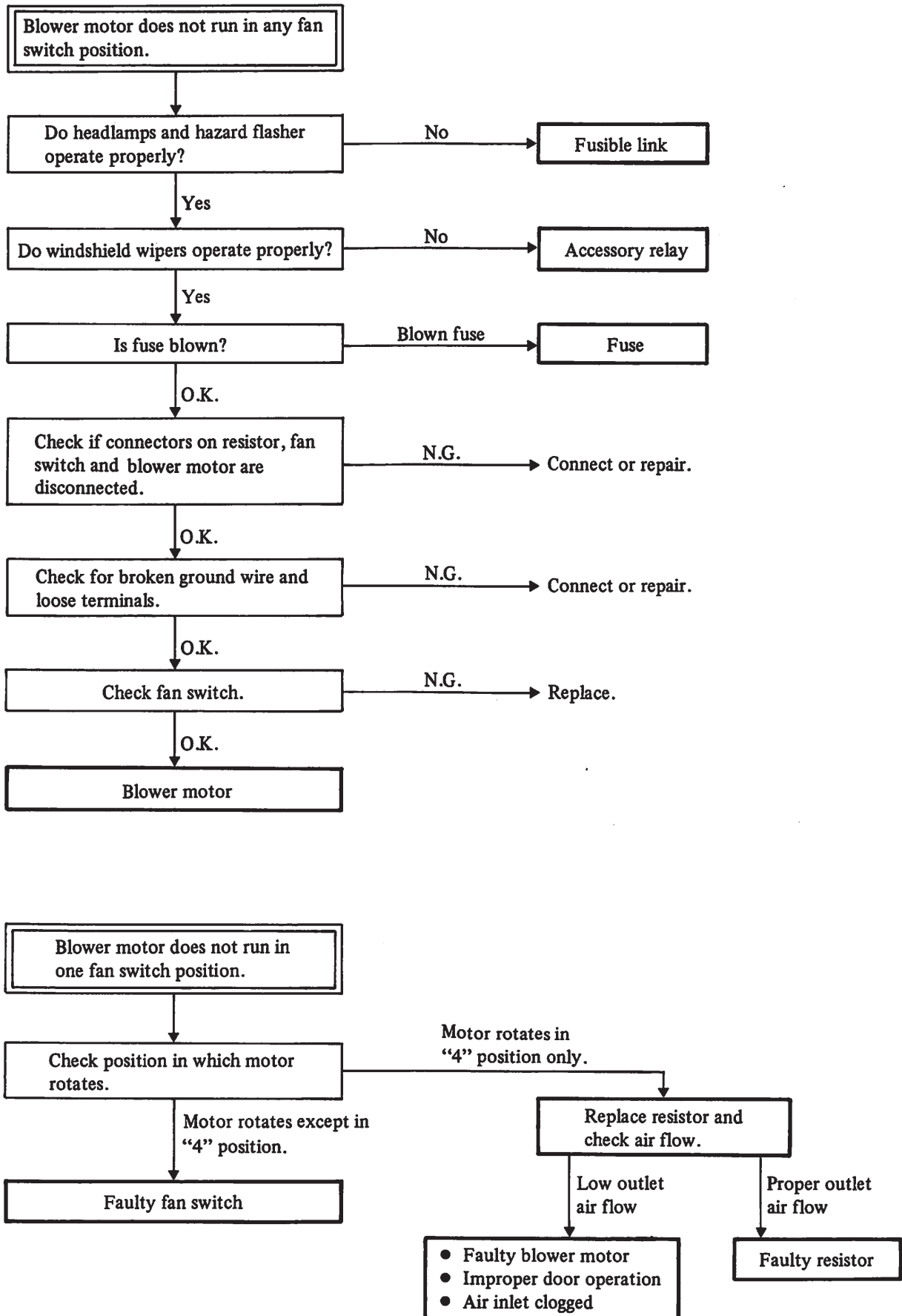
COMPRESSOR DIAGNOSES



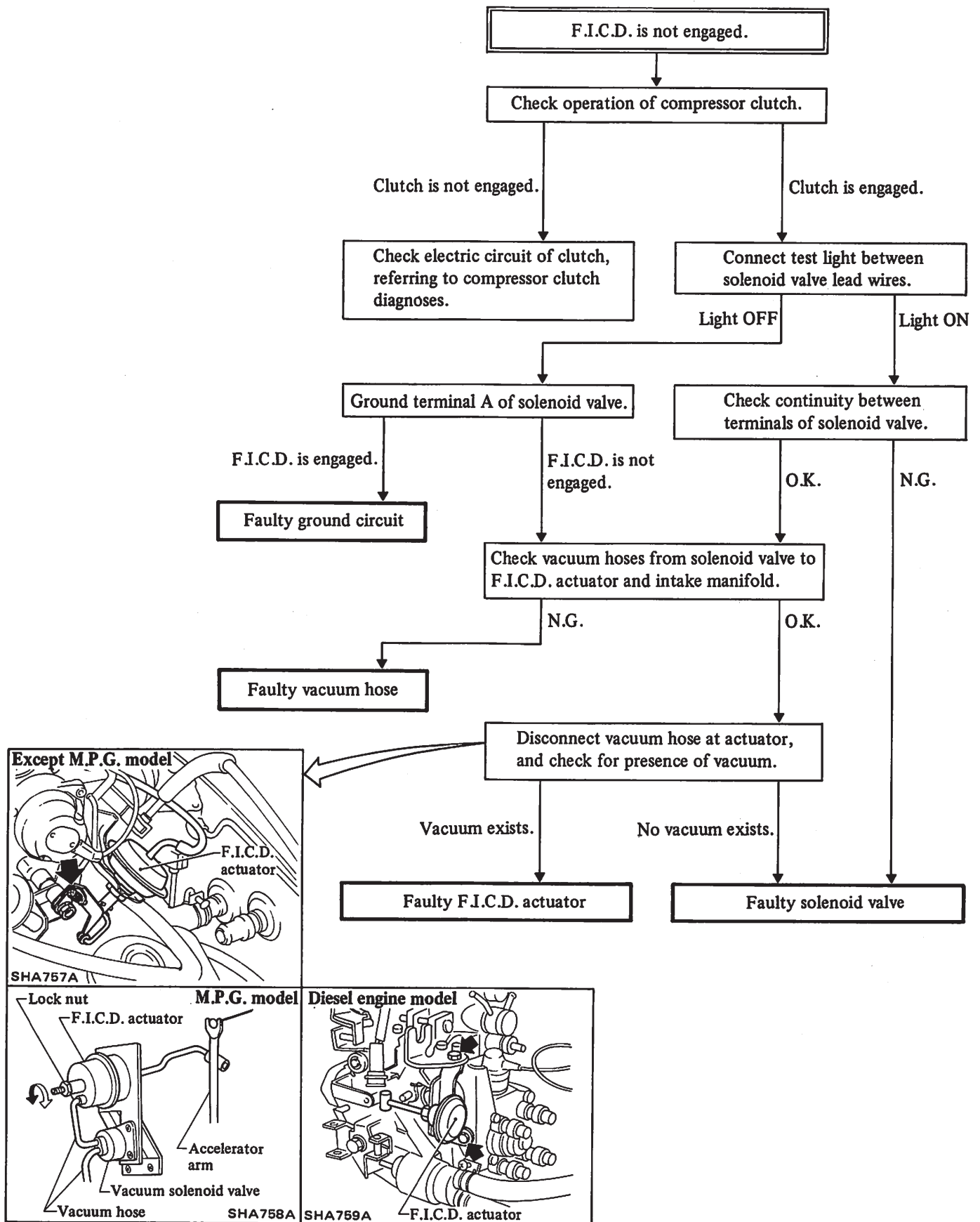
TROUBLE DIAGNOSES AND CORRECTIONS – Air conditioner



BLOWER MOTOR DIAGNOSES



FAST IDLE CONTROL DEVICE DIAGNOSES



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

GENERAL SPECIFICATIONS

COMPRESSOR

Model	MJS170
Type	Swash plate
Displacement cm ³ (cu in)/rev.	170 (10.37)
Cylinder bore x stroke mm (in)	40.0 x 22.6 (1.575 x 0.890)
Direction of rotation	Clockwise (viewed from drive end)
Type of driving belt	A type

LUBRICATING OIL

Model	MJS170
Type	SUNISO 5GS
Capacity ml (US fl oz, Imp fl oz)	150 (5.1, 5.3)

REFRIGERANT

Type	R-12
Capacity kg (lb)	0.8 - 1.0 (1.8 - 2.2)

INSPECTION AND ADJUSTMENT

BELT TENSION

	Used belt	New belt
Fan belt/Applied pressure mm (in)/N (kg, lb)	9 - 11 (0.35 - 0.43)/ 98 (10, 22)	7 - 9 (0.28 - 0.35)/ 98 (10, 22)

COMPRESSOR

Model	MJS170
Clutch hub to pulley clearance mm (in)	0.5 - 0.8 (0.020 - 0.031)

ENGINE IDLING SPEED

When F.I.C.D. is ON	Gasoline engine	M/T	800±50 rpm
		A/T	620±40 rpm ("D" position)
	Diesel engine	M/T	900±50 rpm
		A/T	900±50 rpm ("N" position)

TIGHTENING TORQUE


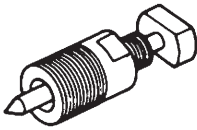
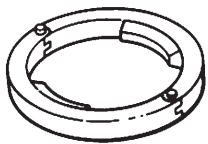
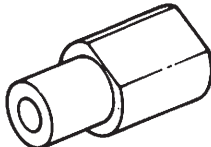
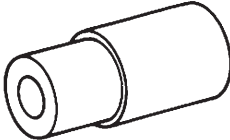
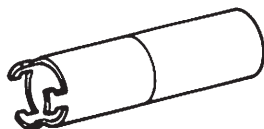
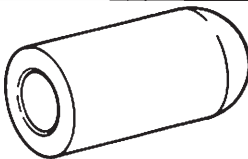
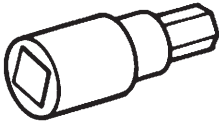
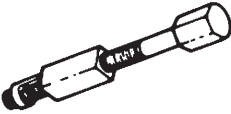
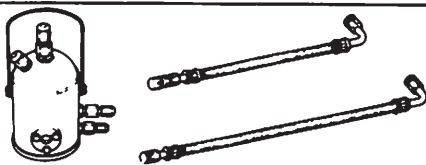
BRACKET AND PIPE

	N·m	kg·m	ft·lb
Compressor bracket to cylinder block	30 - 40	3.1 - 4.1	22 - 30
Compressor to compressor bracket	30 - 40	3.1 - 4.1	22 - 30
Flexible hose to compressor at condenser	14 - 18	1.4 - 1.8	10 - 13
Pipes at compressor	14 - 18	1.4 - 1.8	10 - 13
High pressure pipe (from condenser to receiver drier)	15 - 25	1.5 - 2.5	11 - 18
High pressure pipe (from receiver drier to cooling unit)	10 - 20	1.0 - 2.0	7 - 14
Low pressure pipe	20 - 29	2.0 - 3.0	14 - 22
Low pressure switch	9 - 10	0.9 - 1.0	6.5 - 7.2
High pressure switch	9 - 10	0.9 - 1.0	6.5 - 7.2

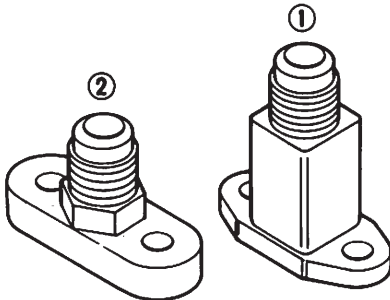
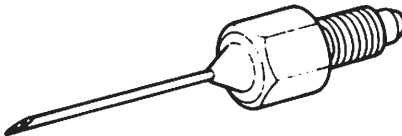
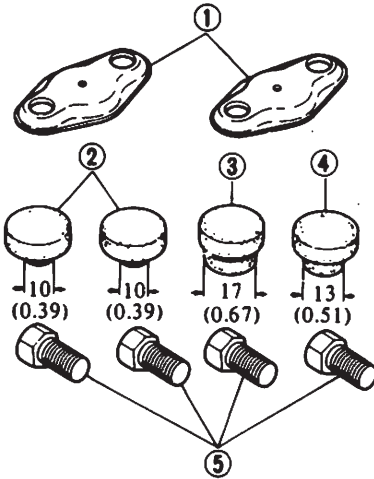
COMPRESSOR

	MJS170		
	N·m	kg·m	ft·lb
Shaft nut	19 - 21	1.9 - 2.1	14 - 15
Rear cover fixing bolt	19 - 21	1.9 - 2.1	14 - 15
Cover plate fixing bolt	15 - 17	1.5 - 1.7	11 - 12

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name
KV99412302 (J24878-1)	Clutch hub wrench 
KV994C5780 (-)	Clutch hub puller 
KV994C5781 (-)	Puller adapter 
KV99412329 (J26072)	Shaft handle socket 
KV994C5782 (-)	Puller pilot 
KV994C1143 (-)	Shaft seal remover and installer 
KV994C5784 (-)	Shaft seal pilot 
KV99412330 (-)	Allen socket 
KV994C5785 (-)	Cylinder head remover 
KV994A9690 (-)	Oil separator kit 

SPECIAL SERVICE TOOLS – Air conditioner

Tool number (Kent-Moore No.)	Tool name
KV992C5079 (-) ① KV992C5081 (-) ② KV992C5082 (-)	Adapter connector set Adapter connector A Adapter connector B <div style="text-align: center;">  </div>
KV994C1552 (-)	Charge nozzle <div style="text-align: center;">  </div>
KV994C4548 (-) ① KV994C4531 (-) ② KV994C4532 (-) ③ KV994C4533 (-) ④ KV994C4534 (-) ⑤ KV994C4559 (-)	Blind cover set Blind cover Gasket Gasket (Useless) Gasket (Useless) Bolt <div style="text-align: center;">  </div>

ELECTRICAL SYSTEM

SECTION EL

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For other electrical systems, refer to the following sections:

- EMISSION CONTROL SYSTEM ... EF & EC section
- HEATER AND AIR CONDITIONER ... HA section

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 diagram 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 vehicle (ground)).

Remembering this basic rule will make

it a lot easier to troubleshoot electrical problems.

WIRING DIAGRAMS

There is a schematic illustrating each electrical circuit. Accurate diagnosis of electrical problems requires that you effectively use and interpret this diagram. Since it uses a special language, i.e., symbols, codes and abbreviations, let's review the following chart.

ELECTRICAL SYMBOLS AND ABBREVIATIONS

SYMBOLS

 Single filament bulb

 Dual filament bulb

 Fuse

 Fusible link

 Diode

 Motor

 Transistor

 Resistor

 Coil

 Variable resistor

 Thermistor

 Reed switch

 Circuit breaker

 Condenser

 or  Switch (Normally open)

 or  Switch (Normally closed)

 Ground

 No connection between wires

 Connection between wires

CONNECTORS

 Pin-type connector (Male)



 Pin-type connector (Female)



 Plain-type connector (Male)



 Plain-type connector (Female)



 Bullet connector (Female and male)

 Plain connector (Female and male)

WIRE COLOR CODING

B = Black	BR = Brown
W = White	OR = Orange
R = Red	P = Pink
G = Green	PU = Purple
L = Blue	GY = Gray
Y = Yellow	SB = Sky blue
LG = Light Green	

In case of color coding using a Stripe, Base Color is given first, followed by the Stripe Color:

Example: L/W = Blue with White Stripe

ABBREVIATIONS

(S) : Sedan
 (C) : Coupe
 (W) : Wagon
 (M) : M/T models
 (A) : A/T models

ELECTRICAL DIAGNOSIS INTRODUCTION

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

POWER SUPPLY ROUTING

This diagram is helpful in identifying specific problems in the power supply portion of the electrical circuits. For example, let's say a vehicle has inoperative instrument meter lights. A quick check proves that all other lights in the vehicle 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.

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.

HARNESS DIAGRAM (Foldout page)

The harness diagram shows the actual harness components. It 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.

A general rule to follow while troubleshooting 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 troubleshooting 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 started 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 wiring diagram in the service manual.

Study the simplified schematic to develop an understanding of how the circuit is supposed to work. Then use harness layout illustration, power supply routing diagram, and vehicle wiring diagram. Get an idea of how the circuit is laid out in the vehicle 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.

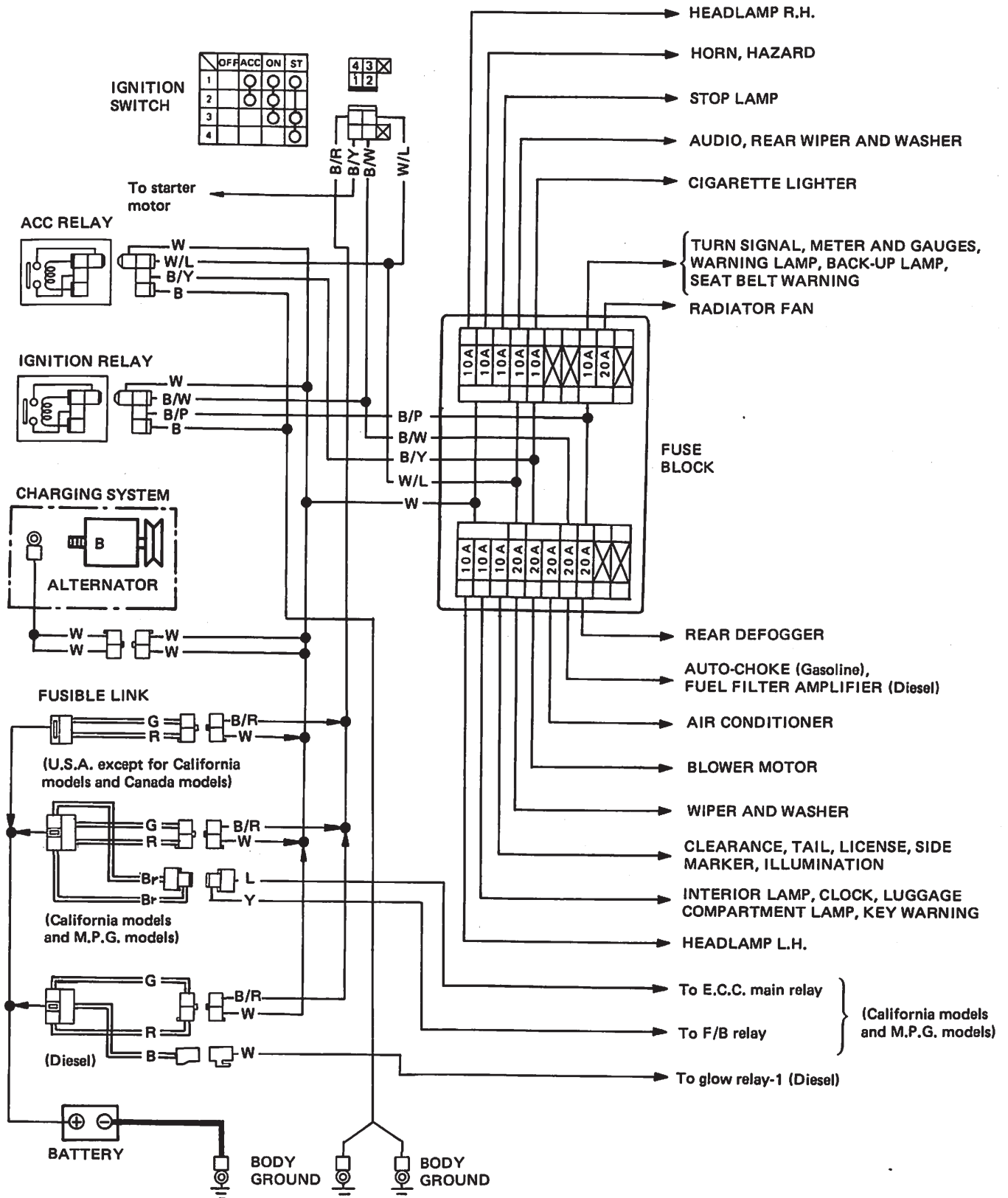
Remember the most complex circuits are constructed from combinations and/or variations of the basic circuit: Source, Conductors, and Load. If you keep this in mind, use the service manual, and follow a logical troubleshooting sequence, you can effectively troubleshoot electrical problems.

POWER SUPPLY

POWER SUPPLY

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

SCHEMATIC/POWER SUPPLY ROUTING

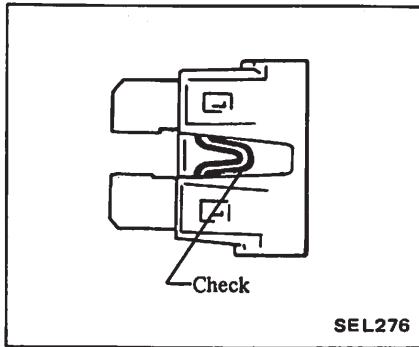


SEL701C

POWER SUPPLY

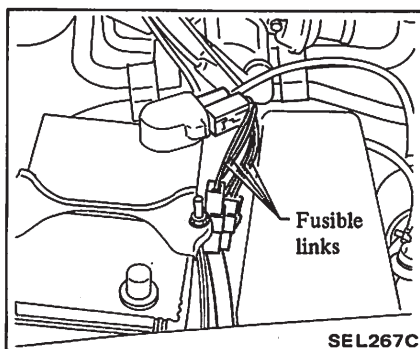
FUSE

INSPECTION



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

FUSIBLE LINK LOCATION

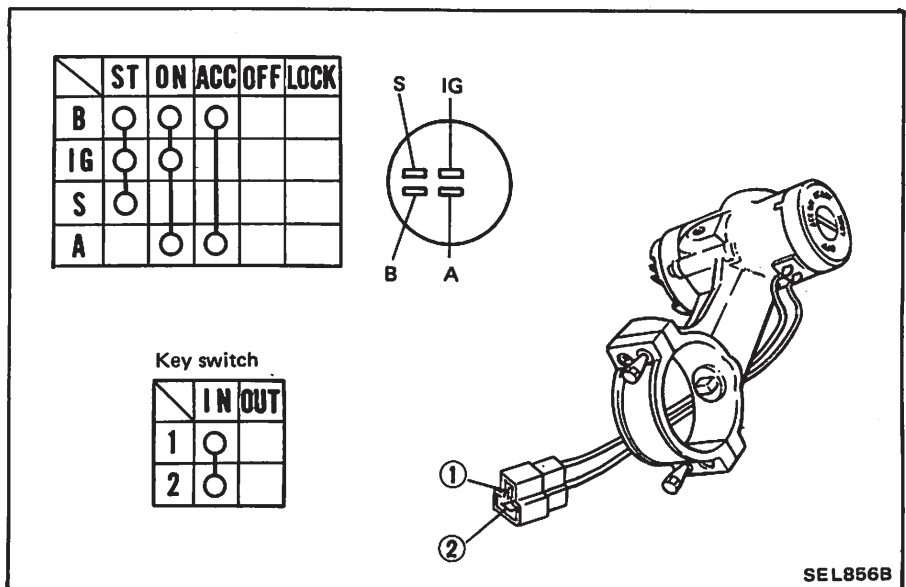


CAUTION:

- 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.
- 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.

IGNITION SWITCH



IGNITION AND ACCESSORY RELAYS

LOCATION

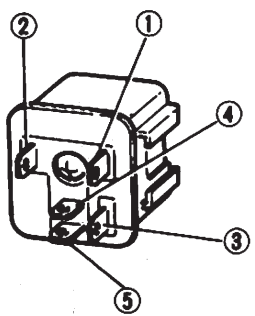
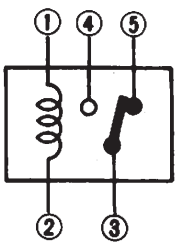

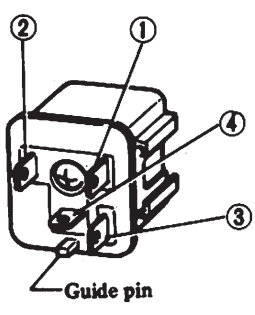
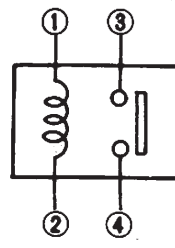
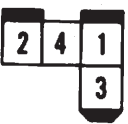
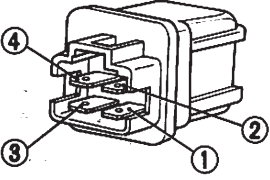

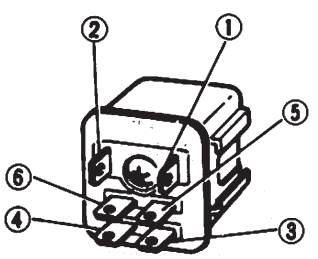
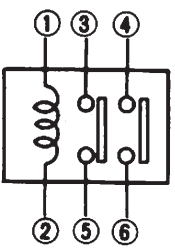

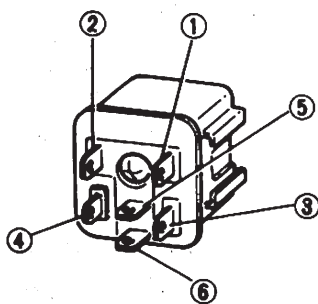
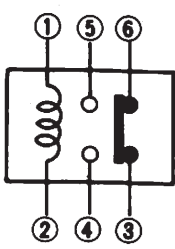

Ignition and accessory relays are located on the fuse block. Refer to page EL-82.

INSPECTION

Ignition relay and accessory relays are 1M type standardized relay. Refer to page EL-7.

POWER SUPPLY

STANDARDIZED RELAY

Type	Outer view	Circuit	Symbols	Case color
1T				BLACK
1M				BLUE
				BLACK
2M				BROWN
1M-1B				GRAY

BATTERY

BATTERY

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

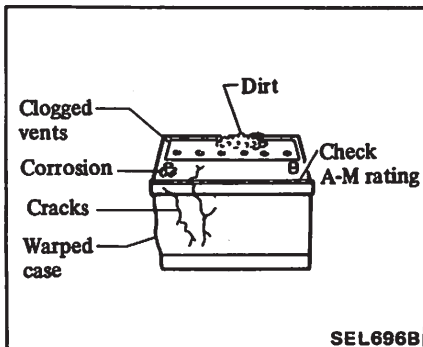
WARNING:

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

CAUTION:

- If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.
- If the battery cables are disconnected, they should be tightly clamped to the battery terminals to secure a good contact.

VISUAL INSPECTION



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

CLEANING

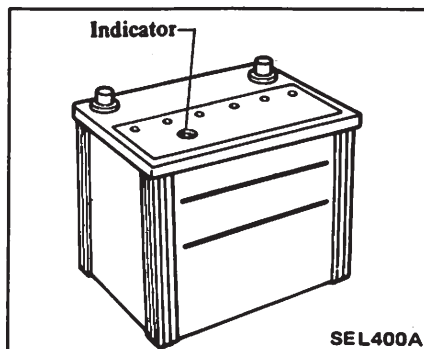
Use a stiff brush and a common baking soda and water solution to clean the battery surface, terminals and cable ends.

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.

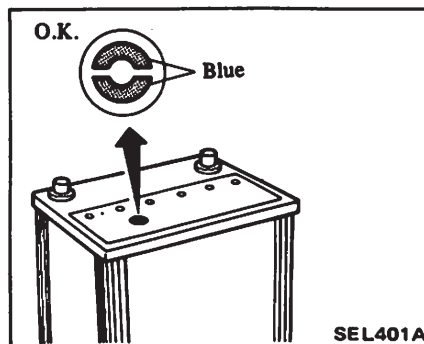
MAINTENANCE-FREE TYPE CONDITION CHECK

Battery condition can be checked using indicator on battery.



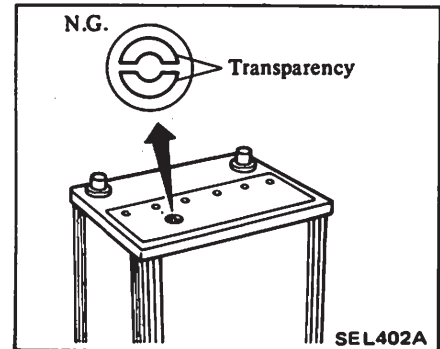
Good condition

When blue indicator is shown, battery is properly charged.



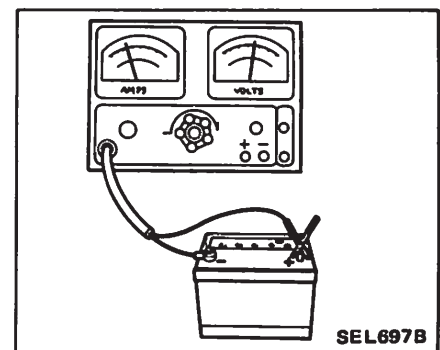
Lack of charge condition

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



TEST

Battery capacity test



- Check battery rating against that of original factory equipment.
- 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.)
- 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.

Three-minute charge test

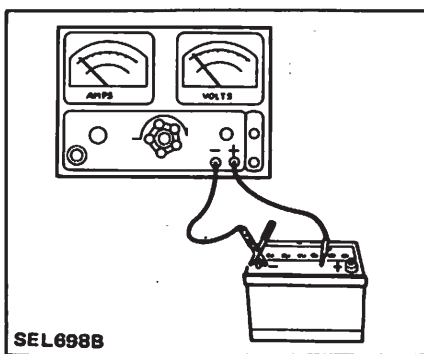
This test identifies a battery as being sulfated and should only be performed if the battery has failed the capacity test.

BATTERY

1. Connect a good quality battery charger.
2. Turn charger to a fast rate not over 40A.
3. After three minutes, check voltmeter reading. If it is over 16.5 volts, battery should be replaced.

Battery leakage test

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



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.

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.

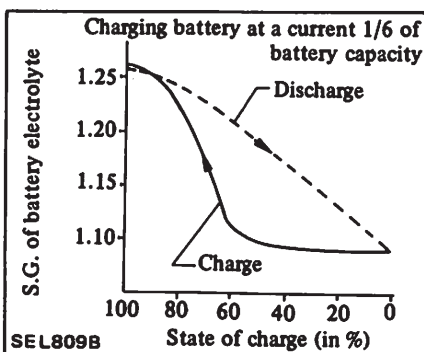
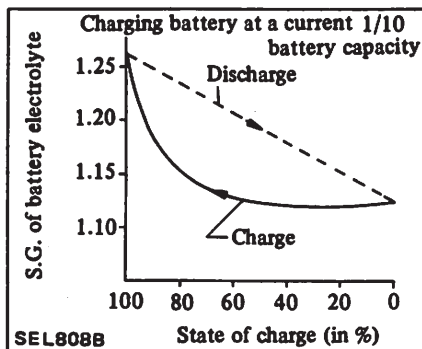
1. Disconnect battery ground cable.
2. Insert test light in series between cable end and the negative battery post.
3. With all switches and systems off the test light should not be lit.
4. If the light is lit begin disconnecting fuses and units until the light goes out. The clock is designed to run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

CHARGING

Description

Charging rate and specific gravity of battery electrolyte

The relationship between the charged condition of the battery and the specific gravity of battery electrolyte differs, as shown in figures below, when the battery is discharging and when it is being charged.



As can be seen from these figures, the battery has the following features:

- The specific gravity of battery electrolyte increases very slowly while the battery is being charged.
- The smaller the charging current, the slower the specific gravity of the electrolyte increases.

Indicator

- The indicator will turn from blue to transparent when the battery charge drops to 20 to 30%.
- The indicator will turn blue when the battery charge is between 65 and 90% under charging.

Charging

If the indicator turns transparent (indicating that battery charge is required), charge the battery in the following manner:

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.
- c. Do not allow electrolyte temperature to go over 45°C (113°F).

Standard method

Charge the battery at 1/10 the current of battery capacity. When the indicator turns from transparent to blue, continue to charge the battery for an additional two hours, then stop charging.

Quick charge

Charge the battery at a current of 40 amperes [except for NS40SL(S)MF] and 20 amperes [for NS40SL(S)MF] for approximately 45 minutes.

Never charge more than 45 minutes.

CAUTION:

Charging the battery at a current of more than 10 amperes while using quick charge methods will shorten the service life of the battery. Use the standard method to charge the battery unless circumstances requires otherwise.

Charging current and time required for charging

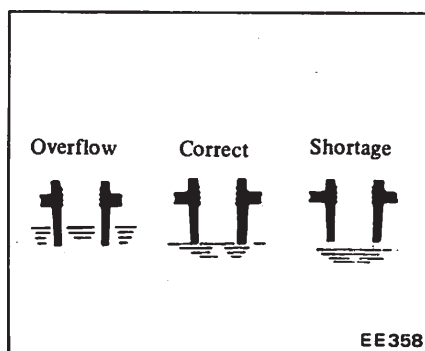
Charging current	Time required
1/6 of battery capacity	Approx. 4 - 5 hours
1/10 of battery capacity	Approx. 8 - 10 hours

BATTERY

If the battery is run down and has not been used for a long period of time, it will be hard to charge and it will require a longer time to charge than under normal circumstances. In such a case, extend the charging time as required while observing the indicator.

LOW MAINTENANCE TYPE CHECKING ELECTROLYTE LEVEL

Check for electrolyte level in each cell.

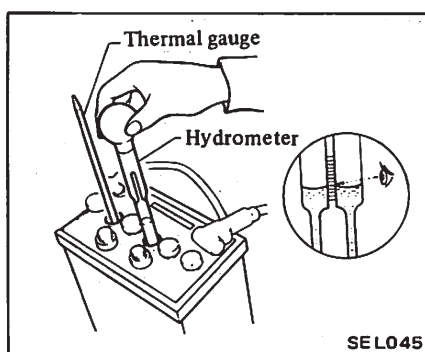


If the level is short, pour distilled water.

CHECKING SPECIFIC GRAVITY

1. Read hydrometer and thermal gauge indications at eye level.

Read top level with scale.



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

$$S_{20} = S_t + 0.0007 (t - 20)$$

Where,

S_t : Specific gravity of electrolyte at $t^\circ\text{C}$

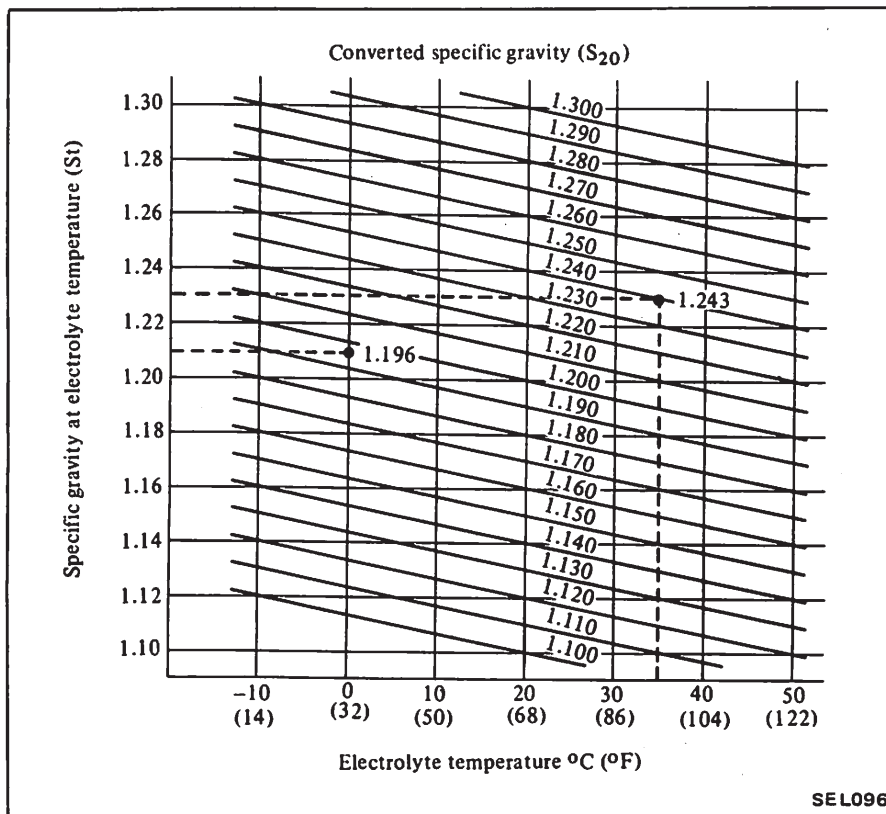
S_{20} : Specific gravity of electrolyte corrected at 20°C (68°F)

t : Electrolyte temperature

Examples:

1. When electrolyte temperature is 35°C (95°F) and specific gravity of electrolyte is 1.230, specific gravity corrected at 20°C (68°F) is 1.243.

2. When electrolyte temperature is 0°C (32°F) and specific gravity of electrolyte is 1.210, specific gravity corrected at 20°C (68°F) is 1.196.



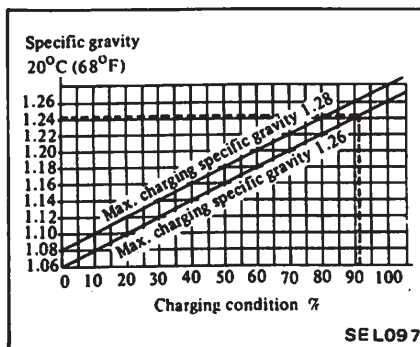
3. Determine charging state of battery.

4. Recharge battery if its rate drops below 70% of full charge.

Examples:

Charging state of battery whose max. charging specific gravity is 1.26, and whose specific gravity corrected at 20°C (68°F) is 1.243, is 92%.

For battery whose max. charging specific gravity is 1.28, charging state is 82% at a corrected specific gravity of 20°C (68°F).



CHARGING

CAUTION:

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

Clean corroded terminal with a brush and common baking-soda solution.

WARNING:

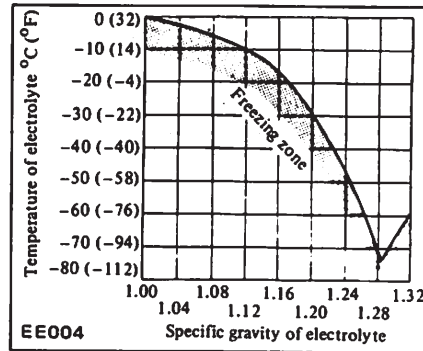
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.

BATTERY

BATTERY FREEZING

CAUTION:

Use extreme caution to avoid freezing battery.



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

BATTERY

Applied model	Gasoline engine model					Diesel engine model
	U.S.A.			Canada		All
	Except M.P.G. model	M.P.G. standard model	M.P.G. deluxe model	M.P.G. model	Except M.P.G. model	All
Type	N60MFL	NS40SL(S)MF	N50ZL		NS70LMF	NX120-7L-MF
	Maintenance-free		Low-maintenance		Maintenance-free	
Capacity V-AH	12-60	12-30	12-60		12-65	12-80

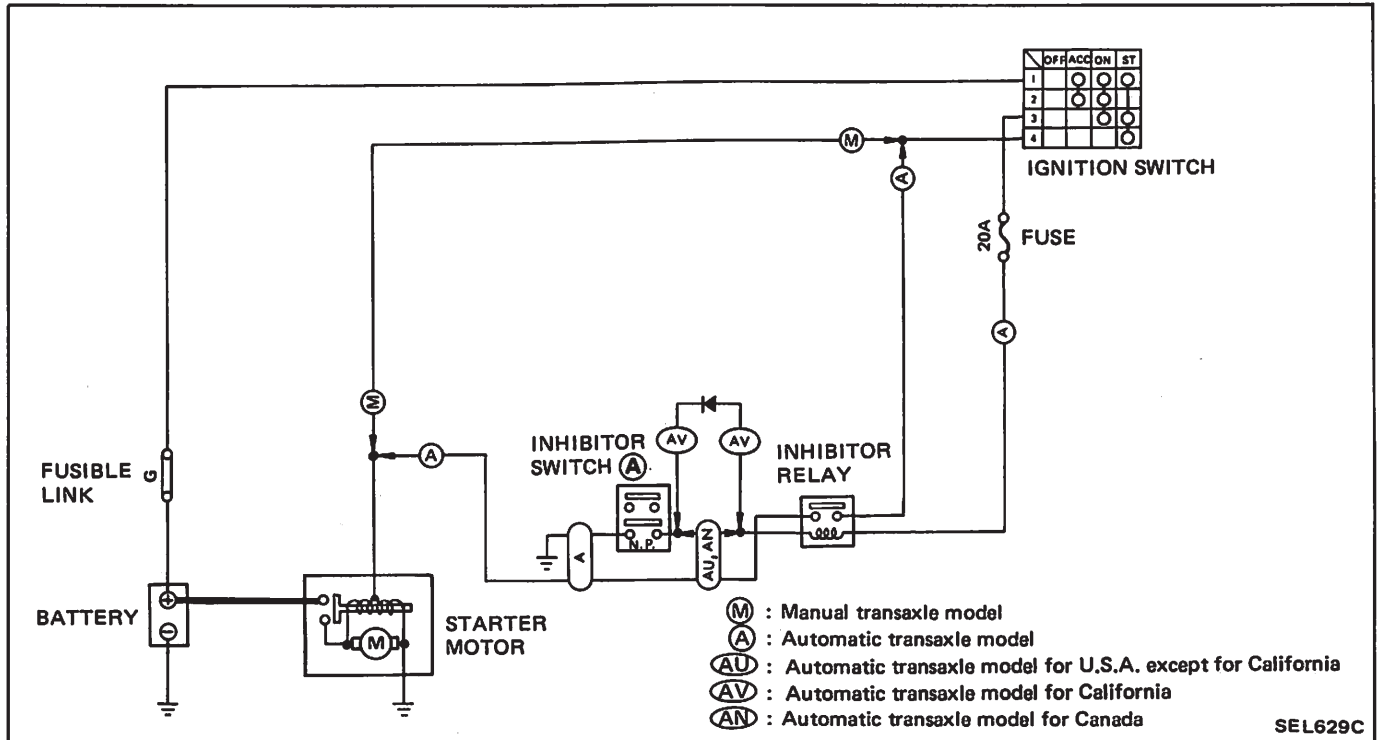
STARTING SYSTEM

STARTING SYSTEM

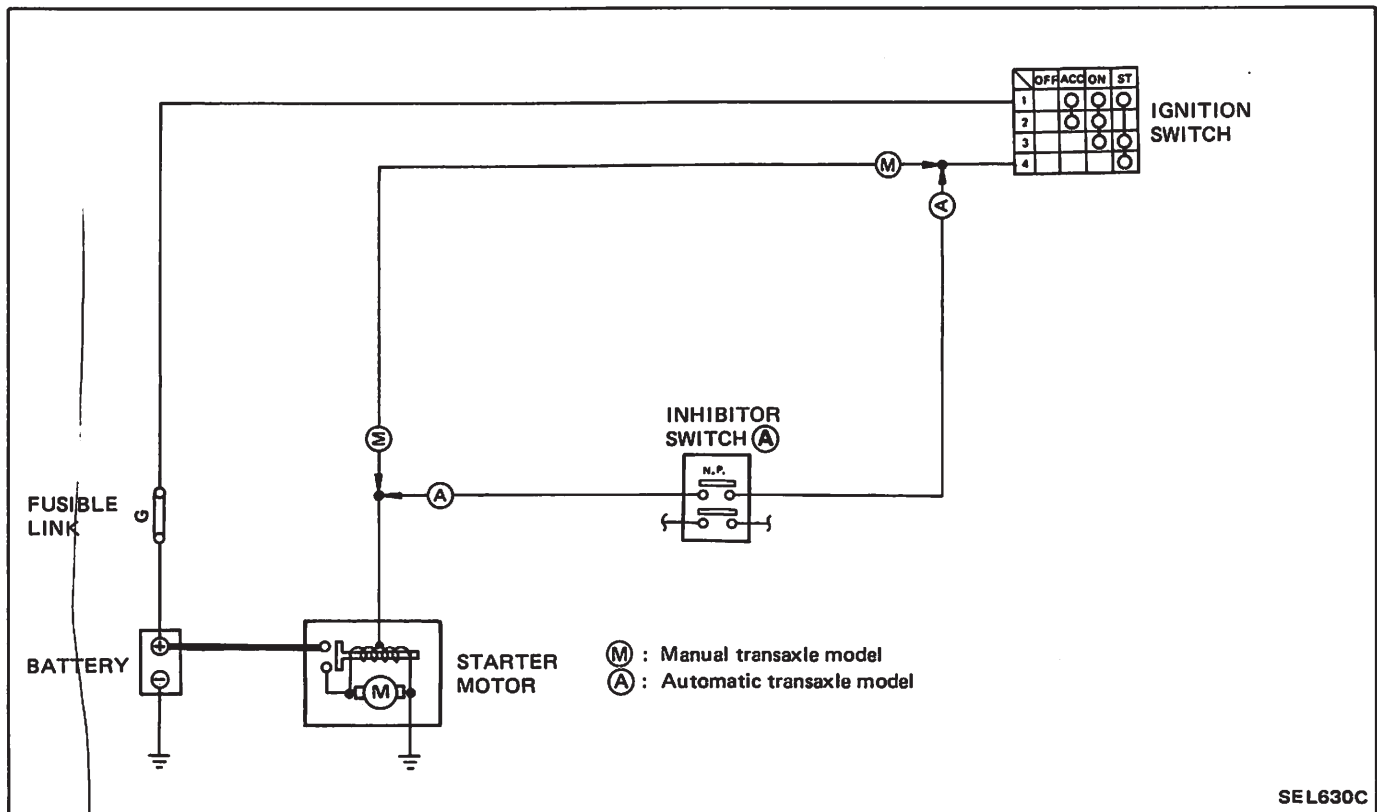
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

SCHEMATIC

GASOLINE ENGINE MODEL



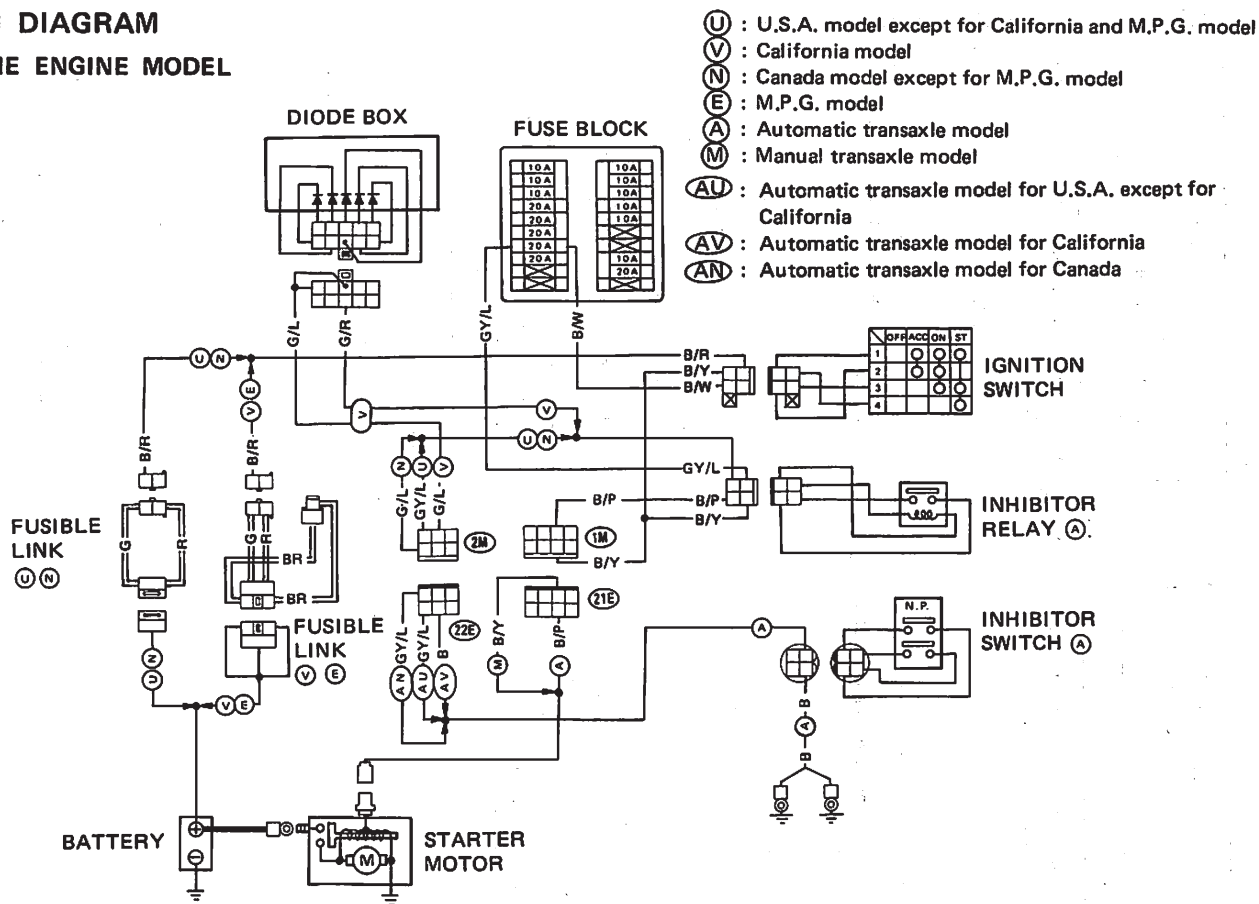
DIESEL ENGINE MODEL



STARTING SYSTEM

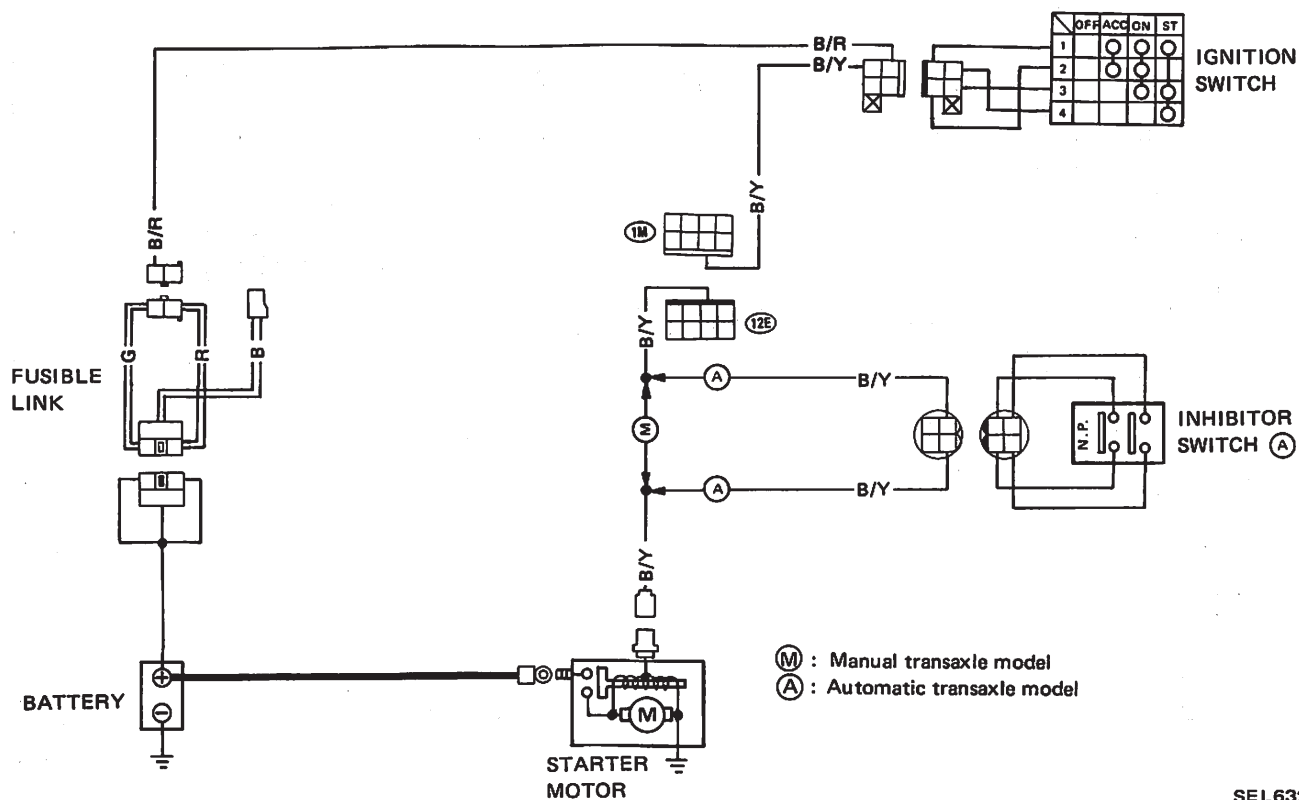
WIRING DIAGRAM

GASOLINE ENGINE MODEL



SEL631C

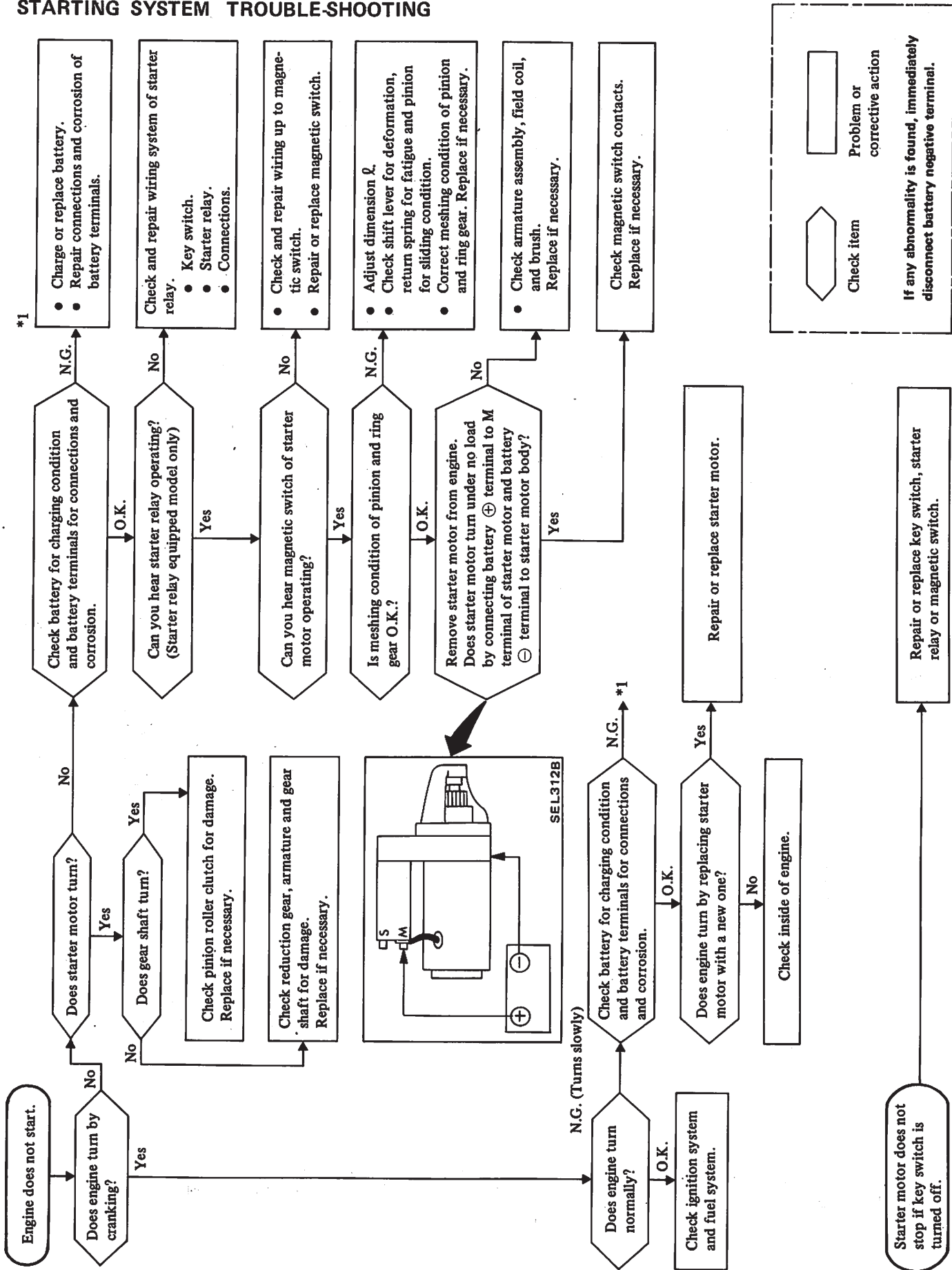
DIESEL ENGINE MODEL



SEL632C

STARTING SYSTEM

STARTING SYSTEM TROUBLE-SHOOTING



STARTING SYSTEM

STARTER MOTOR

S114-315, -316 (Gasoline engine M/T models)

Pinion assembly

- Check for smooth rotation on the one side and locking on the other side.
- If pinion teeth are excessively worn, replace. Flywheel ring gear also must be inspected.
- Clearance "ℓ" between pinion front edge and pinion stopper: 0.3 - 2.5 (0.012 - 0.098) — Fig. (A)

Commutator min. dia:
S114-315 ... 32 (1.26)
S114-316 ... 39 (1.54)

Depth of insulating mica:
0.5 - 0.8 (0.020 - 0.031)

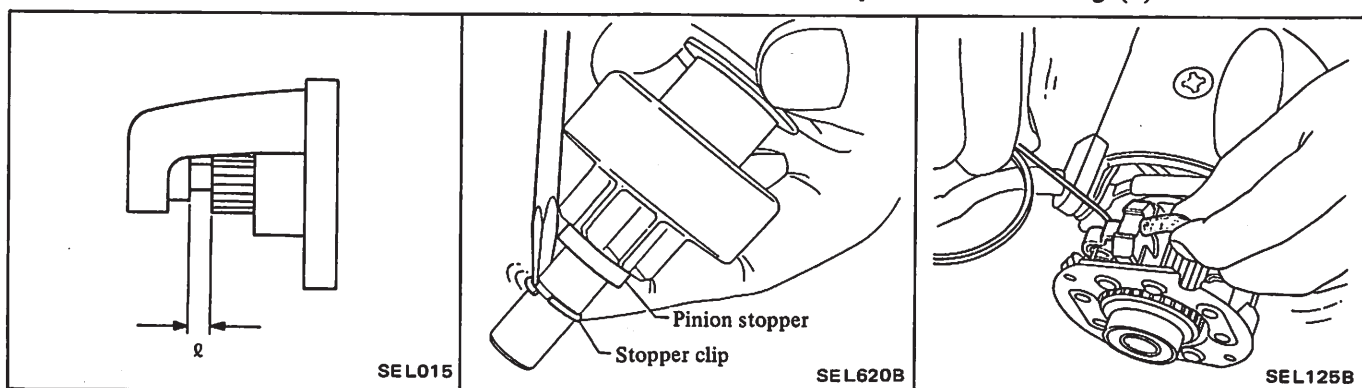
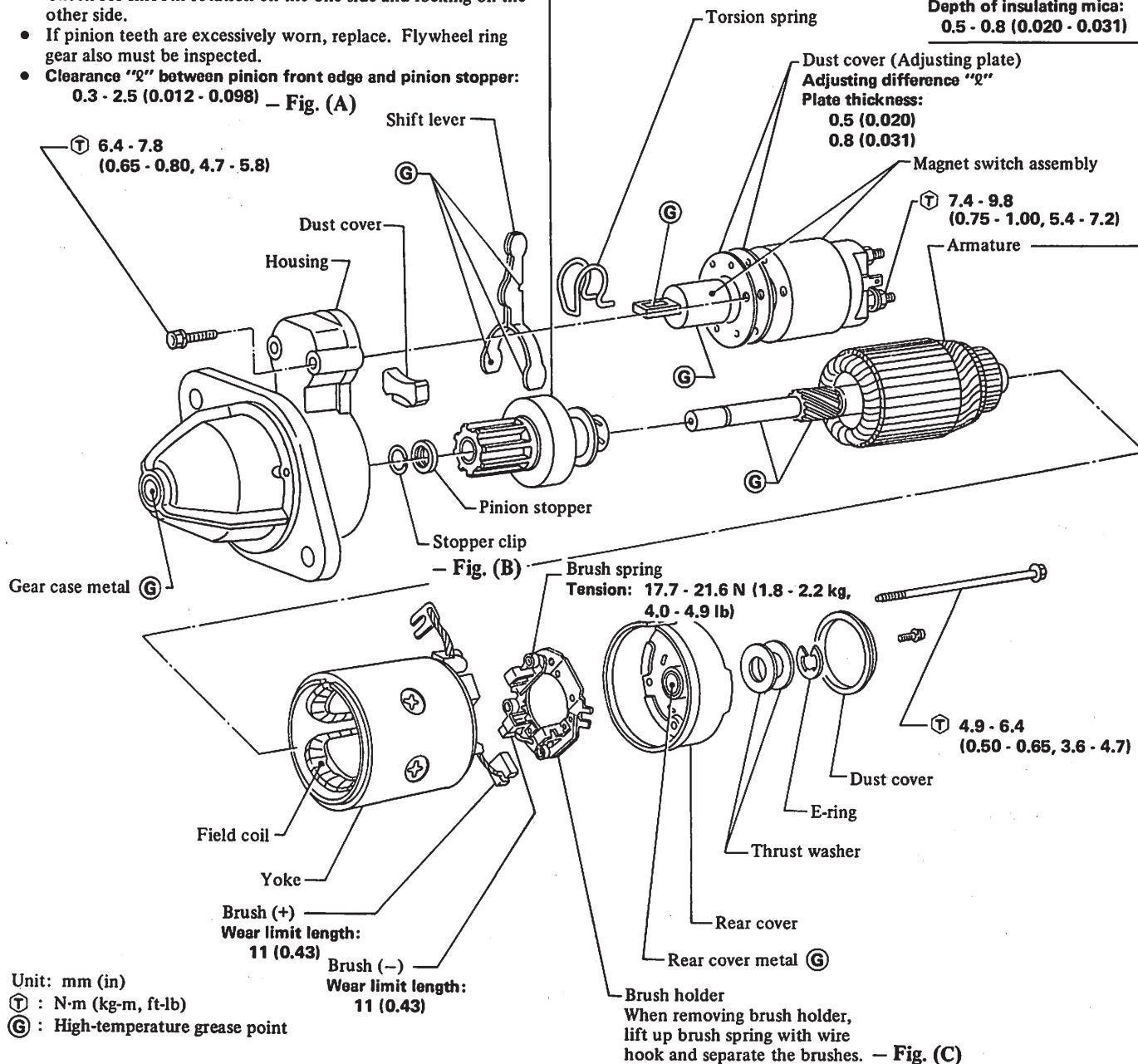


Fig. (A)

Fig. (B)

Fig. (C)

SEL245C

STARTING SYSTEM

S114-317, -345 (Gasoline engine A/T models)

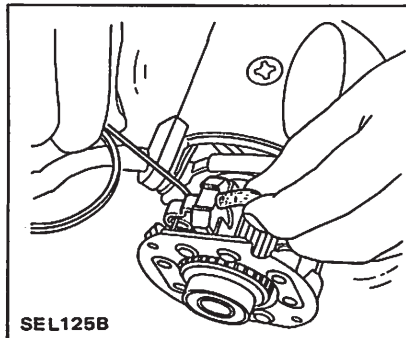
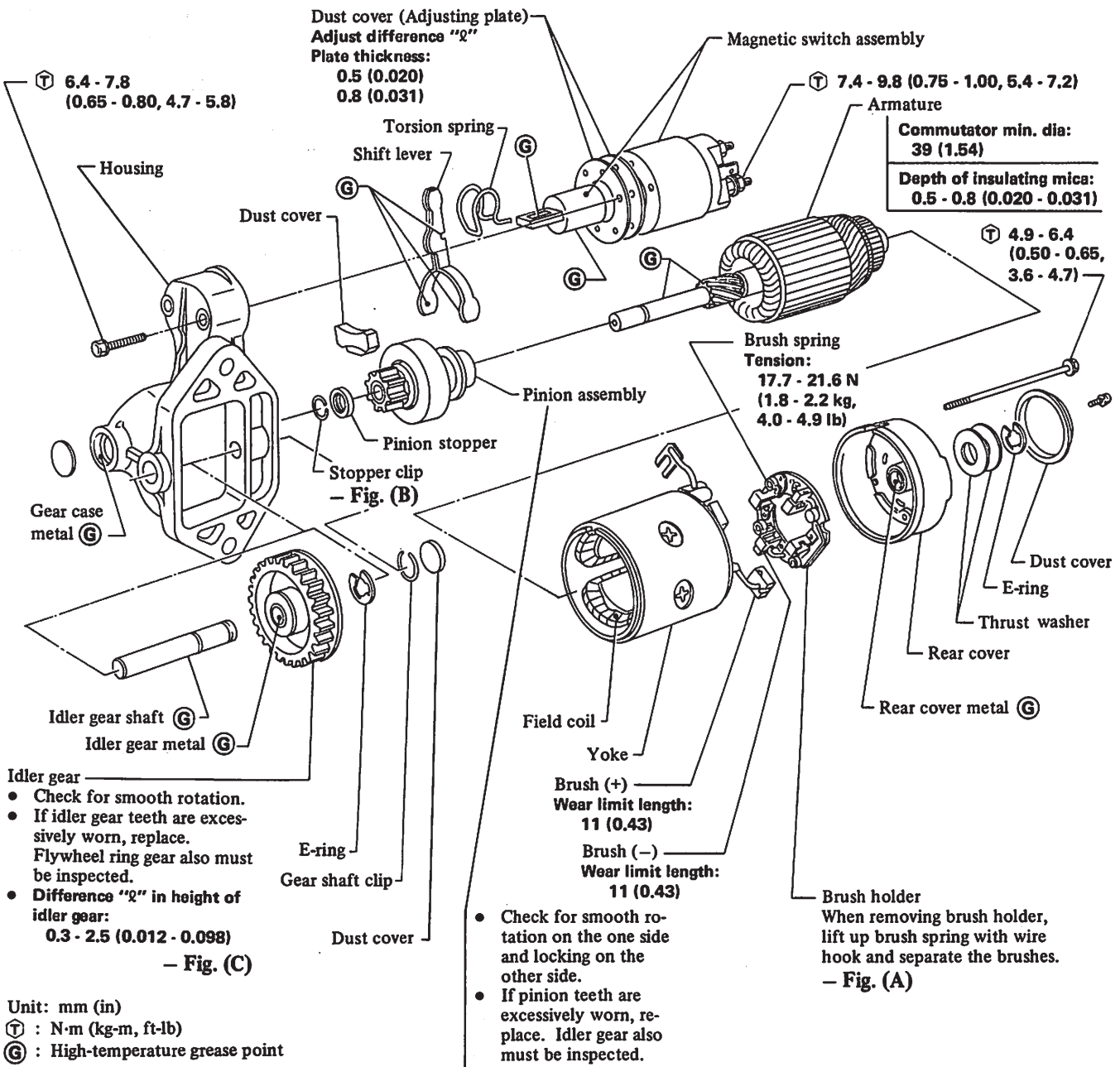


Fig. (A)

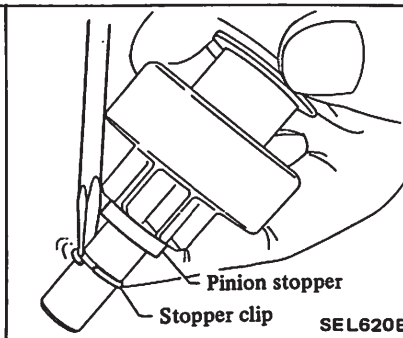


Fig. (B)

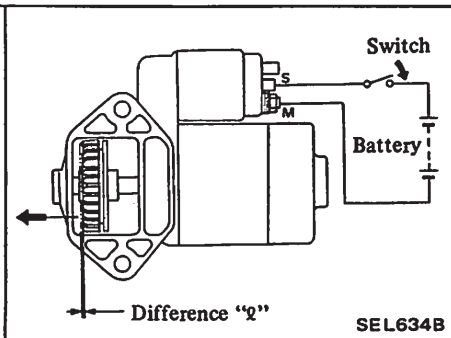


Fig. (C)

SEL246C

STARTING SYSTEM

S114-357 (Diesel engine model)

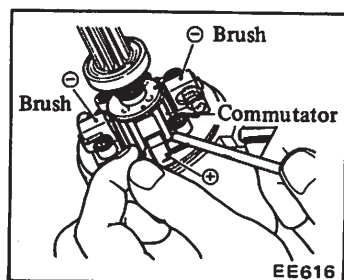
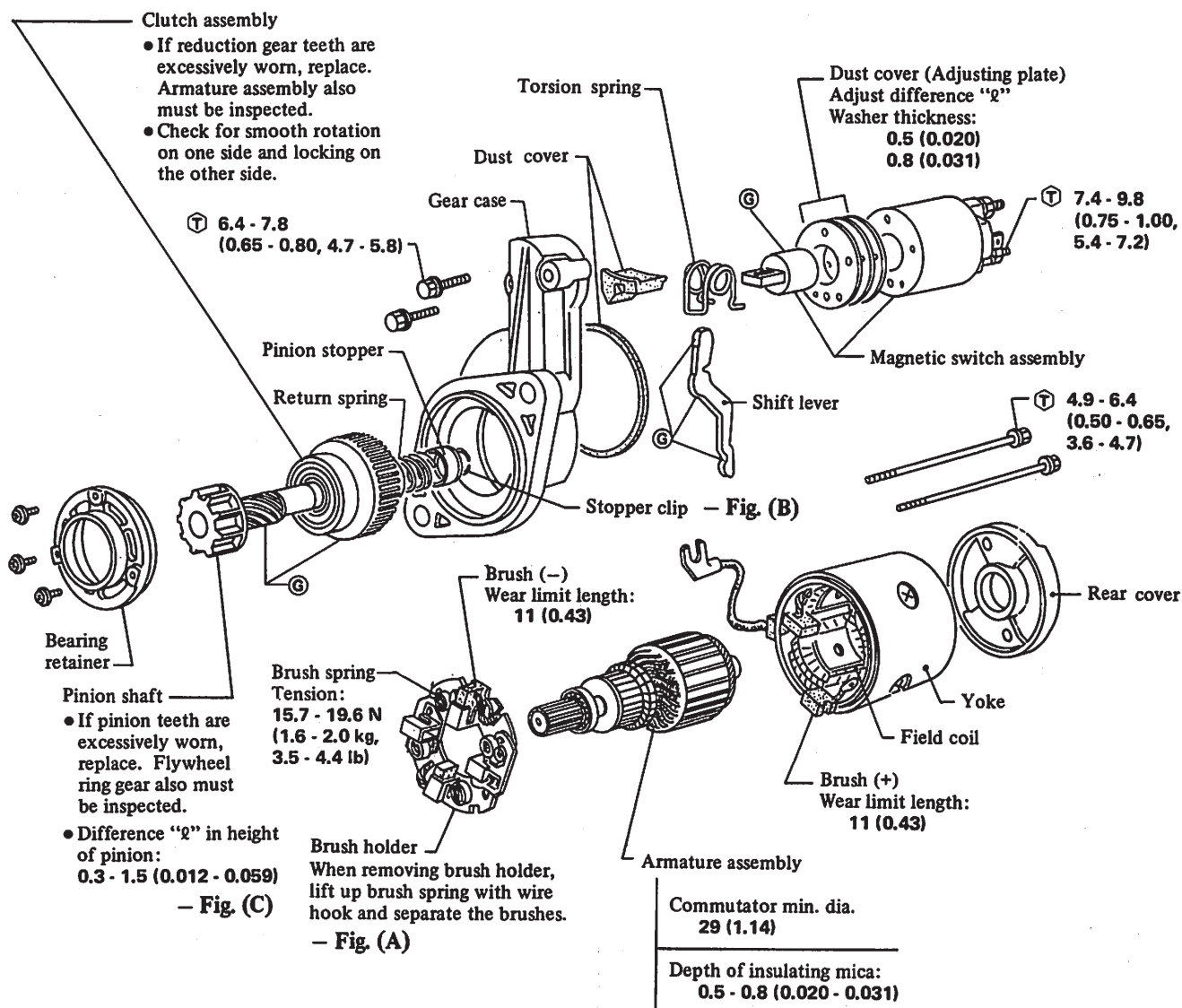


Fig. (A)

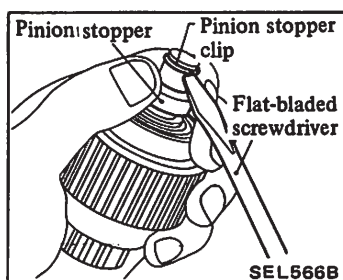


Fig. (B)

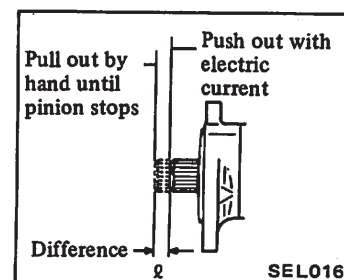


Fig. (C)

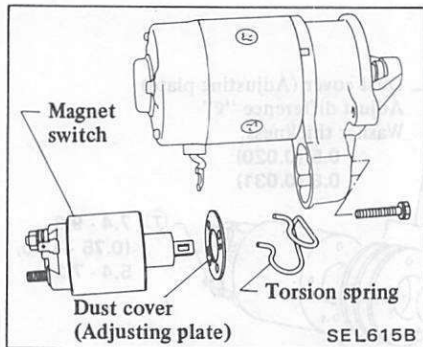
SEL633C

STARTING SYSTEM

DISASSEMBLY

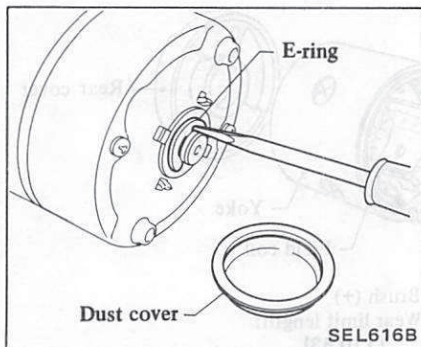
Gasoline engine model

1. Remove magnetic switch.

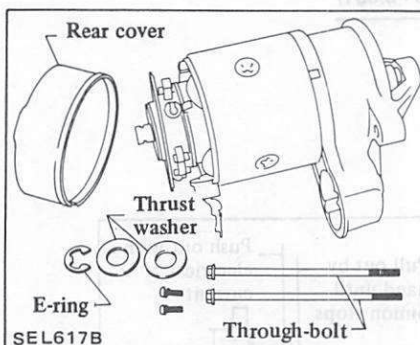


2. Remove rear cover.

- (1) Remove dust cover, E-ring and thrust washer(s).

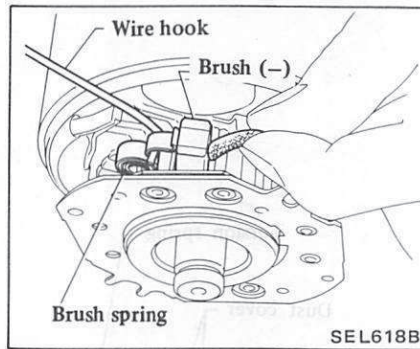


- (2) Remove brush holder setscrews and through-bolts.



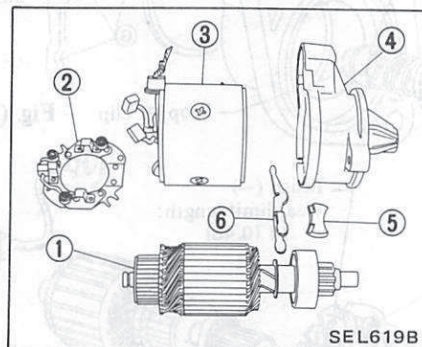
3. Remove brush holder.

- (1) Lift brush spring and hold it against side surface of negative brush. This causes the brush to separate from commutator.



- (2) Remove positive brush from brush holder by lifting the brush spring.

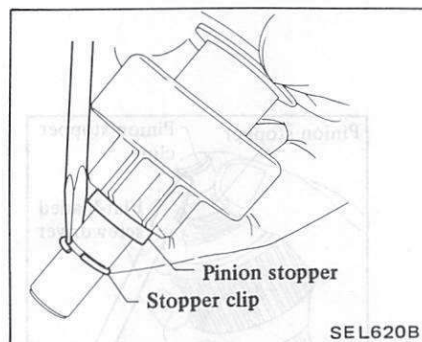
4. Remove yoke and withdraw armature assembly and shift lever.



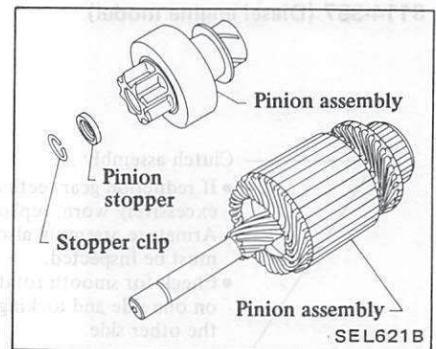
- 1 Armature assembly
- 2 Brush holder
- 3 Yoke
- 4 Housing
- 5 Dust cover
- 6 Shift lever

5. Remove pinion assembly from armature assembly.

- (1) Move pinion stopper toward pinion, and remove pinion stopper clip with a flat-bladed screwdriver.

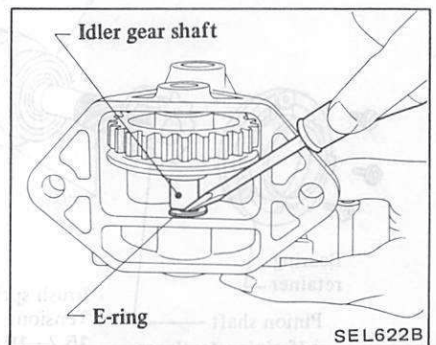


- (2) Remove pinion stopper, and detach pinion assembly.



6. Remove idler gear (A/T models only).

- (1) Remove E-ring from idler gear shaft.



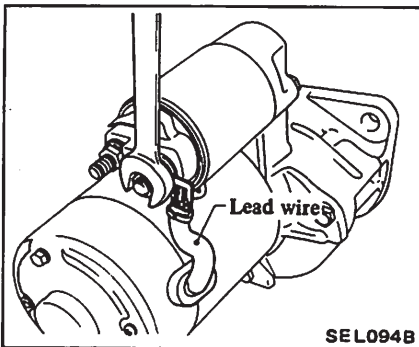
- (2) Remove dust cover, and drive out idler gear shaft with a hammer or similar tool.



STARTING SYSTEM

Diesel engine model

1. Disconnect lead wire.



2. Remove rear cover.

CAUTION:

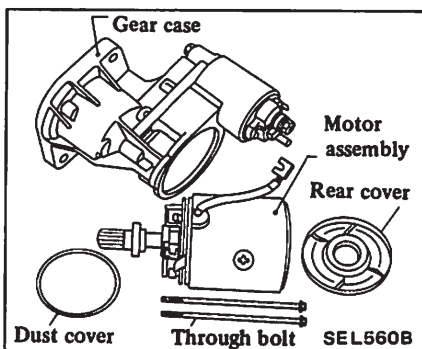
Be careful not to damage dust cover.

3. Remove yoke assembly, armature and brush holder.

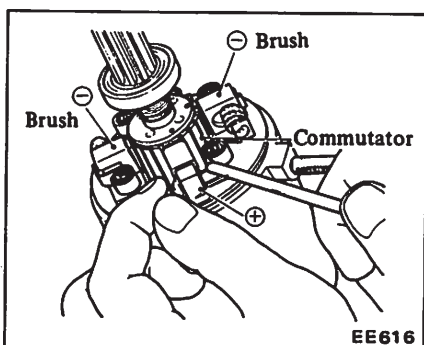
(1) Remove yoke, armature and brush holder as an assembly from center housing.

CAUTION:

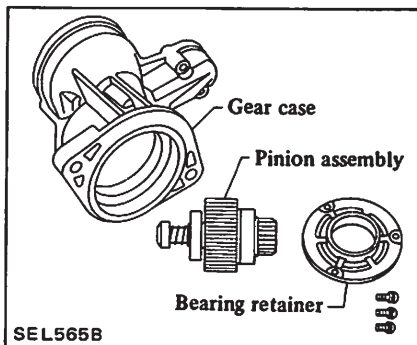
Be careful not to knock brush, commutator or coil against any adjacent part.



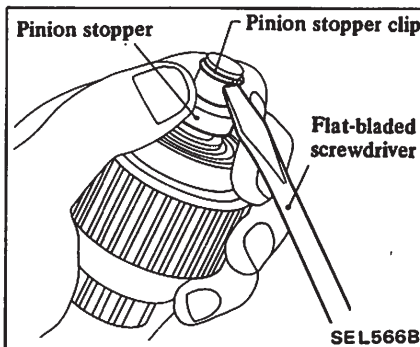
- (2) Lift up brush (–) and remove brush (+), then remove brush holder.



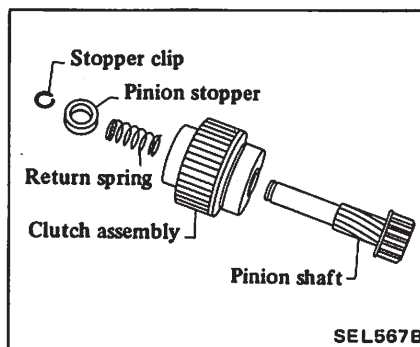
- (3) Draw out armature from yoke. Remove bearing retainer and draw out pinion assembly.



4. Remove pinion stopper clip.



5. Remove pinion shaft.

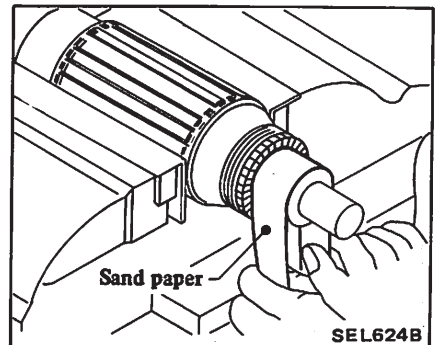


INSPECTION

Armature assembly

1. Check commutator surface.

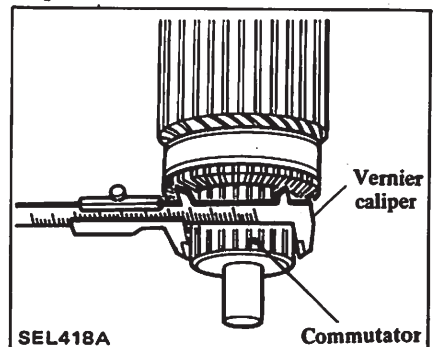
- Rough ... Sand lightly with No. 500 ~600 sandpaper.



2. Check diameter of commutator.

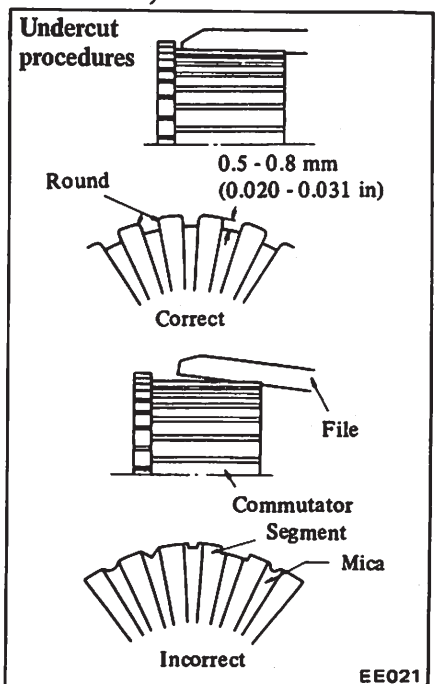
Commutator minimum diameter:
Refer to S.D.S.

- Less than specified value ... Re-place.



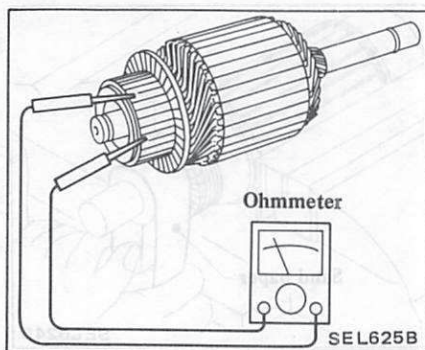
3. Check depth of insulating mica from commutator surface.

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



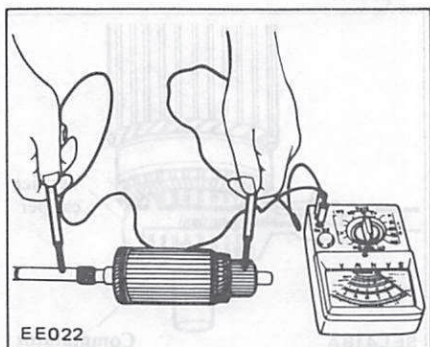
STARTING SYSTEM

4. Continuity test (between two segments side by side).



- No continuity ... Replace.

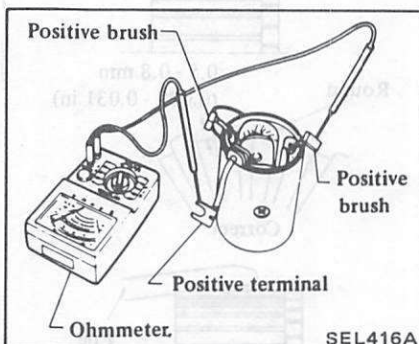
5. Insulation test (between each commutator bar and shaft).



- Continuity exists ... Replace.

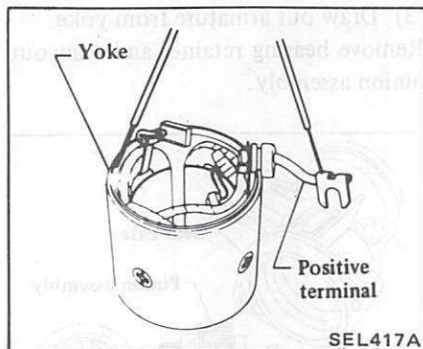
Field coil

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



- No continuity ... Replace field coil.

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

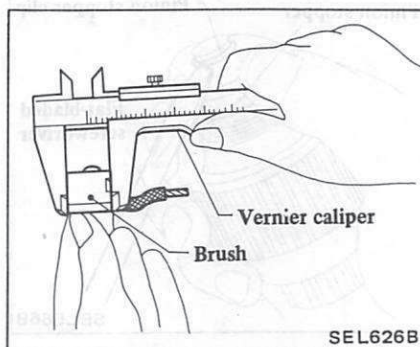


- Continuity exists ... Replace field coil.

Brush

Check wear of brush.

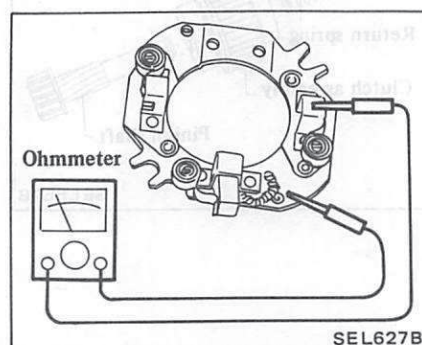
Wear limit length: Refer to S.D.S.



- Excessive wear ... Replace.

Brush holder

1. Perform insulation test between brush holder (positive side) and its base (negative side).



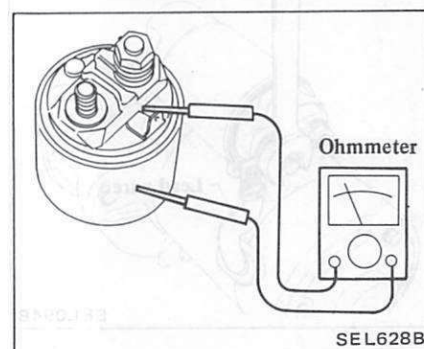
- Continuity exists ... Replace.

2. Check brush holder to see if it moves smoothly.

- If brush holder is bent, replace it; if sliding surface is dirty, clean.

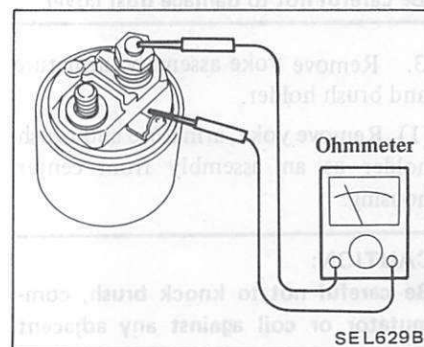
Magnetic switch

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



- No continuity ... Replace.

2. Continuity test (between "S" terminal and "M" terminal).

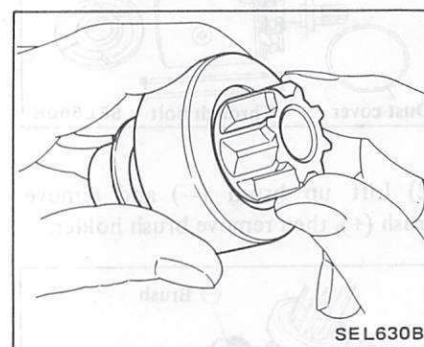


- No continuity ... Replace.

Pinion assembly

1. Check clutch.

Check pinion to see that it locks properly when turned in "drive" direction and rotates smoothly when turned in reverse.



- Pinion does not lock in either direction or unusual resistance is evident ... Replace.

2. Inspect pinion teeth.

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

STARTING SYSTEM

ASSEMBLY

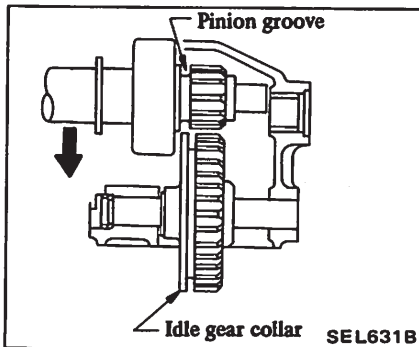
To assemble, reverse order of disassembly. Note the following:

a. Apply grease to:

- Frictional surface of pinion
- Moving portion of shift lever
- Plunger of magnetic switch
- Rear cover metal (Gasoline engine models)
- Gear case metal (Gasoline engine models)
- Reduction gear (Diesel engine models)

b. Gasoline engine A/T models

When installing armature assembly to gear case, properly align groove in pinion gear with flange of idler gear.

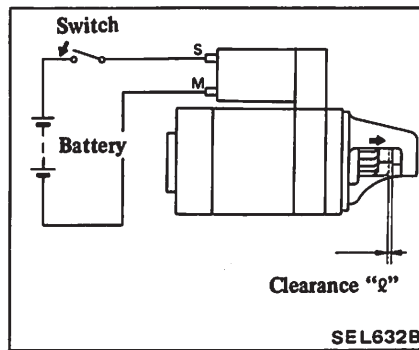


- c. Check pinion to see if its engagement length is correct.

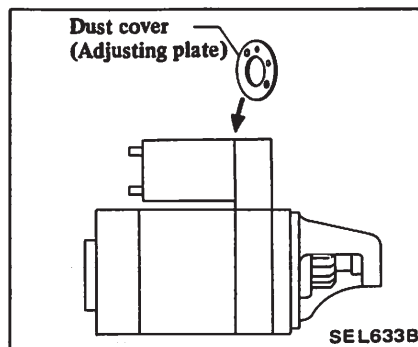
(Gasoline engine M/T models)

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

Clearance "ℓ":
Refer to S.D.S.



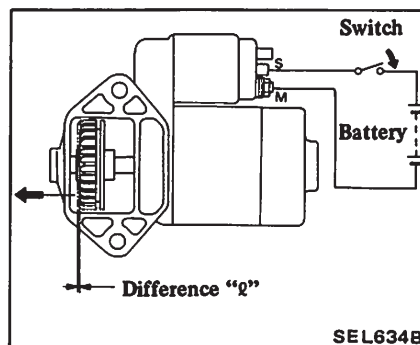
- Not in the specified value ... Adjust by dust cover (Adjusting plate).



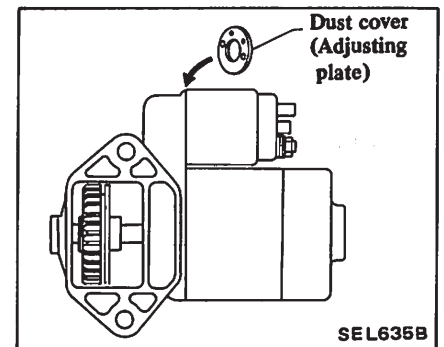
(Gasoline engine A/T models)

Measure difference in length "ℓ" of idler gear's front edge when idler gear is forced out by the magnetic switch and then when it is pulled out by hand.

Difference "ℓ":
Refer to S.D.S.



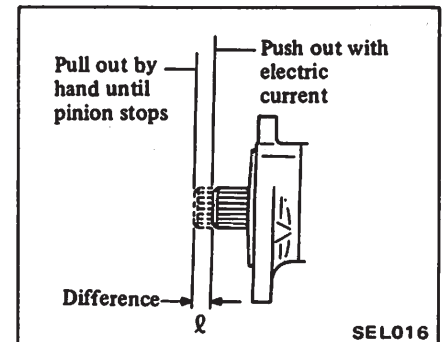
- Not in the specified value ... Adjust by dust cover (Adjusting plate).



(Diesel engine model)

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":
Refer to S.D.S.



- Not in the specified value ... Adjust by dust cover (Adjusting plate).

STARTING SYSTEM

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

STARTER MOTOR

Type		S114-315	S114-316	S114-317	S114-345	S144-357
Applied model		Gasoline engine model				Diesel engine model
		M/T models for U.S.A.	M/T models for Canada and optional for U.S.A. M/T models	A/T models for U.S.A.	A/T models for Canada	All
System voltage	V	12	12	12	12	12
No load						
Terminal voltage	V	11.5	11.5	11.5	11.5	11
Current	A	Less than 60	Less than 60	Less than 60	Less than 60	Less than 100
Revolution	rpm	More than 7,000	More than 7,000	More than 7,000	More than 2,000	More than 3,900
Outer diameter of commutator	mm (in)	More than 32 (1.26)	More than 39 (1.54)	More than 39 (1.54)	More than 39 (1.54)	More than 29 (1.14)
Minimum length of brush	mm (in)	11 (0.43)	11 (0.43)	11 (0.43)	11 (0.43)	11 (0.43)
Brush spring tension	N (kg, lb)	17.7 - 21.6 (1.8 - 2.2, 4.0 - 4.9)	17.7 - 21.6 (1.8 - 2.2, 4.0 - 4.9)	17.7 - 21.6 (1.8 - 2.2, 4.0 - 4.9)	17.7 - 21.6 (1.8 - 2.2, 4.0 - 4.9)	15.7 - 19.6 (1.6 - 2.0, 3.5 - 4.4)
Clearance between bearing metal and armature shaft	mm (in)	Less than 0.2 (0.008)	Less than 0.2 (0.008)	Less than 0.2 (0.008)	Less than 0.2 (0.008)	—
Clearance "X" between pinion front edge and pinion stopper	mm (in)	0.3 - 2.5 (0.012 - 0.098)	0.3 - 2.5 (0.012 - 0.098)	—	—	—
Difference "X" in height of idler gear	mm (in)	—	—	0.3 - 2.5 (0.012 - 0.098)	0.3 - 2.5 (0.012 - 0.098)	0.3 - 1.5 (0.012 - 0.059)

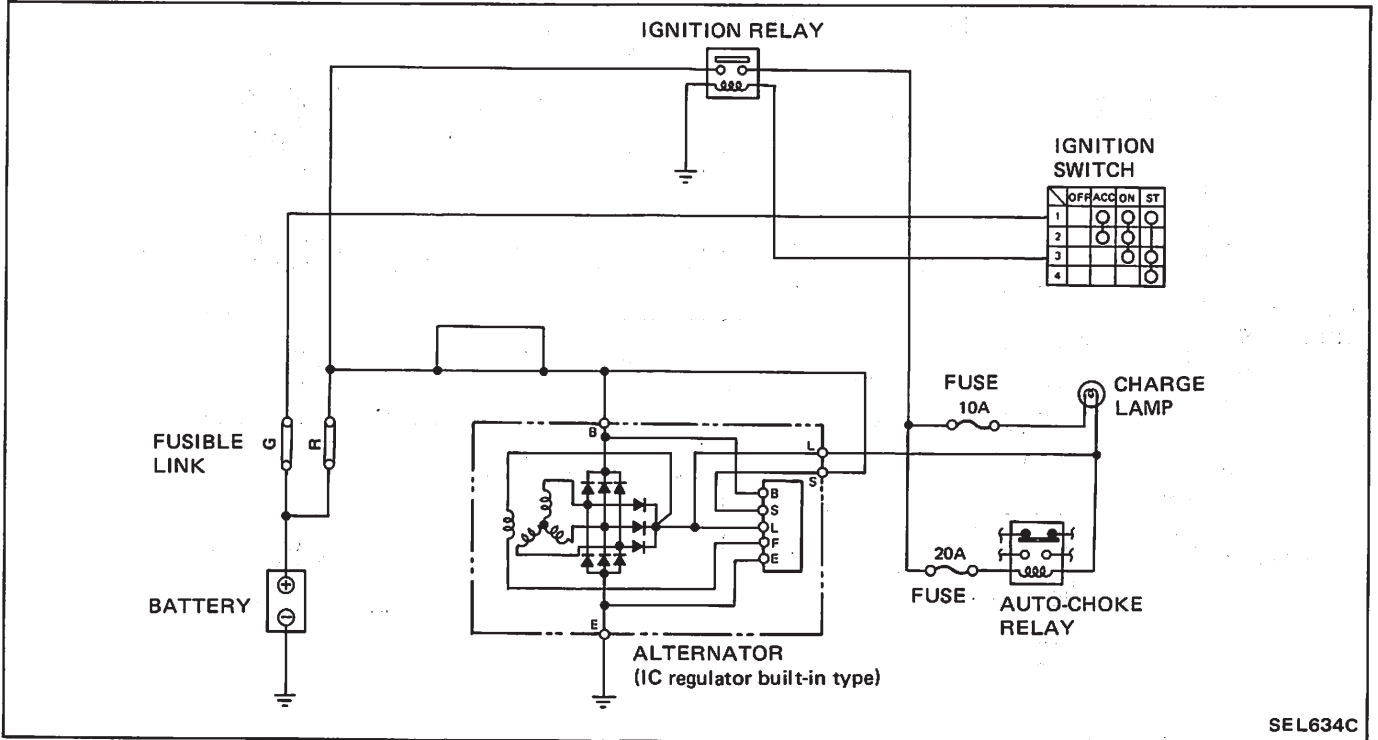
CHARGING SYSTEM

CHARGING SYSTEM

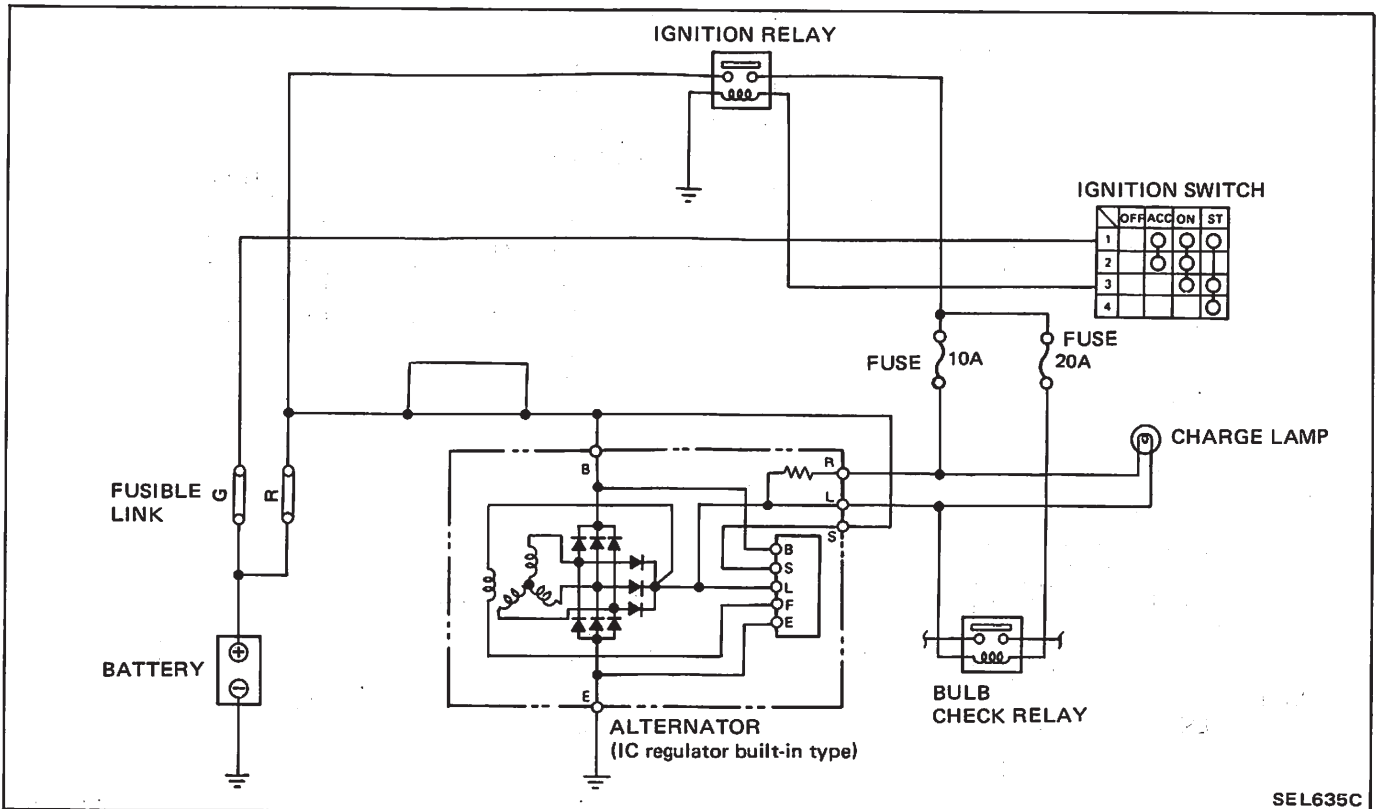
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

SCHEMATIC

GASOLINE ENGINE MODELS



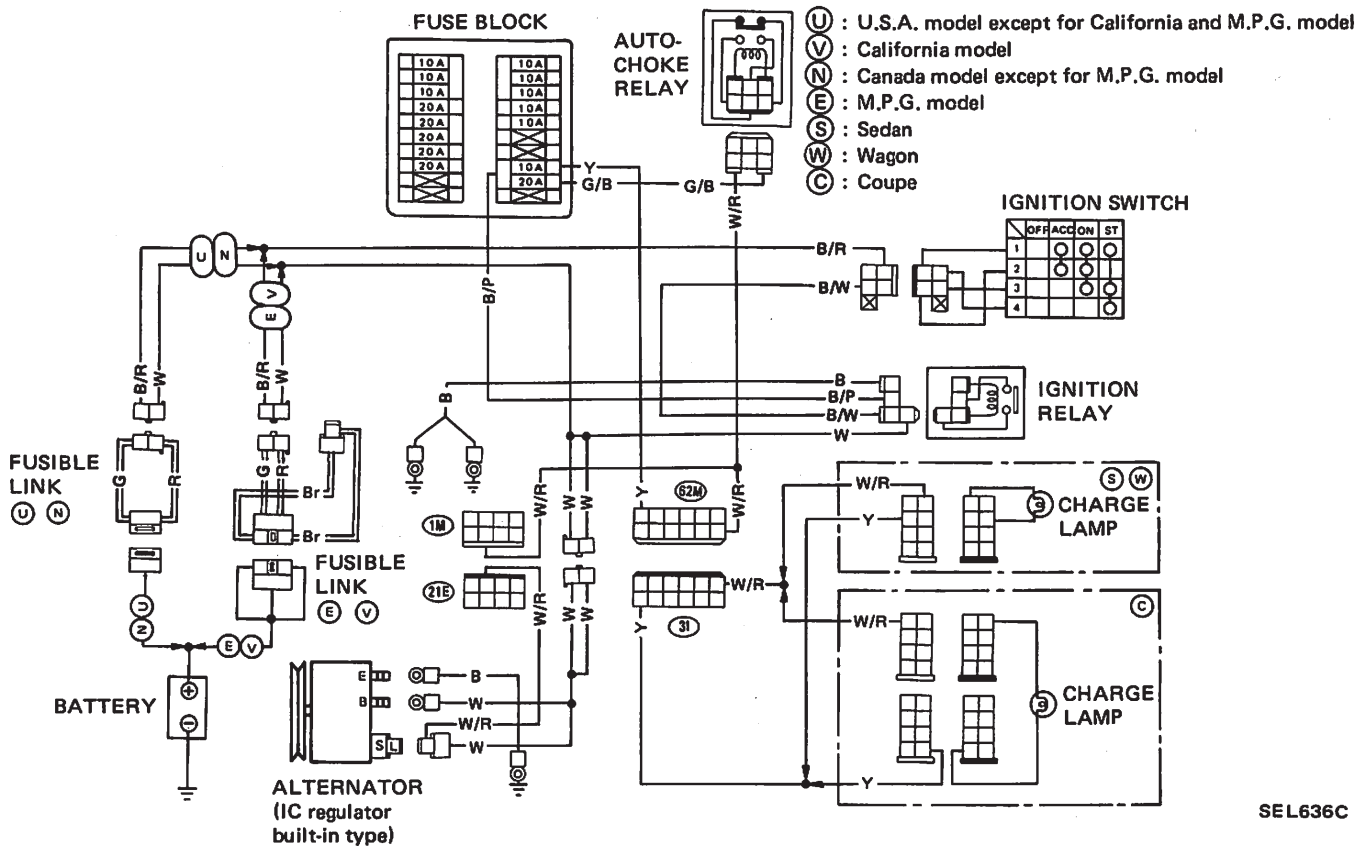
DIESEL ENGINE MODELS



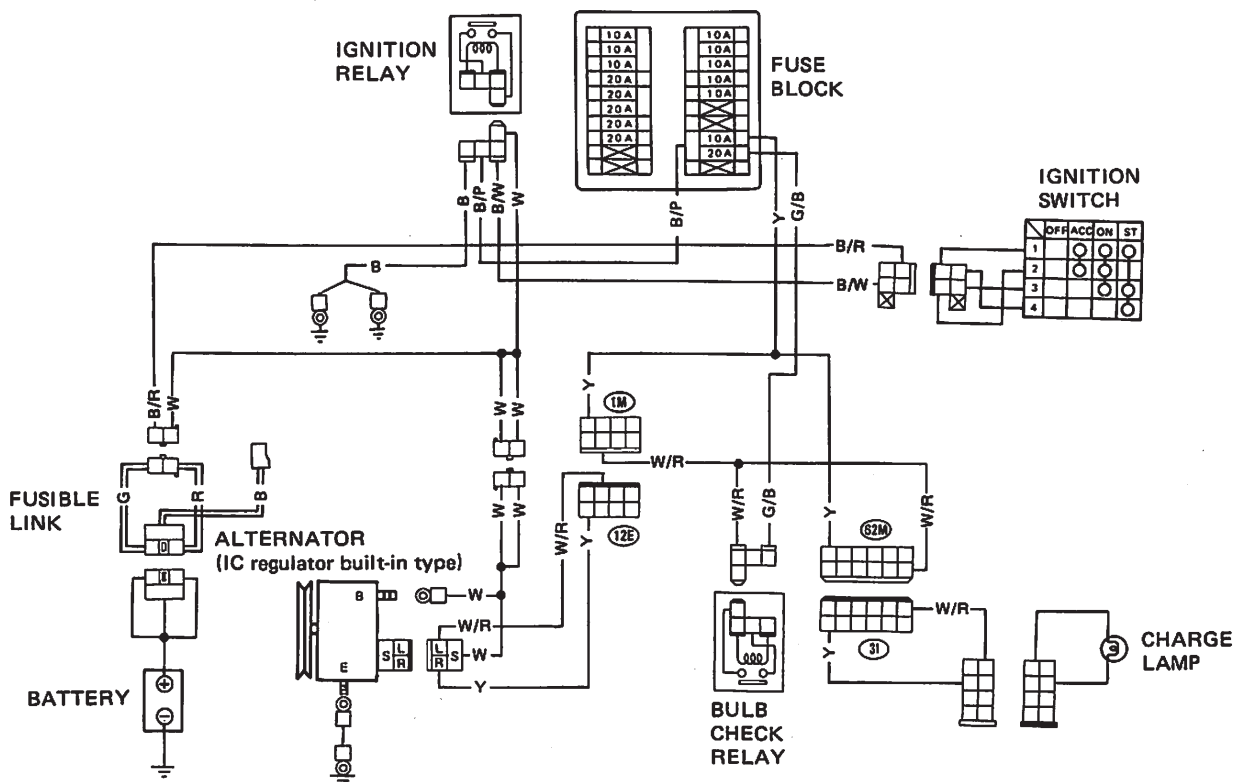
CHARGING SYSTEM

WIRING DIAGRAM

GASOLINE ENGINE MODELS



DIESEL ENGINE MODELS



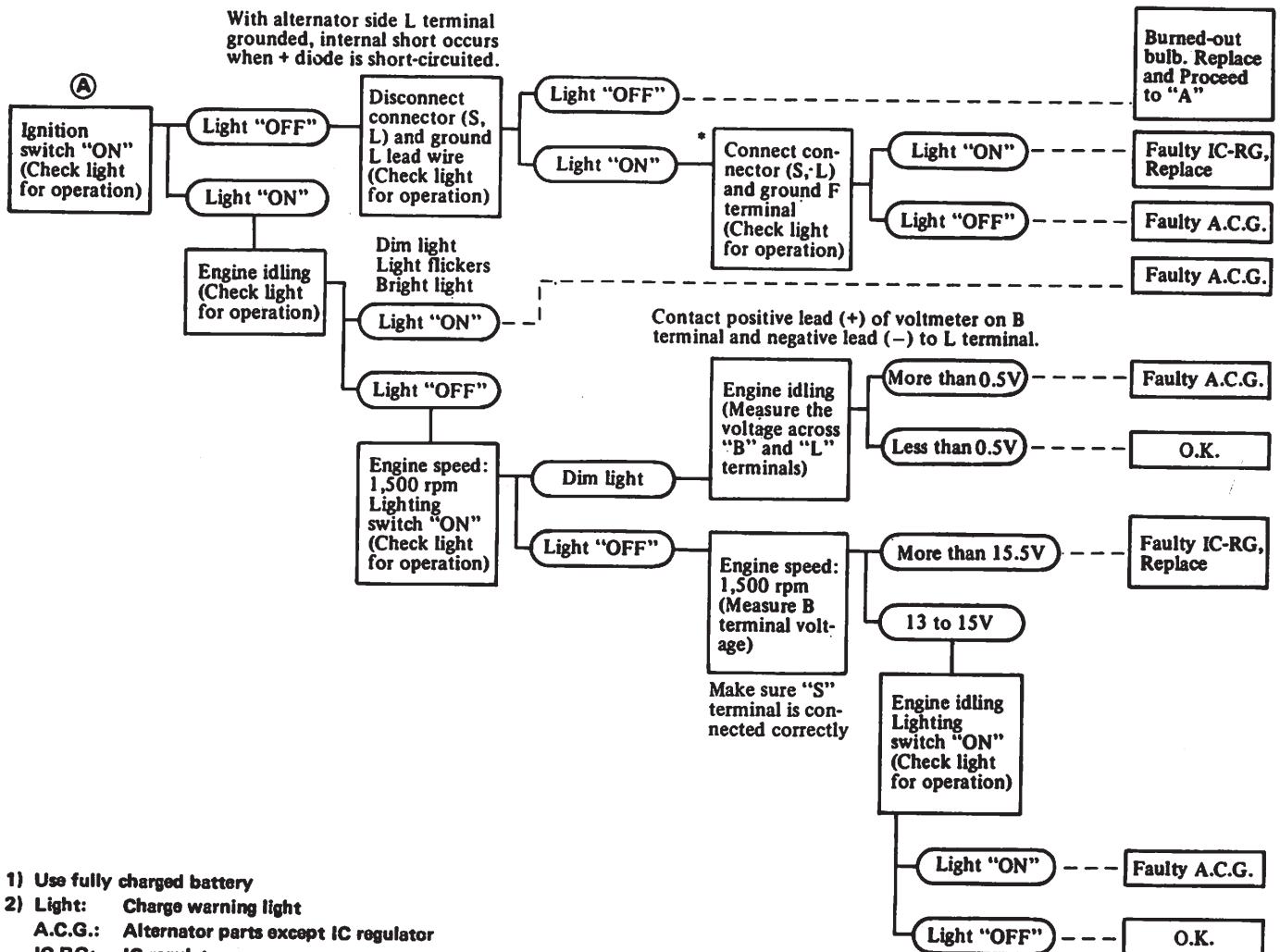
CHARGING SYSTEM

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.

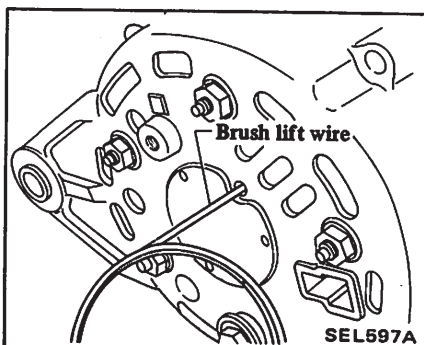
The alternator can be checked easily by referring to the Inspection Table.



- 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

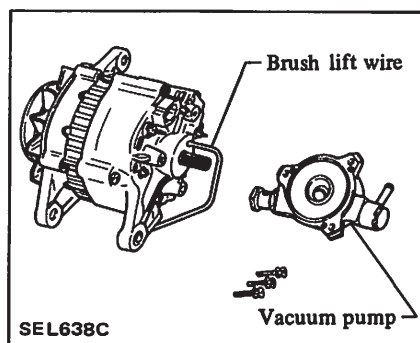
Gasoline engine model

Contact tip of wire with brush and attach wire to alternator body.



Diesel engine model

Remove vacuum pump and connect 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.

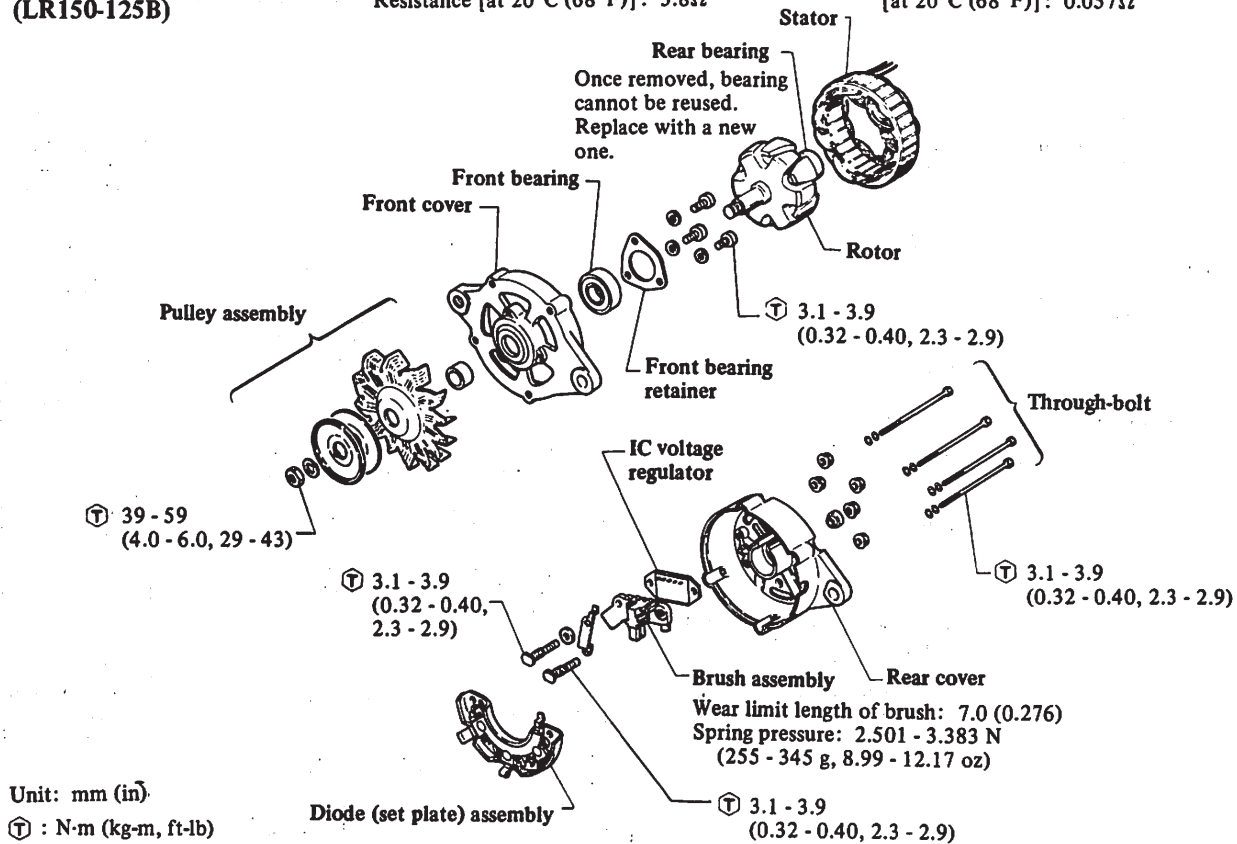
ALTERNATOR

**Gasoline engine model
(LR150-125B)**

**Gasoline engine model
(LR150-125B)**

Slip ring dia.: more than 30 (1.18)
Resistance [at 20°C (68°F)]: 3.8Ω

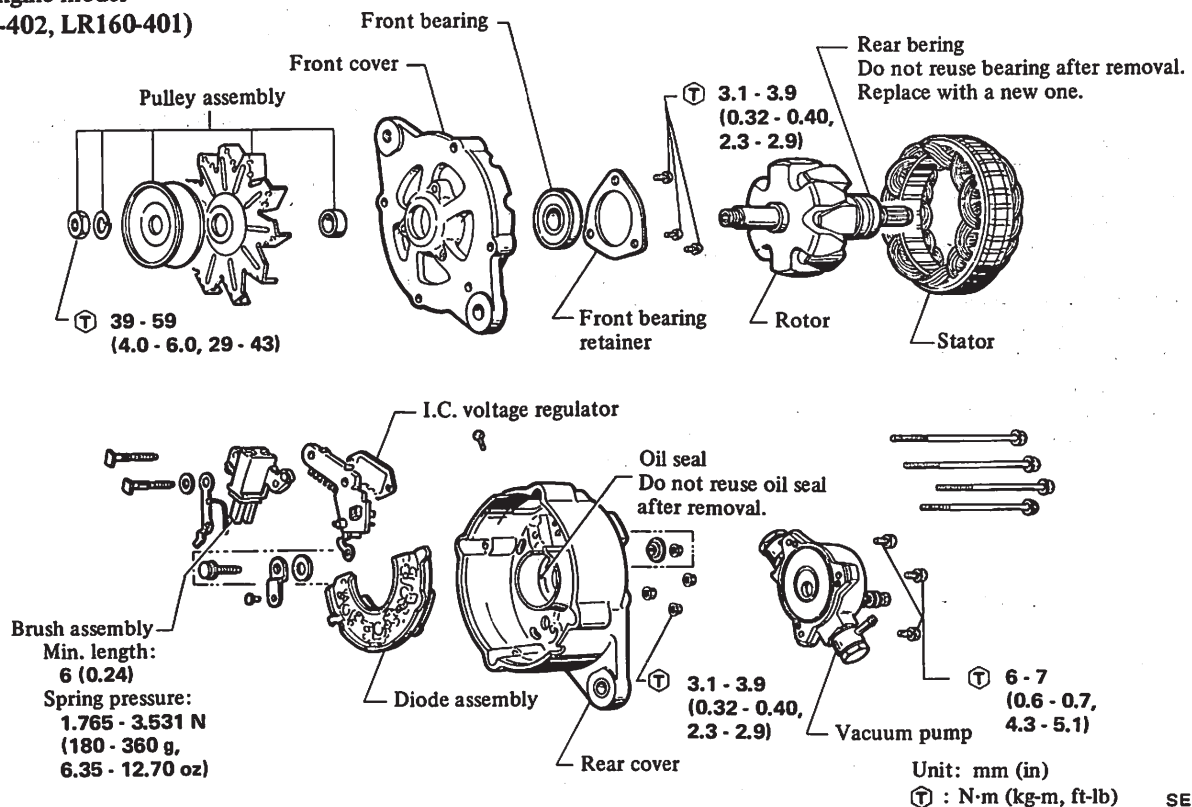
Resistance per phase
[at 20°C (68°F)]: 0.057Ω



SEL583A

**Diesel engine model
(LR150-402, LR160-401)**

Slip ring dia.: more than 33.6 (1.323)



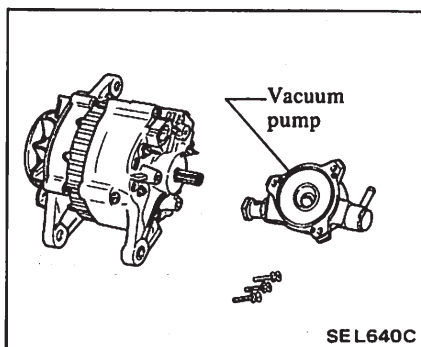
Unit: mm (in)
 Ⓣ : N·m (kg-m, ft-lb)

SE L639C

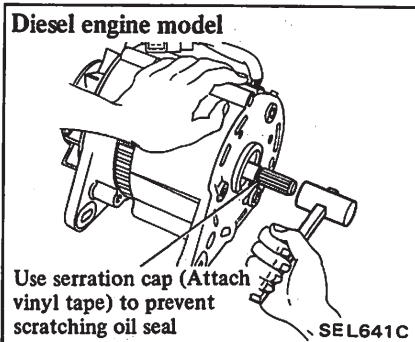
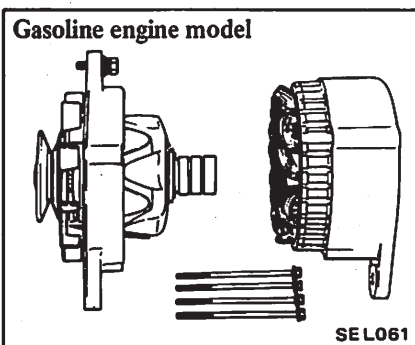
CHARGING SYSTEM

DISASSEMBLY

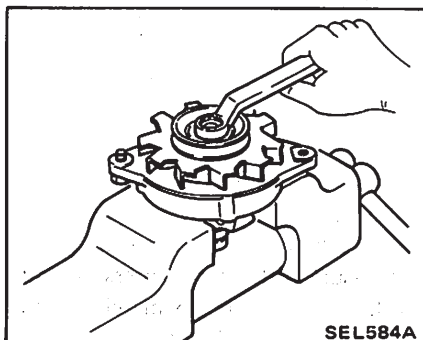
1. Remove vacuum pump (Diesel engine model only).



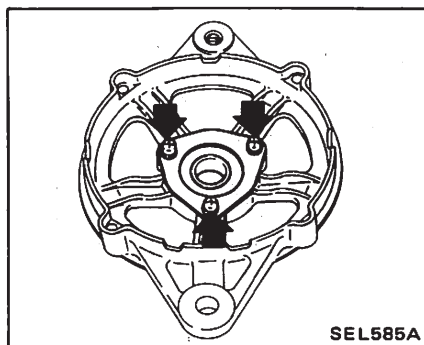
2. Remove through-bolts and the separate front cover and rear cover.



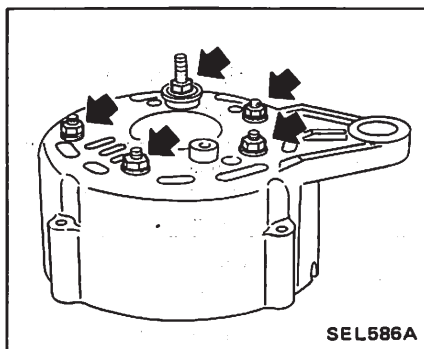
3. Remove pulley and fan.
 - (1) Place rear cover side of rotor in a vice.
 - (2) Remove pulley nut.



4. Remove setscrews from bearing retainer.



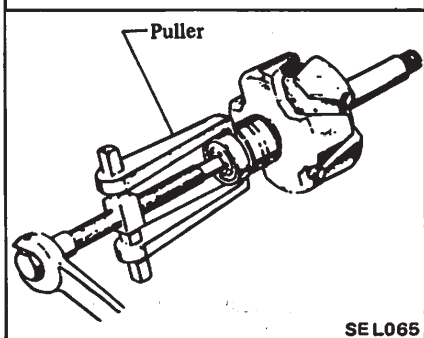
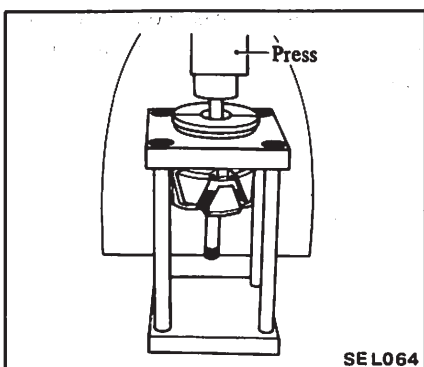
5. Remove attaching nuts and take out stator assembly.



Rotor

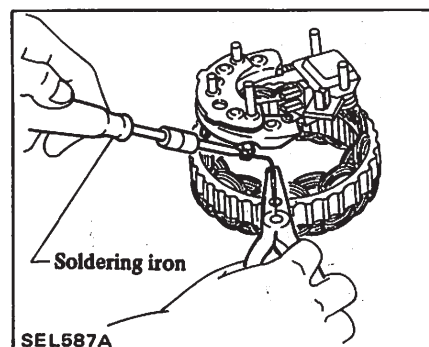
Pull rear bearing off from rotor assembly with a press or bearing puller.

Once removed, bearing cannot be re-used. Replace with a new one.



Stator

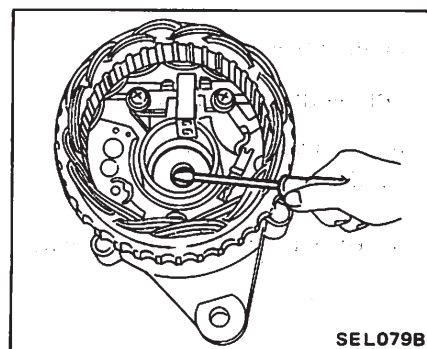
Disconnect stator coil lead wires from diode terminals



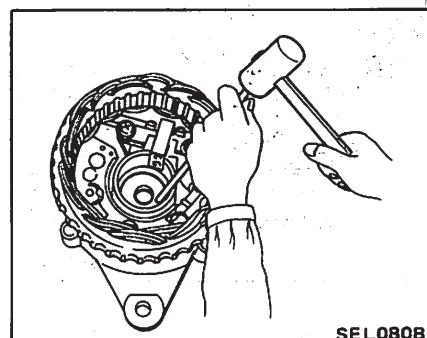
Replacement of oil seal (Only diesel engine model)

If oil leaks from oil seal or any abnormalities are found after inspection, replace oil seal.

1. Pry off oil seal.



2. Apply engine oil to seal and install oil seal in position.

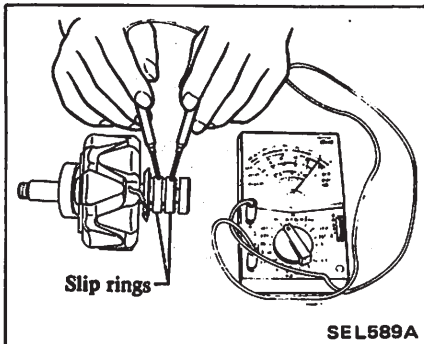


CHARGING SYSTEM

INSPECTION

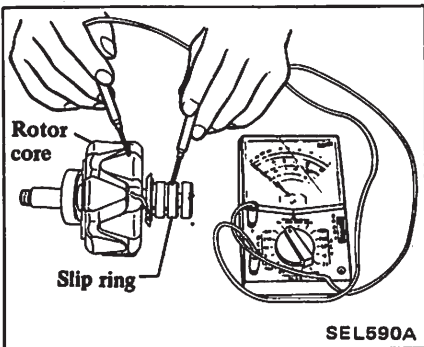
Rotor

1. Continuity test.



- No continuity ... Replace rotor.

2. Insulation test



- Continuity exists ... Replace rotor.

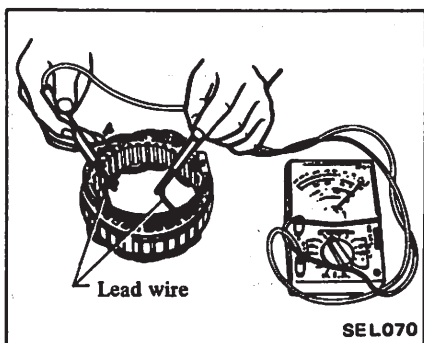
3. Check slip ring for wear.

Slip ring outer diameter:
Refer to S.D.S.

If necessary, replace rotor assembly.

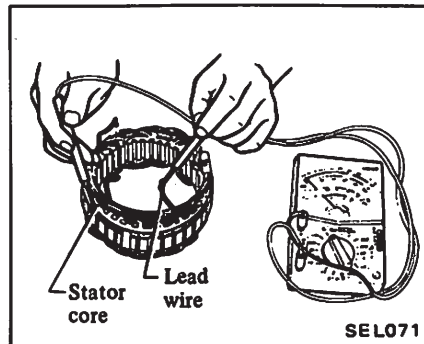
Stator

1. Continuity test



- No continuity ... Replace stator.

2. Insulation test



- Continuity exists ... Replace stator.

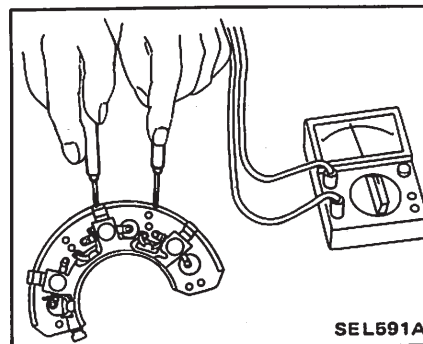
Diode

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

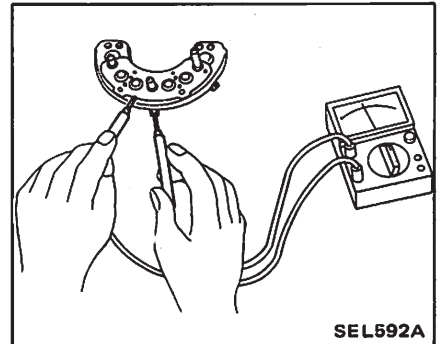
Some ohmmeters use a reverse polarity, in which case continuity will be exactly opposite from the chart above.

Positive diode



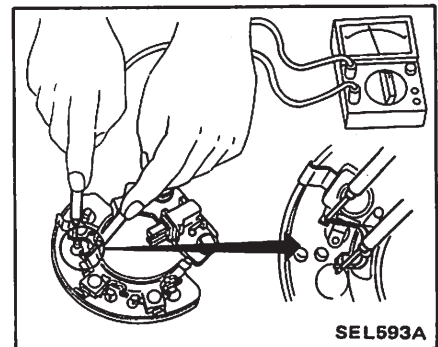
- Conduction test is N.G. ... Replace diode assembly.

Negative diode



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

Sub-diode



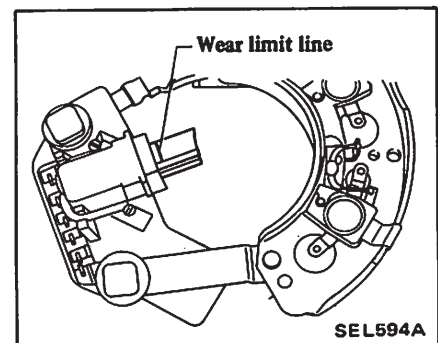
- Conduction test is N.G. ... Replace diode assembly.

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.

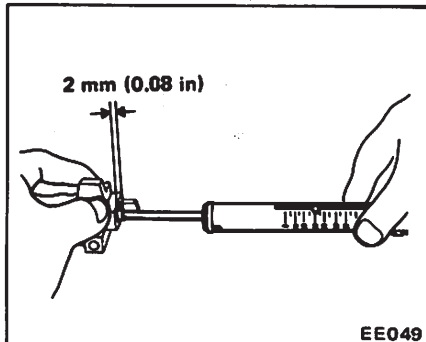
Measure brush spring pressure with brush projected approximately 2 mm (0.08 in) from brush holder.

CHARGING SYSTEM

Spring pressure:

Refer to S.D.S.

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.

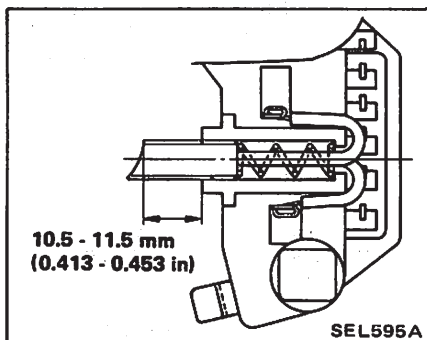
Oil seals (Only diesel engine model)

- Check oil seal for wear, cracks or deformation. Replace if necessary.
- Do not reuse oil seal once removed.

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.

Ⓣ : Brush holder

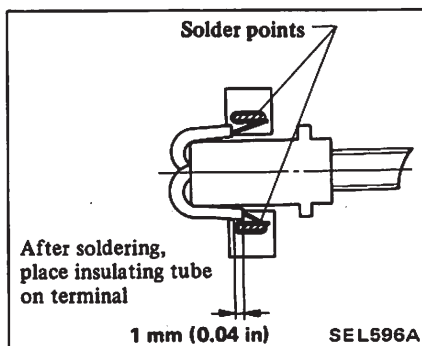
3.1 - 3.9 N·m
(0.32 - 0.4 kg-m,
2.3 - 2.9 ft-lb)

Diode and IC regulator

3.1 - 3.9 N·m
(0.32 - 0.4 kg-m,
2.3 - 2.9 ft-lb)

Bearing retainer

3.1 - 3.9 N·m
(0.32 - 0.4 kg-m,
2.3 - 2.9 ft-lb)



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

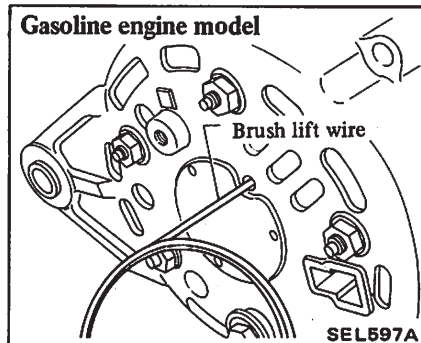
Ⓣ : Pulley nut

39 - 59 N·m
(4 - 6 kg-m,
29 - 43 ft-lb)

V-groove deflection:

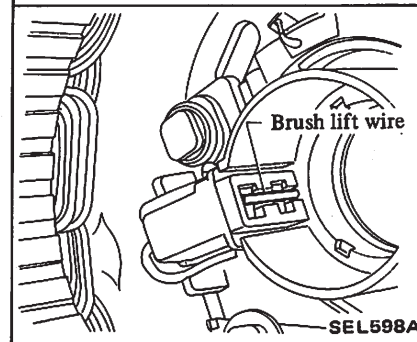
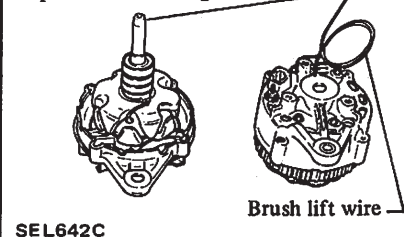
0.3 mm (0.012 in)

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



Diesel engine model

Use serration cap (Attach vinyl tape) to prevent scratching oil seal



5. After installing front and rear sides of alternator, pull brush lift 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

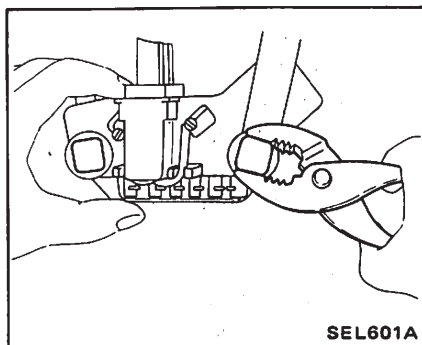
3.1 - 3.9 N·m
(0.32 - 0.4 kg-m,
2.3 - 2.9 ft-lb)

CHARGING SYSTEM

IC VOLTAGE REGULATOR DESCRIPTION

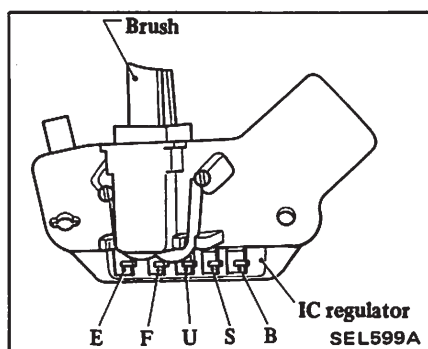
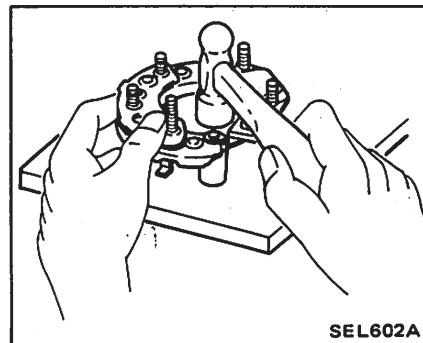
The regulator consists essentially of integrated circuits incorporating transistors. These transistors interrupt and admit current flow to the alternator rotor coil, thus maintaining its output voltage at a constant value. Unlike in a mechanical type regulator, an electronic relay employing transistors 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 terminals solder and take out bolts.



When installing the regulator, reverse order removal noting following.

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



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

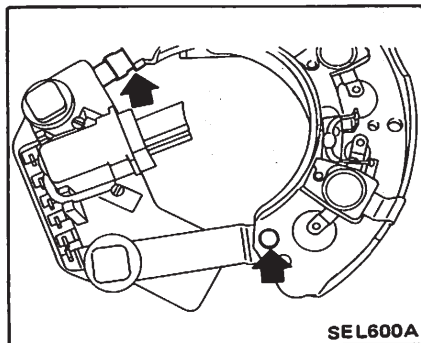
ALTERNATOR

Type	LR150-125B	LR150-402	LR160-401
Applied model	Gasoline engine model	Diesel engine models	
		Non-California models for U.S.A.	California, Canada and non-California optional models for U.S.A.
Nominal rating V-A	12-50	12-50	12-60
Ground polarity	Negative	Negative	Negative
Minimum revolution under no-load (When 14 volts is applied) rpm	Less than 900	Less than 1,000	Less than 1,000
Hot output current A/rpm	More than 42/2,500 More than 50/5,000	More than 16/1,300 More than 42/2,500 More than 50/5,000	More than 50/2,500 More than 60/5,000
Regulated output voltage V	14.4 - 15.0	14.4 - 15.0	14.4 - 15.0
Brush wear limit mm (in)	More than 7.0 (0.276)	More than 6.0 (0.236)	More than 6.0 (0.236)
Brush spring pressure N (g, oz)	2.501 - 3.383 (255 - 345, 8.99 - 12.17)	1.765 - 3.531 (180 - 360, 6.35 - 12.70)	1.765 - 3.531 (180 - 360, 6.35 - 12.70)
Slip ring outer diameter mm (in)	More than 30 (1.18)	More than 33.6 (1.323)	More than 33.6 (1.323)

REPLACEMENT

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

1. Remove rivet and solder.

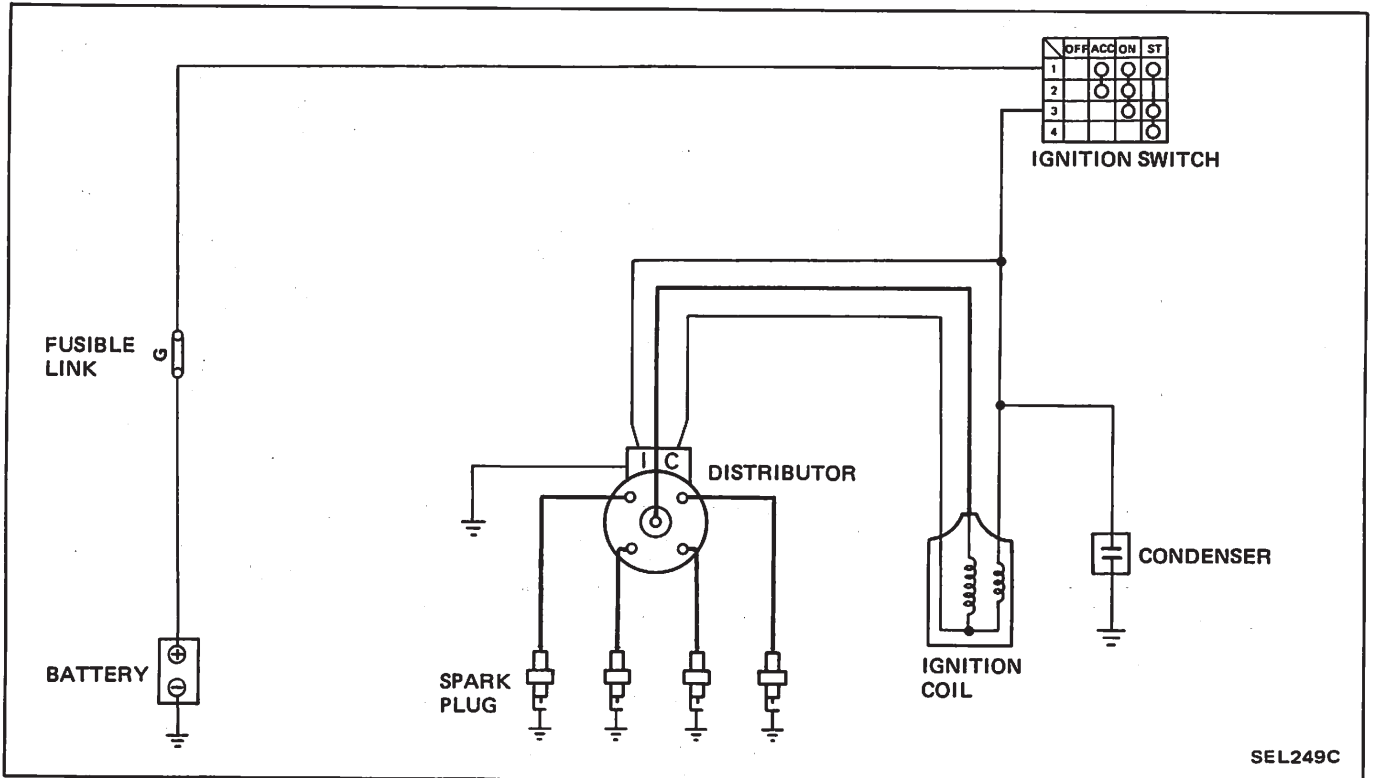


IGNITION SYSTEM

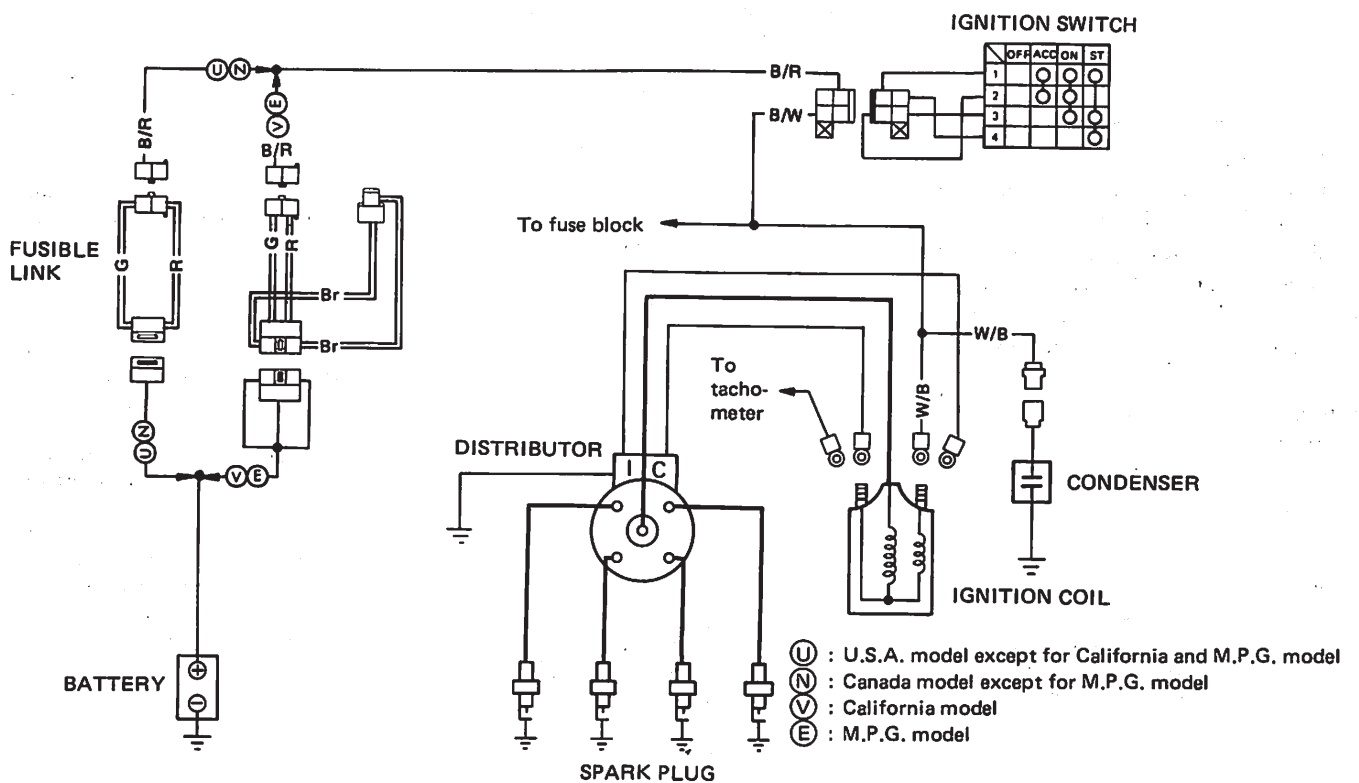
IGNITION SYSTEM

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

SCHEMATIC

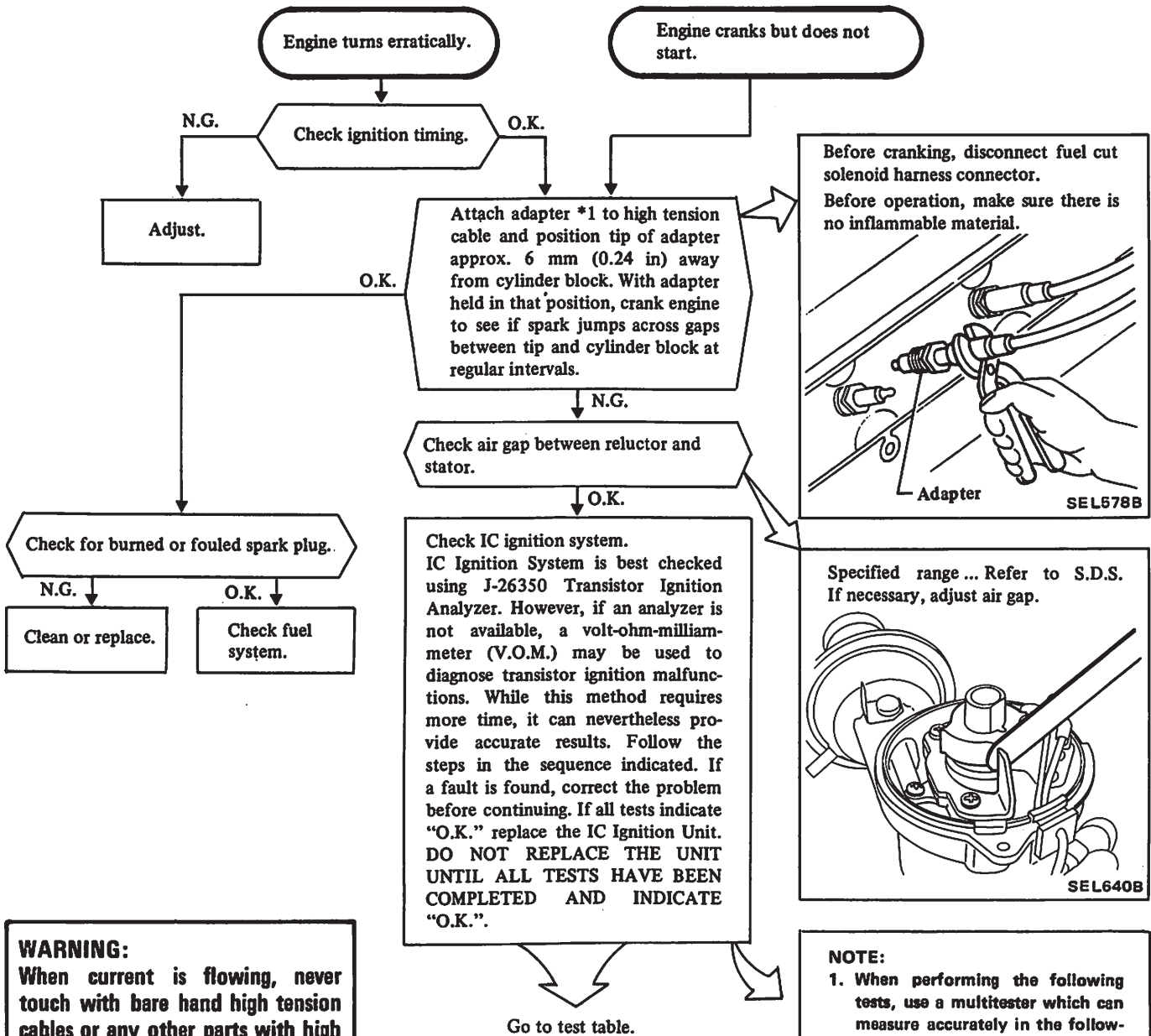


WIRING DIAGRAM



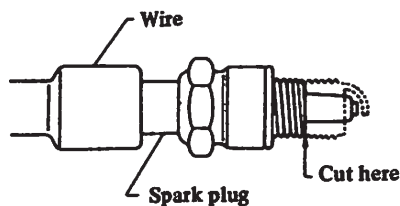
IGNITION SYSTEM

IC IGNITION SYSTEM TROUBLE-SHOOTING



*1:

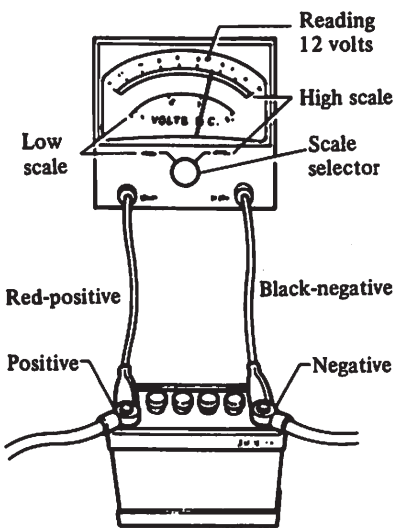
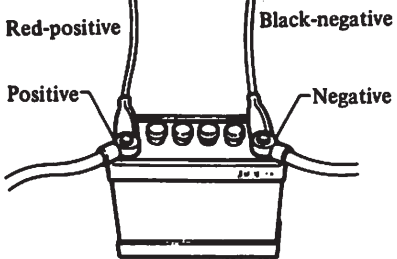
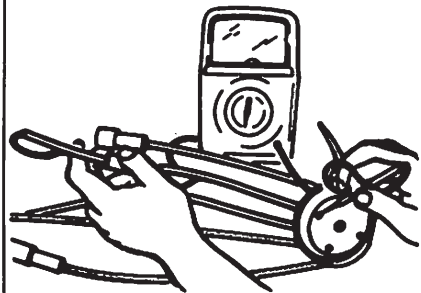
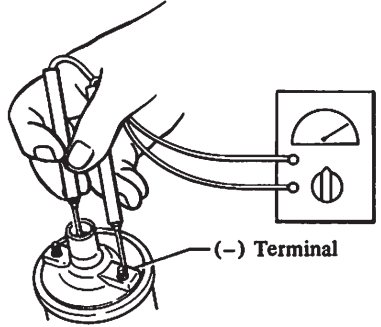
Preparation of spark plug for checking
Many things can be utilized as an adapter. However, it is recommended that a used spark plug whose threaded portion has been half cut off as shown in the figure be utilized.



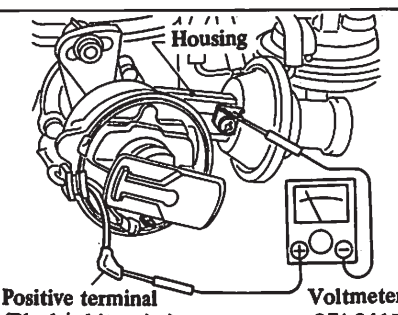
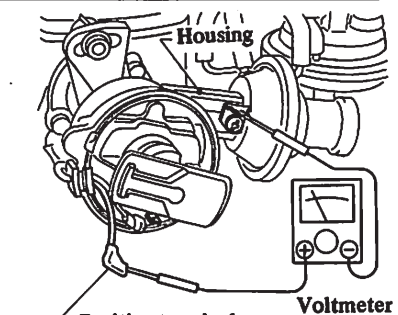
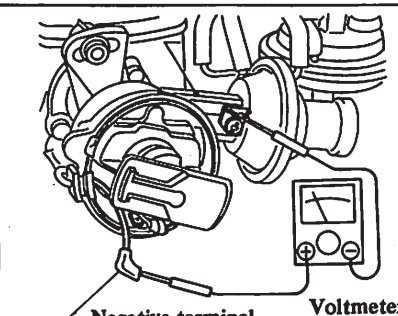
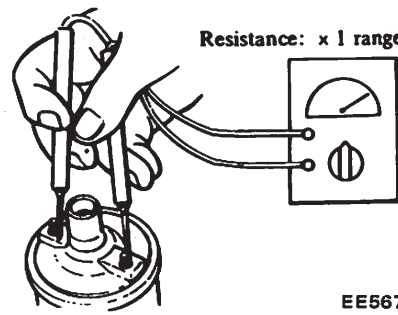
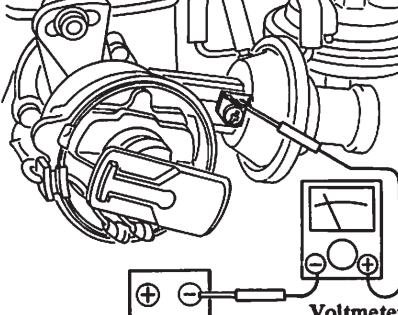
SEL581B

IGNITION SYSTEM

TEST TABLE

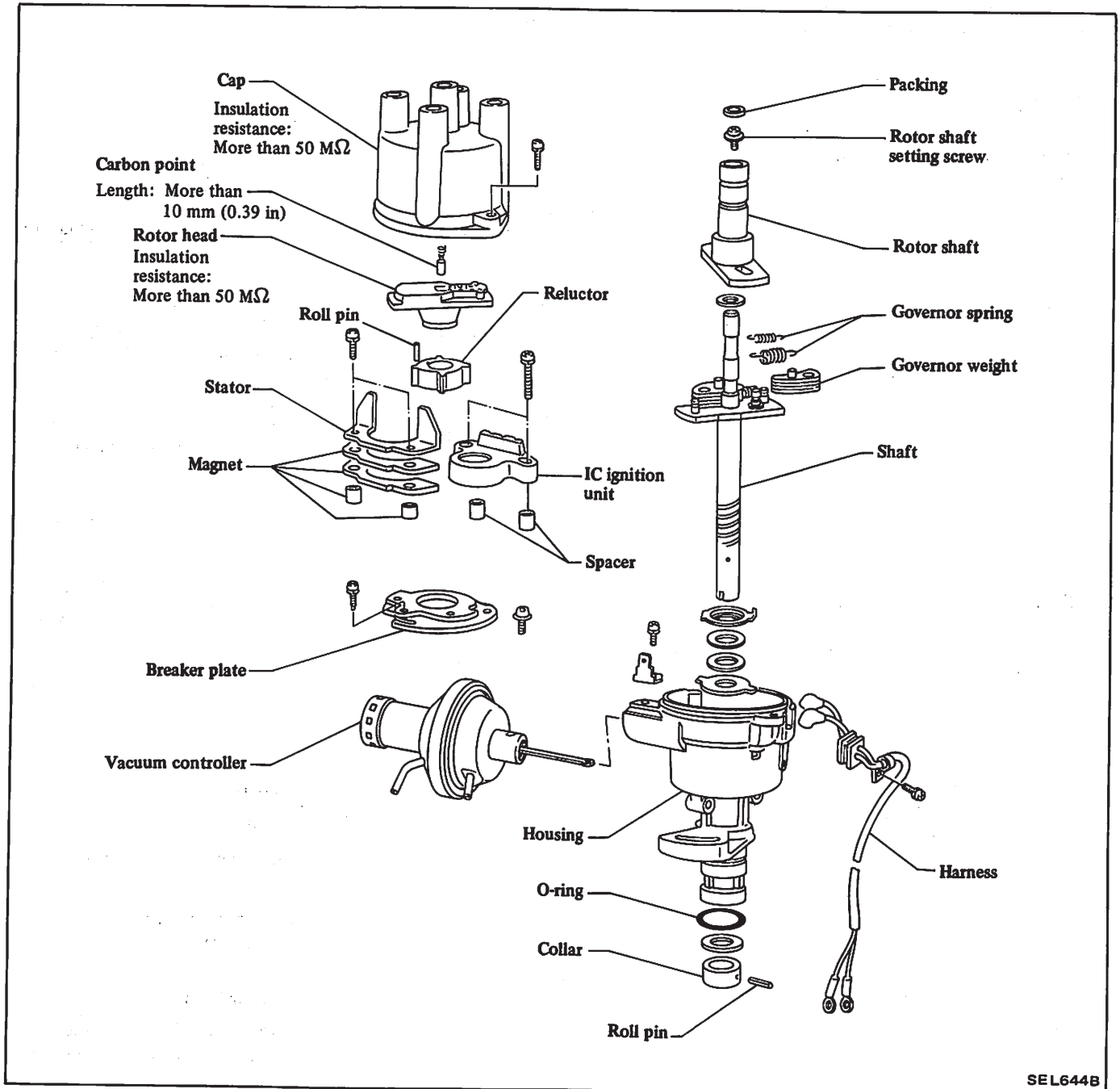
TEST	TEST METHOD	CONDITIONS	RESULT	ACTION
1. Battery Voltage (no load)		1. Ignition key in "OFF" position.	11.5 - 12.5 volts	Proceed to Step 2.
		2. Connect voltmeter as illustrated and set to appropriate scale. 3. Read and record battery voltage reading. Battery voltage <input type="text"/>	Below 11.5 volts	Battery, charging system or starting system – Faulty. Refer to applicable sections in Service Manual to correct the situation.
2. Battery Cranking Voltage		1. Connect voltmeter as illustrated and set to appropriate scale.	Voltage reading greater than 9.6 volts	Battery O.K. Proceed to Step 3.
		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 <input type="text"/>	Voltage reading less than 9.6 volts	Battery, charging system or starting system – Faulty. Refer to applicable sections in Service Manual to correct the situation.
3. Secondary Wiring		1. Connect ohmmeter as illustrated and measure the resistance of each high tension cable.	Resistance readings less than 30,000 ohms	Distributor cap and high tension cables – O.K. Proceed to Step 4.
			Resistance readings greater than 30,000 ohms	Replace high tension cable(s) and/or distributor cap as required.
4. Ignition Coil Secondary Circuit		1. Ignition key in "OFF" position.	7,300 - 11,000 ohms	Ignition coil secondary windings – O.K. Proceed to step 5 for California
		2. Coil wire removed from coil. 3. Connect ohmmeter as illustrated.	Resistance reading not between 7,300 - 11,000 ohms	Faulty ignition coil – replace

IGNITION SYSTEM

TEST	TEST METHOD	CONDITIONS	RESULT	ACTION
5. Power Supply Circuit	 <p>Positive terminal (Black/white wire) Voltmeter SEL641B</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	Proceed to Step 6.
			Below 11.5 volts	Check wiring from ignition switch to IC unit.
6. Power Supply Circuit (Cranking)	 <p>Positive terminal (Black/white wire) Voltmeter SEL641B</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>Negative terminal (Blue wire) Voltmeter SEL642B</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 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. 	1.04 - 1.27 ohms	Ignition coil primary winding O.K. Check ignition switch and wiring from ignition switch to coil and IC unit.
			Resistance reading not between 1.04 - 1.27 ohms	Faulty ignition coil - replace.
9. I.C. Unit Ground Circuit	 <p>Battery (on vehicle) Voltmeter SEL643B</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	Replace IC ignition unit assembly.
			More than 0.5 volts	Check distributor ground, wiring from chassis ground to battery including battery cable connections.

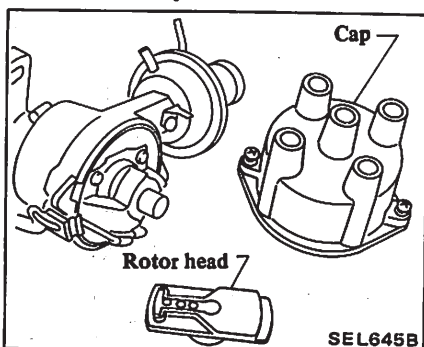
IGNITION SYSTEM

DISTRIBUTOR

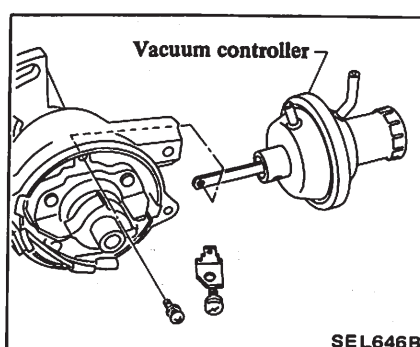


DISASSEMBLY

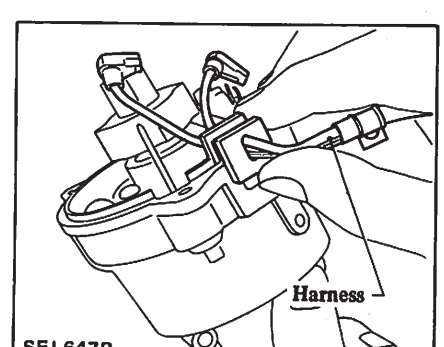
1. Remove cap and rotor head.



2. Remove vacuum controller.



3. Remove harness from housing.

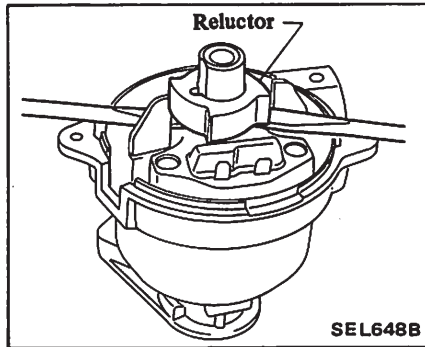


IGNITION SYSTEM

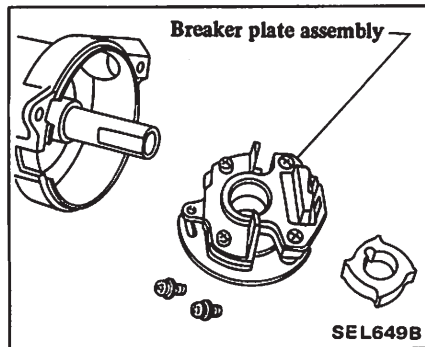
4. Insert a flat-bladed screwdriver under lower side of reluctor, and pry reluctor from shaft. Remove roll pin from reluctor.

CAUTION:

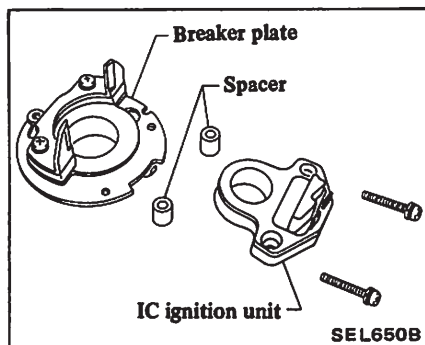
When removing reluctor, be careful not to distort or damage the teeth.



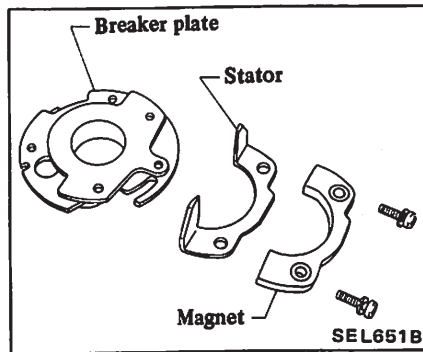
5. Remove breaker plate assembly.



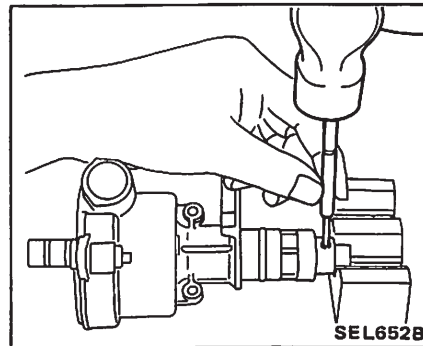
6. Remove IC ignition unit and spacer.



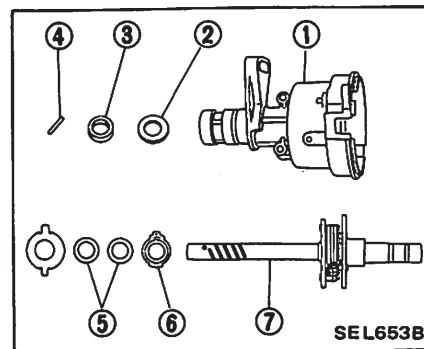
7. Remove magnet and stator from breaker plate.



8. Knock roll pin out and remove collar.



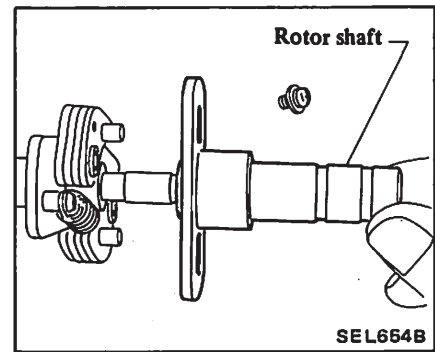
9. Draw out shaft assembly from housing.



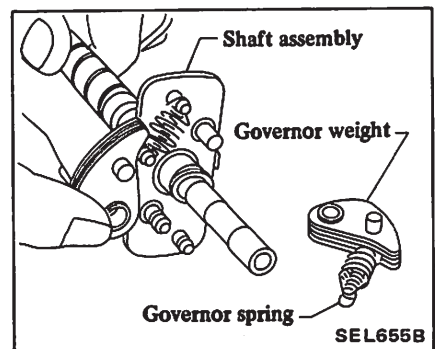
- 1 Housing
- 2 Thrust washer
- 3 Collar
- 4 Roll pin
- 5 Thrust washer
- 6 Thrust plate
- 7 Shaft

10. Remove packing from the top of rotor shaft and unscrew rotor shaft setscrew.

Remove rotor shaft.



11. Remove governor weight and governor spring from the shaft assembly.



INSPECTION

Carbon point

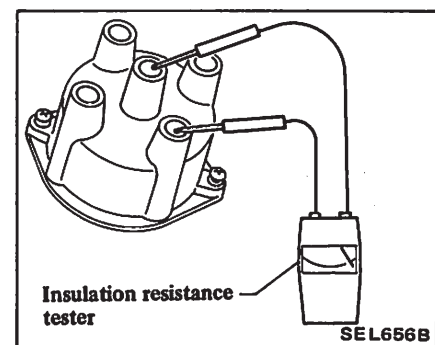
Check length of carbon point inside cap.

Carbon point length:
Refer to S.D.S.

Cap and rotor head

Measure insulation resistance between electrodes on ignition coil and side of spark plug.

Insulation resistance:
Refer to S.D.S.



IGNITION SYSTEM

- Less than specified value ... Replace.

Reluctor and stator

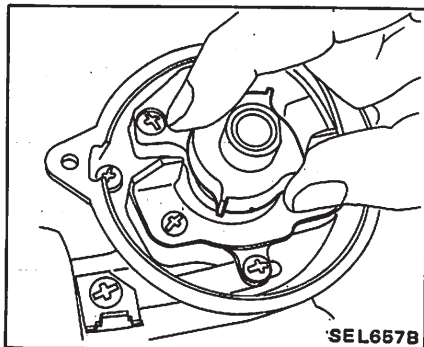
- Check reluctor and stator for bending or scratches. If necessary, replace.

Breaker plate

- If breaker plate shows any signs of binding or dragging, replace.

Centrifugal advance mechanical parts

- While preventing the shaft from turning, turn reluctor counterclockwise by hand and release it. It should return to its original position.



Vacuum advance mechanical parts

Apply negative pressure to vacuum controller with a vacuum pump to see if leakage is present. Also check breaker plate for smooth movement.

- If leak is found, replace vacuum controller.
- If breaker 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 assembly.

ASSEMBLY

To assemble, reverse order of disassembly. Note the following:

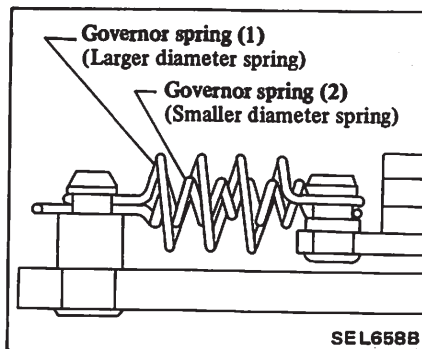
a. Apply grease to:

- Shaft bearing metal
- Governor spring

- Frictional surface of governor weight

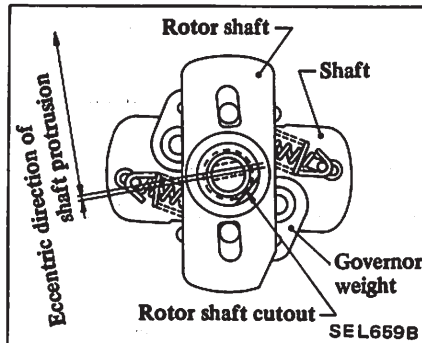
b. Installation of governor springs

Attach the smaller diameter spring to the hanger pins of shaft and governor weight first; then install the larger diameter spring.



c. Installation of rotor shaft

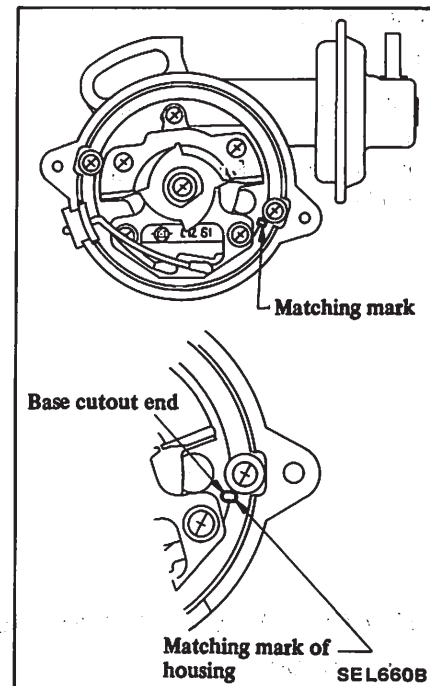
Position cutout direction of rotor shaft and eccentric direction of drive shaft protrusion as shown below; then install rotor shaft to drive shaft.



d. Use a new roll pin when installing collar.

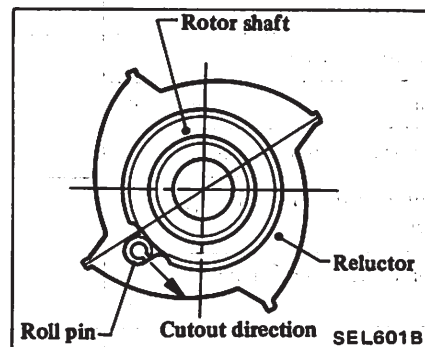
e. Installation of breaker plate

Ensure that alignment marks on breaker plate and housing are lined up properly.



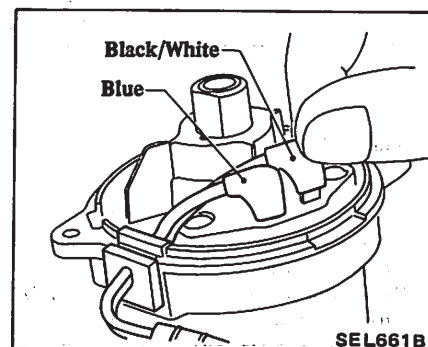
f. Inserting roll pin into reluctor

Position cutout direction of roll pin in parallel with notch in reluctor.



g. Connecting harness

Ensure that harness to IC ignition unit is tightly secured.

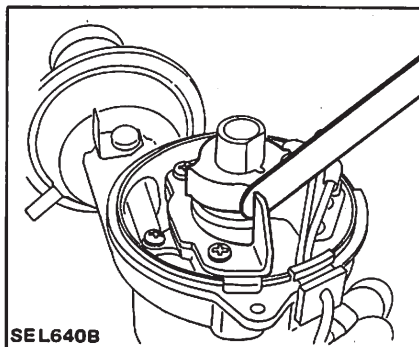


IGNITION SYSTEM

ADJUSTMENT

Air gap

Measure air gap between reluctor and stator. If it is not within specifications, loosen stator retaining screws and adjust.



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

DISTRIBUTOR

Type	D4R82-12	D4R82-13	D4R82-14	D4R82-21	D4R82-22	D4R82-25	D4R81-18	D4R81-08
Applied model	Except for M.P.G. model					M.P.G. model		
	U.S.A. M/T model	U.S.A. A/T model except California	California A/T model	Canada M/T model	Canada A/T model	Optional for U.S.A. except California	U.S.A. except California	Canada
Firing order	1-3-4-2							
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)	More than 10 (0.39)							
Vacuum advance [Distributor degree/distributor kPa (mmHg, inHg)]	0°/9.3 (70, 2.76)	0°/9.3 (70, 2.76)	0°/9.3 (70, 2.76)	0°/14.0 (105, 4.13)	0°/14.0 (105, 4.13)	0°/9.3 (70, 2.76)	0°/9.3 (70, 2.76)	0°/14.0 (105, 4.13)
Advance side	4°/13.3 (100, 3.94)	3.7°/16.0 (120, 4.72)	4.35°/16.0 (120, 4.72)	3.6°/24.0 (180, 7.09)	20°/18.7 (140, 5.51)	9.0°/28.0 (210, 8.27)	4°/13.3 (100, 3.94)	3.8°/24.0 (180, 7.09)
	10°/28.0 (210, 8.27)	6.5°/22.7 (170, 6.69)	7.5°/22.7 (170, 6.69)	6.5°/33.3 (250, 9.84)	3.5°/24.0 (180, 7.09)		9°/28.0 (210, 8.27)	6.5°/33.3 (250, 9.84)
Retard side						0°/12.0 (90, 3.54)	0°/24.0 (180, 7.09)	
						7.9°/20.0 (150, 5.91)	-7°/34.7 (260, 10.24)	
						12.5°/26.7 (200, 7.87)	-12.5°/46.7 (350, 13.78)	
Centrifugal advance [Distributor degree/ distributor rpm]	0°/700, 5°/1,300, 13°/2,600			0°/800, 13°/2,400		0°/700 5°/1,200 12°/2,700	0°/700 5°/1,200 12.5°/2,700	

GLOW SYSTEM

IGNITION COIL

Type		HITACHI make CIT-72
Applied model		All
Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	1.04 - 1.27
Secondary resistance [at 20°C (68°F)]	kΩ	7.3 - 11.0

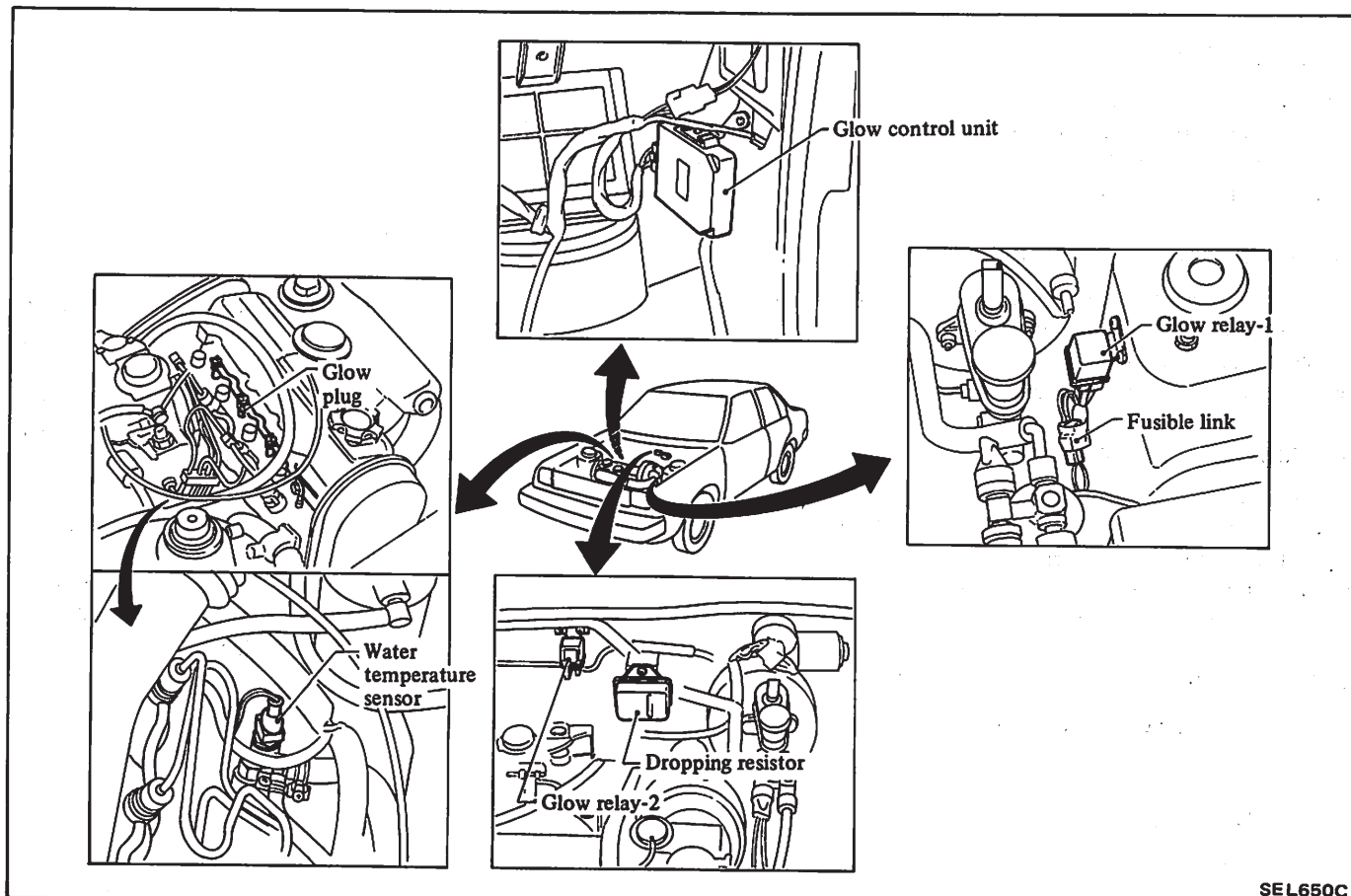
SPARK PLUG

Applied model	U.S.A.	Canada
Type		
Standard	BPR5ES-11	BPR5ES
Hot	BPR4ES-11	BPR4ES
Cold	BPR6ES-11	BPR6ES
Size (Screw dia. x reach)	14 x 19 (0.55 x 0.75)	
Plug gap	mm (in)	
	1.0 - 1.1 (0.039 - 0.043)	0.8 - 0.9 (0.031 - 0.035)

GLOW SYSTEM

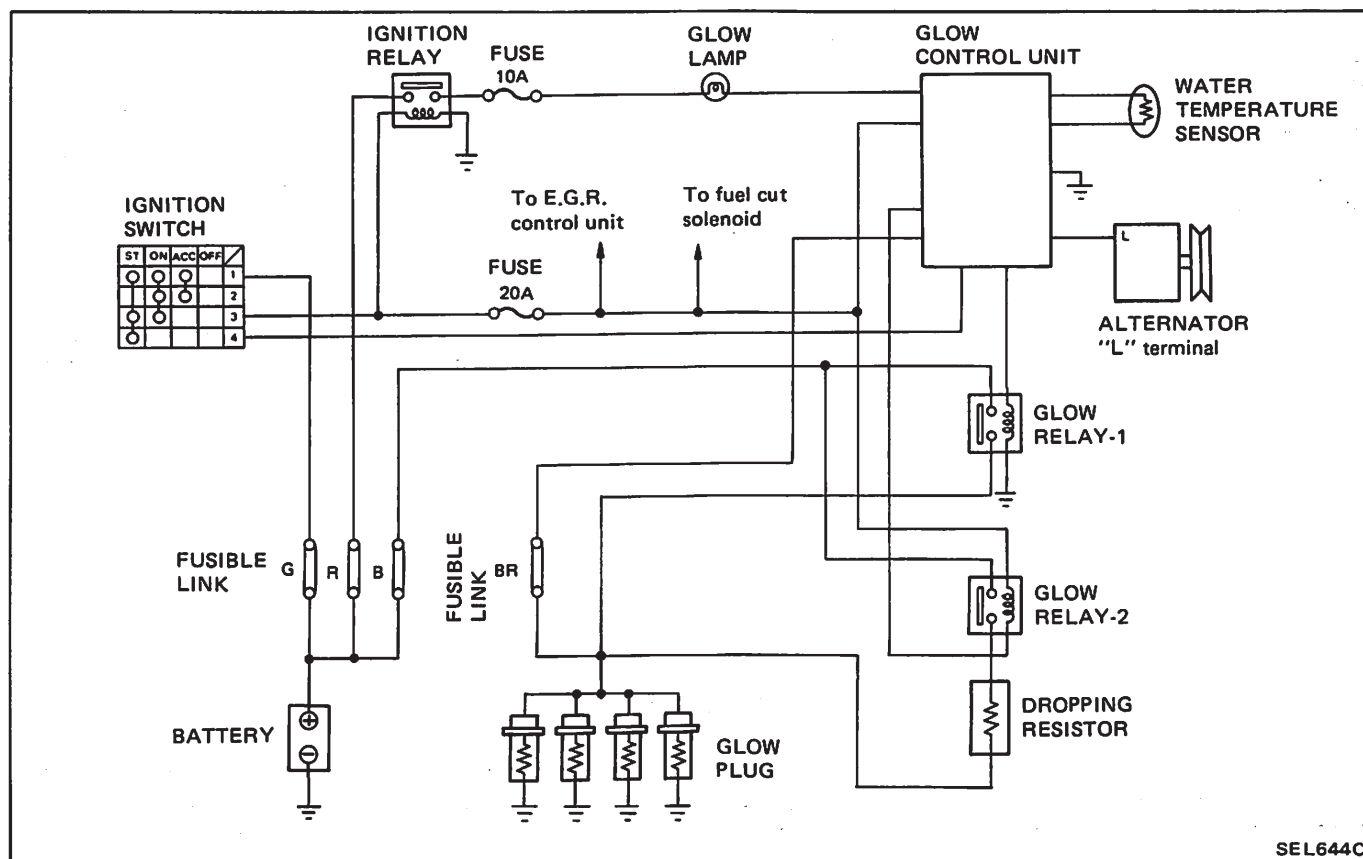
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

LOCATION



GLOW SYSTEM

SCHEMATIC



SEL644C

DESCRIPTION

The auto glow system provides the pre-glow (fast glow) operation before the engine starts as well as after-glow operation after the engine has started.

WATER TEMPERATURE SENSOR

The water temperature sensor is connected to the glow control unit. Sensor resistance varies with changes in the temperature of engine coolant.

ALTERNATOR "L" TERMINAL

The alternator "L" terminal is connected to the charge warning lamp. The voltage at "L" terminal rises from zero to alternator generating voltage when the engine starts.

GLow PLUG RELAY-1

This is used for the pre-glow operation.

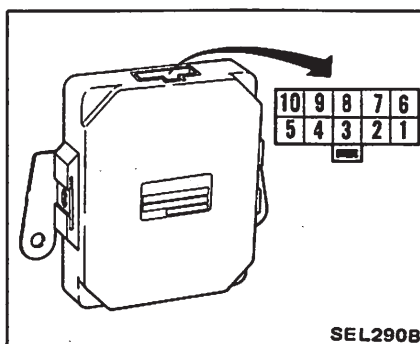
GLow PLUG RELAY-2

This is used for the after-glow operation.

DROPPING RESISTOR

This resistor reduces the amount of current flowing through glow plugs during the after-glow operation.

GLow CONTROL UNIT



SEL290B

This unit is operated by glow plug voltage, engine coolant temperature, generating voltage of the alternator and the ignition switch. It controls the following:

Glow lamp

The length of time for the glow lamp to light is controlled by the temperature of the engine coolant.

Pre-glow

1. Basically, the pre-glow system operates for about six seconds when the temperature of the engine coolant is lower than 50°C (122°F).
2. The length of time for the pre-glow system to operate is controlled by the terminal voltage of the glow plug.
3. And the length of time for the pre-glow system to operate is controlled by the duration of time from OFF to ON (ignition switch) for re-adjusting the engine.
4. After the engine starts, the pre-glow system turns off.

After-glow

1. The after glow system operates for a specified length of time after the ignition switch is turned from

GLOW SYSTEM

OFF or ST to ON when the temperature of the engine coolant is below 50°C. (122°F).

The length of time for the after-glow system to operate is controlled by the temperature of the engine coolant. (about 5 to 32 seconds)

2. After pre-glow operation, the after-glow system turns off when the terminal voltage of the glow plug is higher than 7 volts.

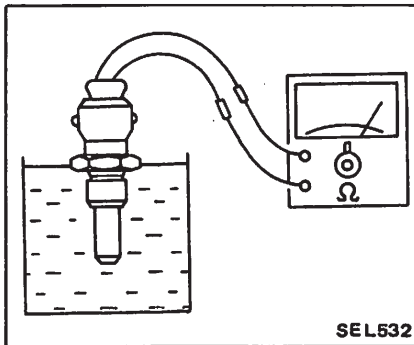
3. However, when the ignition switch is in ST, the after-glow system is in operation.

WATER TEMPERATURE SENSOR

INSPECTION

Measure resistance to temperature as shown.

Temperature °C (°F)	Resistance kΩ
10 (50)	Approx. 3.7
20 (68)	Approx. 2.5
50 (122)	Approx. 0.85
80 (176)	Approx. 0.33

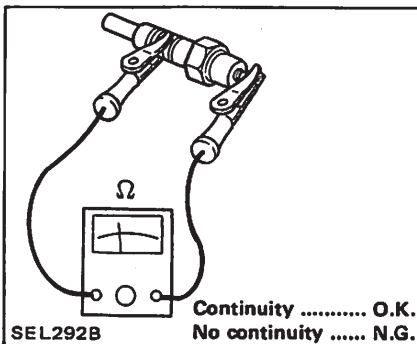


Function of each terminal

- ① Terminal:
A terminal at which voltage being applied to the glow plug is measured.
- ② Terminal:
Control unit's power source terminal
- ③ Terminal:
Control unit's ground terminal
- ④ Terminal:
A terminal that controls the ON-OFF operation of glow plug relay-1
- ⑤ Terminal:
A terminal connected to the water temperature sensor
- ⑥ Terminal:
A terminal connected to the "START" position of the ignition switch
- ⑦ Terminal:
Controls the ON-OFF operation of glow plug relay-2
- ⑧ Terminal:
A grounding terminal for the water temperature sensor
- ⑨ Terminal:
A terminal for the glow lamp
- ⑩ Terminal:
A terminal used to determine whether the engine has started or not

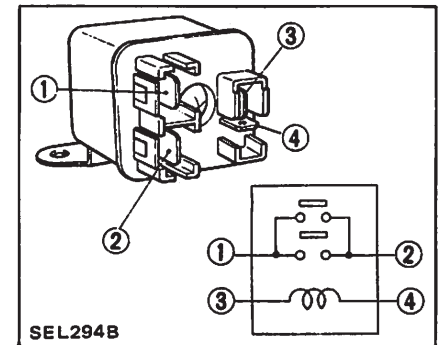
GLOW PLUG INSPECTION

Check continuity test in glow plug.



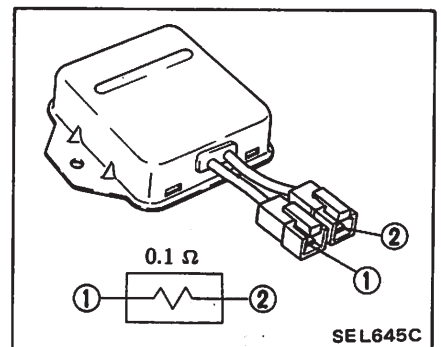
Do not scratch glow plug pipe end.

GLOW PLUG RELAY INSPECTION



DROPPING RESISTOR INSPECTION

Resistance is approx. 0.1Ω.

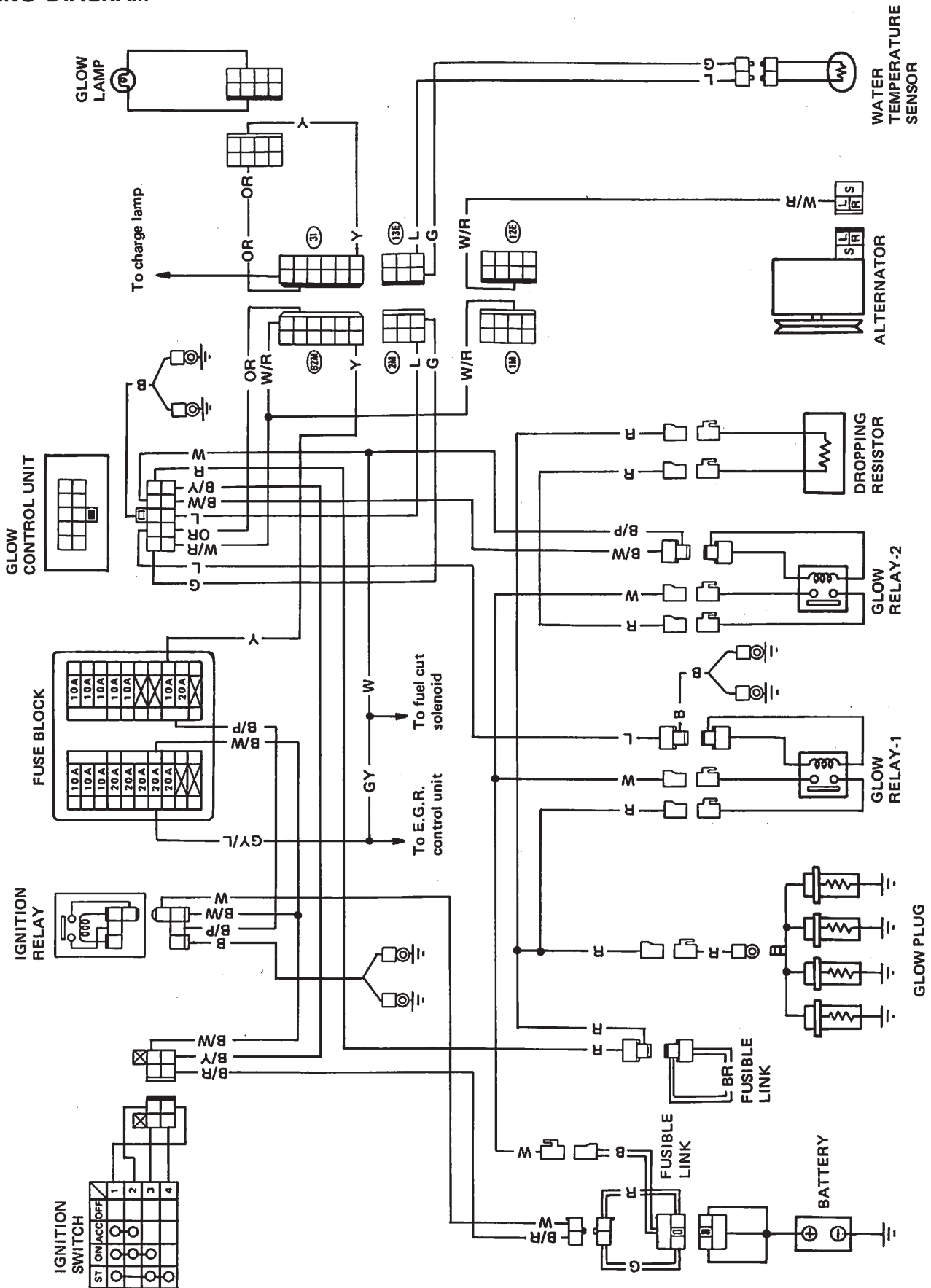


GLOW CONTROL UNIT INSPECTION

Control unit must not be checked as a single unit. Check control unit for operation as a system, referring to "Trouble Diagnoses and Corrections".

GLOW SYSTEM

WIRING DIAGRAM



SEL646C

GLOW SYSTEM

TROUBLE DIAGNOSES AND CORRECTIONS

TRUBLE-SHOOTING CHART

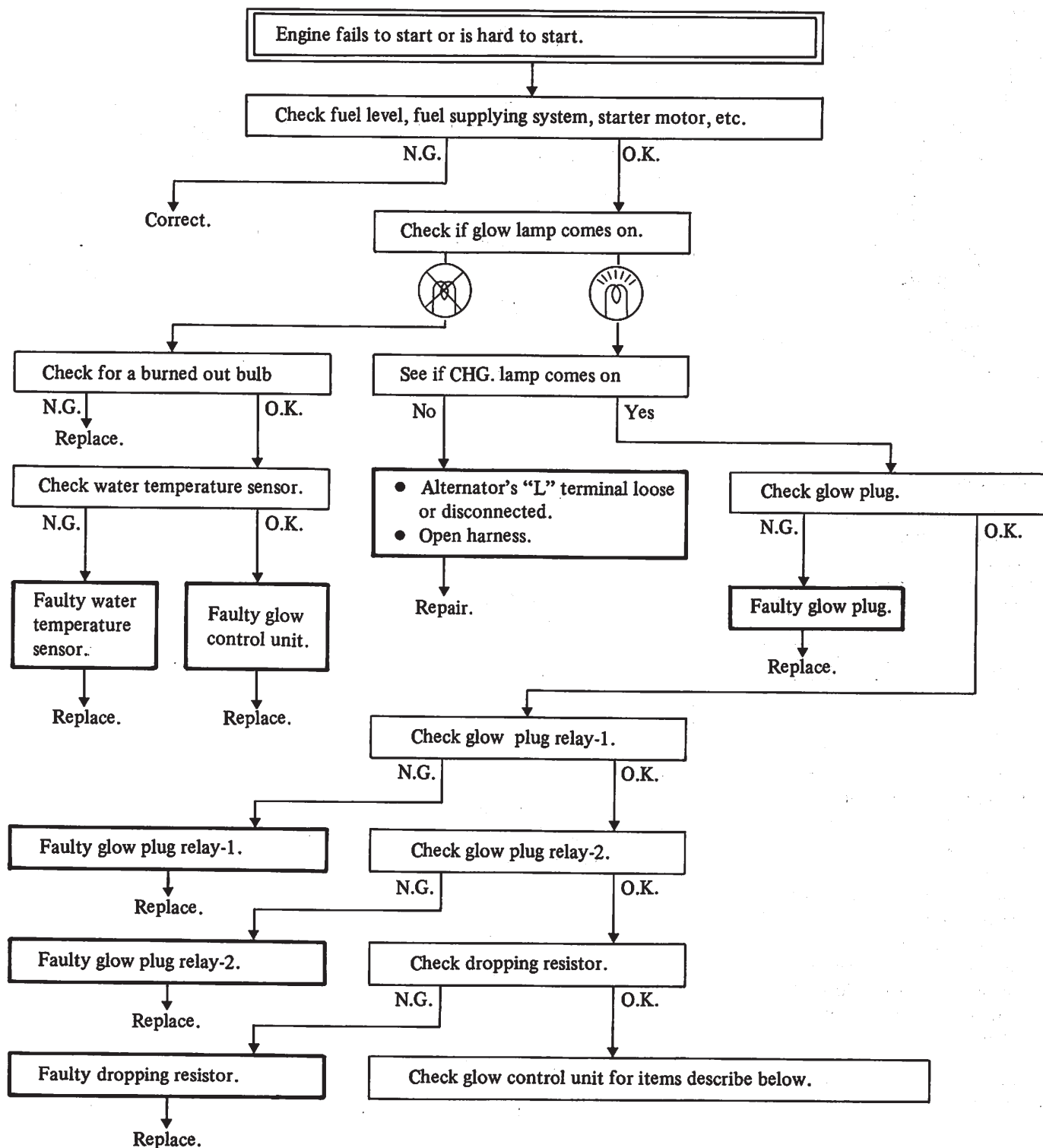
Test condition

- BATTERY : O.K.
- FUSIBLE LINK : O.K.
- FUSE : O.K.

- IGNITION SWITCH : O.K.
- IGNITION RELAY : O.K.

<div style="border: 1px solid black; width: 50px; height: 15px;"></div>	: Condition
<div style="border: 1px solid black; width: 50px; height: 15px;"></div>	: Check
<div style="border: 1px solid black; width: 50px; height: 15px;"></div>	: Probable cause

Before starting to troubleshoot the glow system, check connectors to determine if they are in good order.

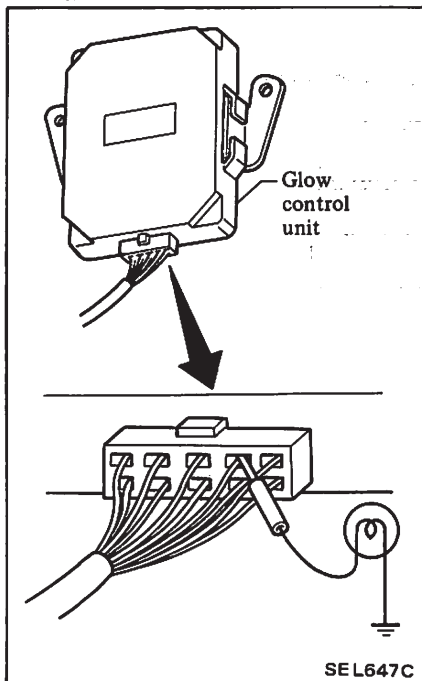


GLOW SYSTEM

Checking glow control unit

1. Pre-glow system

Connect test lamp to blue wire leading to glow control unit. Measure the length of time that the test lamp is lighted.



Normal condition

- Standard operation (Except re-start operation within 60 seconds)

Engine coolant temperature °C (°F)	Glow plug terminal voltage	Time (sec.)
Below 50 (122)	8V	Approx. 12
	10.5V	Approx. 6
Above 50 (122)	—	Approx. 0

- Re-start operation (within 60 sec.)
Length of time (test lamp in ON):
Below 6 sec.

[e.g.]

When re-starting the engine 5 seconds after the ignition switch is turned off, the lamp should be on for 1.4 seconds [engine coolant temperature: below 50°C (122°F), glow plug terminal voltage: 10.5 volts].

- Others

Ignition switch	CHG. lamp	Test lamp
ON	OFF	OFF

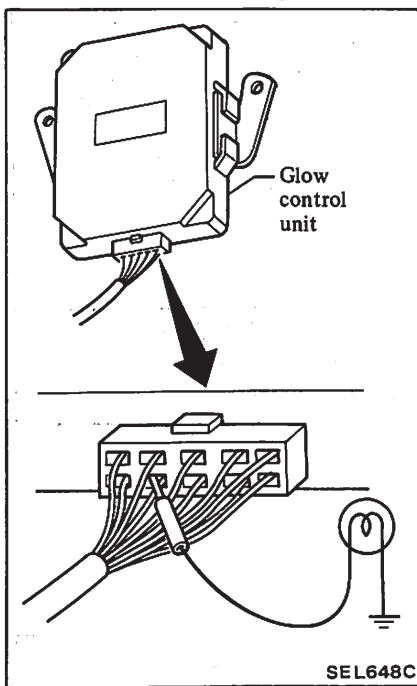
2. After-glow operation

Connect test lamp to black-and-white wire leading to glow control unit. Measure the length of time that the test lamp is lighted.

Normal condition

- When the ignition switch is turned ON from ST or OFF:

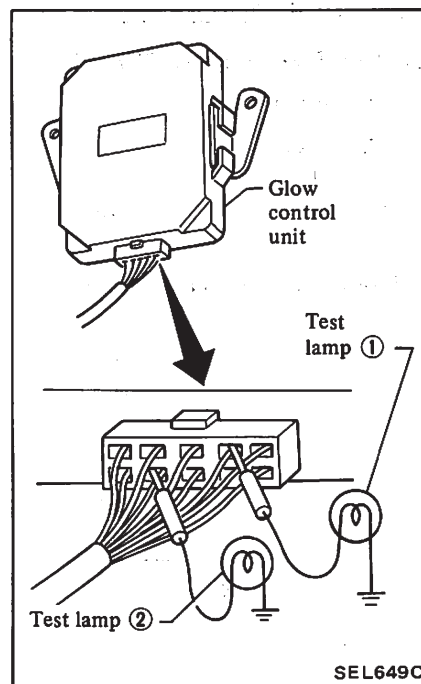
Engine coolant temperature °C (°F)	Time (sec.)
Below -25 (-13) (approx.)	Approx. 31
Approx. 20 (68)	Approx. 11
Approx. 30 - 50 (86 - 122)	Approx. 5
Above 50 (122) (approx.)	0



- When the ignition switch is in ST:
Test lamp is ON (continuously)
(Refer to above figure.)

- After-pre-glow operation:
After the pre-glow system turns off, check operation of test lamp ②.
(test lamp ① in OFF)

Glow plug terminal voltage	Test lamp ②
Above 7V	OFF
Below 7V	ON



LIGHTING SYSTEM

LIGHTING SYSTEM

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

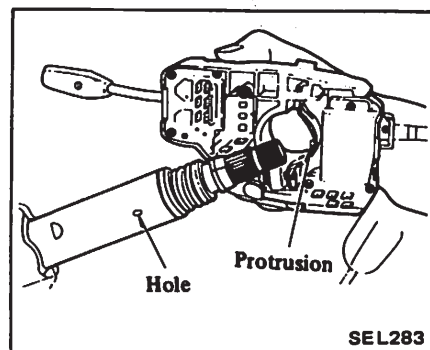
BULB SPECIFICATIONS

Item	Wattage (W)	SAE trade number
Headlamp (sealed beam) High/Low	65/55	—
Headlamp (Sealed beam halogen) High/Low	65/35	H6054
Front turn signal lamp	27	1156
Front side marker lamp	3.4	158
Clearance lamp	8	67
License plate lamp	10	—
	8	67
Rear combination lamps		
Turn signal	27	1156
Back-up	27	1156
Stop/Tail	27/8	1157
Rear side marker lamp	3.4	158
Luggage compartment lamp	5	—
Interior lamp	10	—

COMBINATION SWITCH

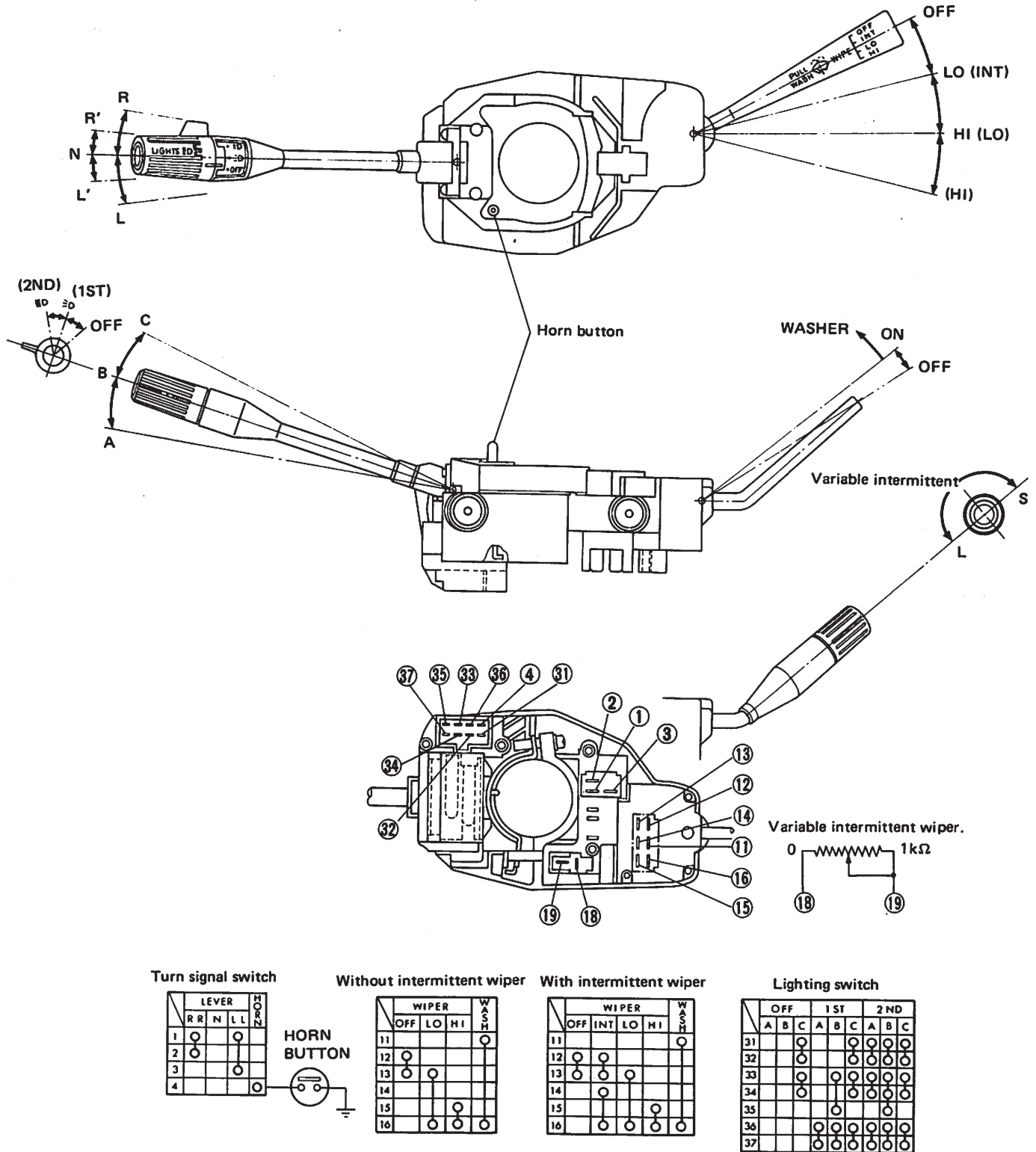
REMOVAL AND INSTALLATION

1. Remove steering wheel.
2. Remove steering column cover.
3. Disconnect all combination switch wires.
4. Loosen retaining screw and remove combination switch.
5. To install combination switch, align protrusion on switch body with hole on steering column, and tighten retaining screw.



LIGHTING SYSTEM

INSPECTION

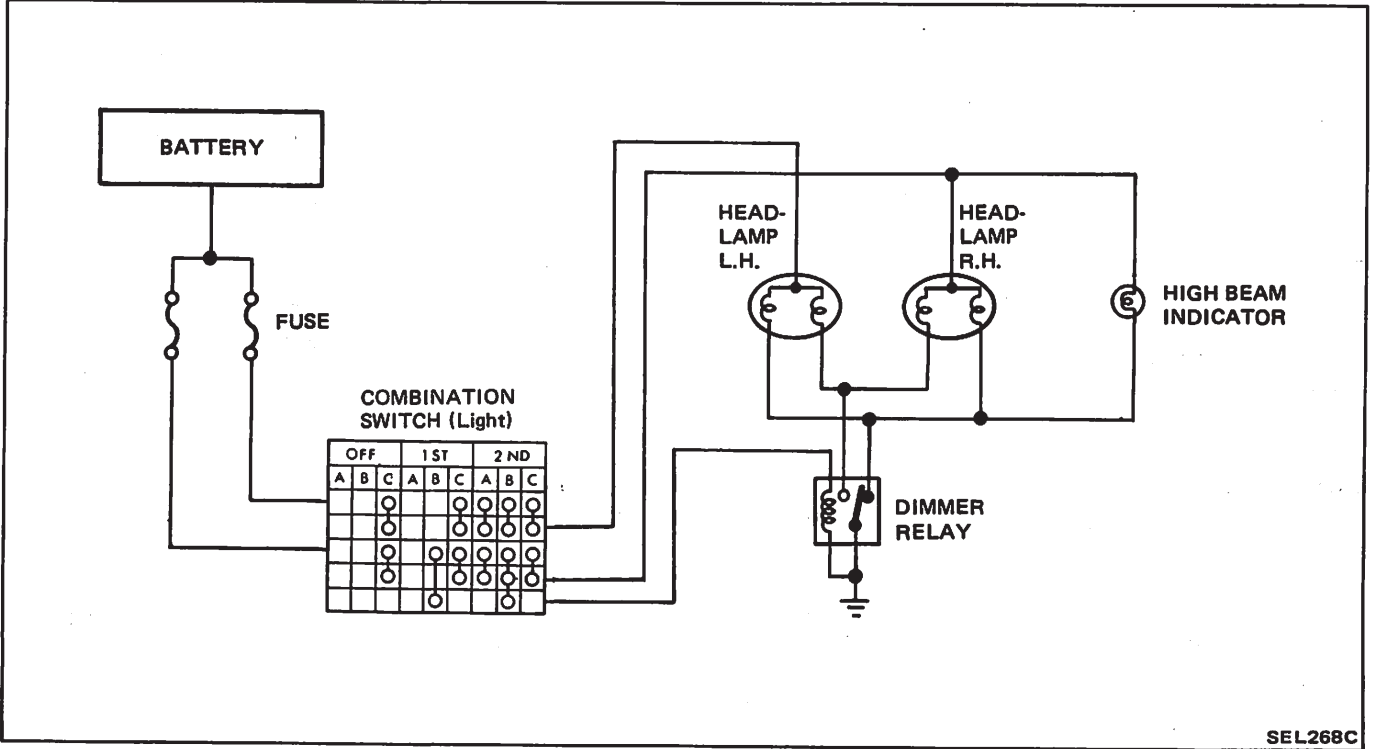


SEL375B

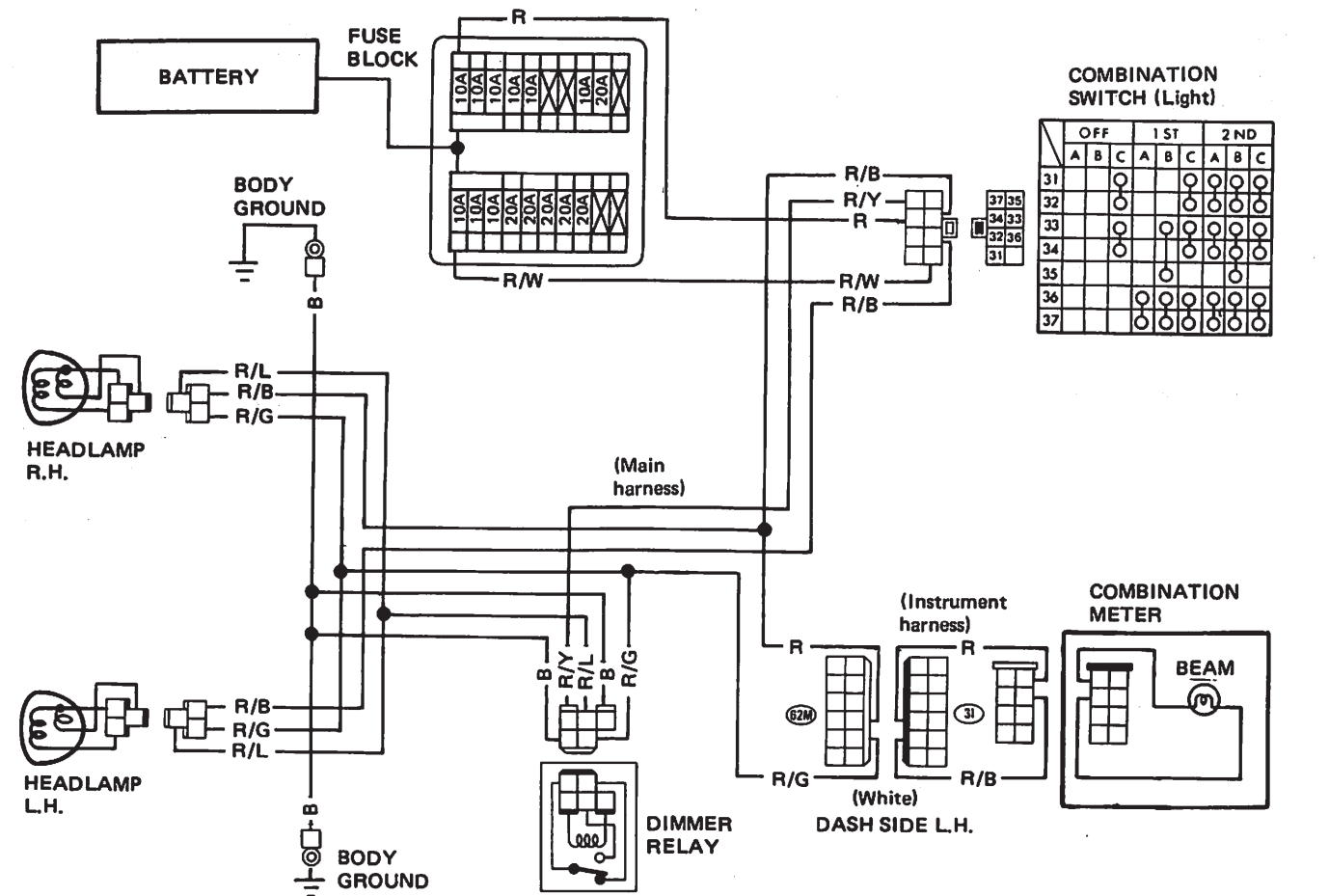
LIGHTING SYSTEM

HEADLAMP

SCHEMATIC/HEADLAMP



WIRING DIAGRAM/HEADLAMP



LIGHTING SYSTEM

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause
Headlamps do not light for either high or low beam.	Burnt fusible link. Loose connection or open circuit. Faulty lighting switch. Faulty dimmer relay. No ground.
High beam cannot be switched to low beam or vice versa.	Faulty lighting switch. Faulty dimmer relay.

Condition	Probable cause
Headlamp dim.	Partly discharged or faulty battery. Faulty charging system. Poor ground or loose connection.
One headlamp dim.	Burnt fuse.
Headlamp lights on only one side.	Loose headlamp connection. Faulty headlamp beam.

LIGHTING SWITCH

Refer to "COMBINATION SWITCH".

DIMMER RELAY

Location

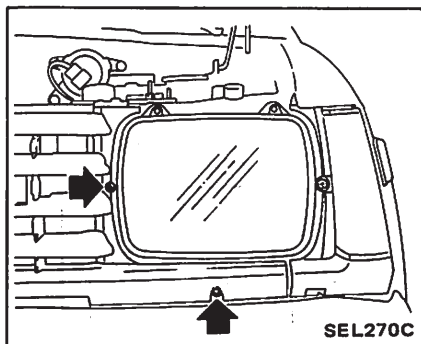
Dimmer relay is installed on the relay bracket in the L.H. hoodledge. Refer to page EL-81.

Inspection

Dimmer relay is 1T type standardized relay. Refer to EL-7.

AIMING ADJUSTMENT

To adjust headlamp's left-and-right aim, turn the adjusting knob that is located on the side of the headlamp; to adjust its up-and-down aim, turn the adjusting screw that is located on the bottom side of the headlamp.



Before making headlamp aiming adjustment, observe the following instructions.

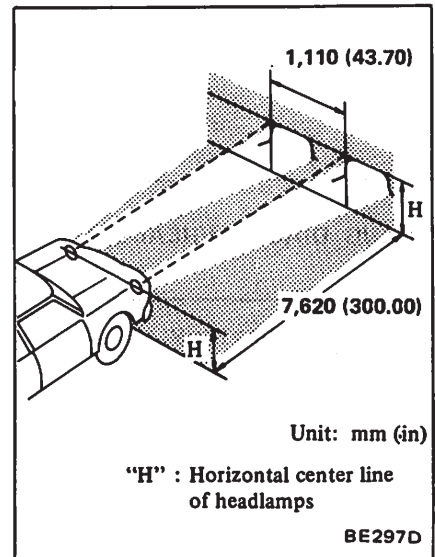
- a. Keep all tires inflated to correct pressures.
- b. Place car and tester on one and same flat surface.
- c. See that there is no load in car (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).

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:

Sealed beam type

Turn headlamp low beam on.



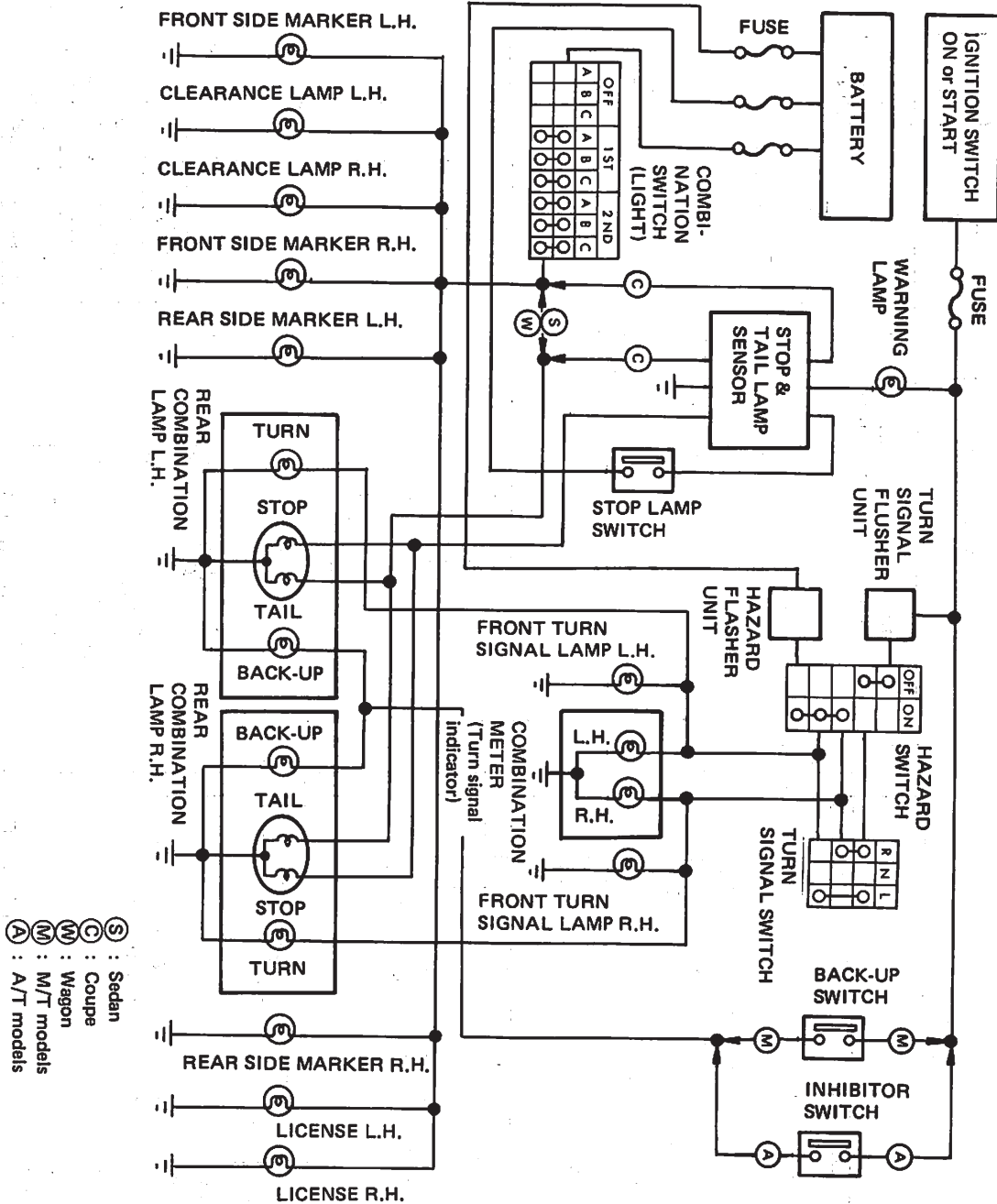
- a. Adjust headlamps so that upper edge of hot spot is equal in height to headlamp height and left edge of hot spot is equal in height to each center line of headlamps.
- b. Dotted lines in illustration show center of headlamp.

LIGHTING SYSTEM

EXTERIOR LAMPS

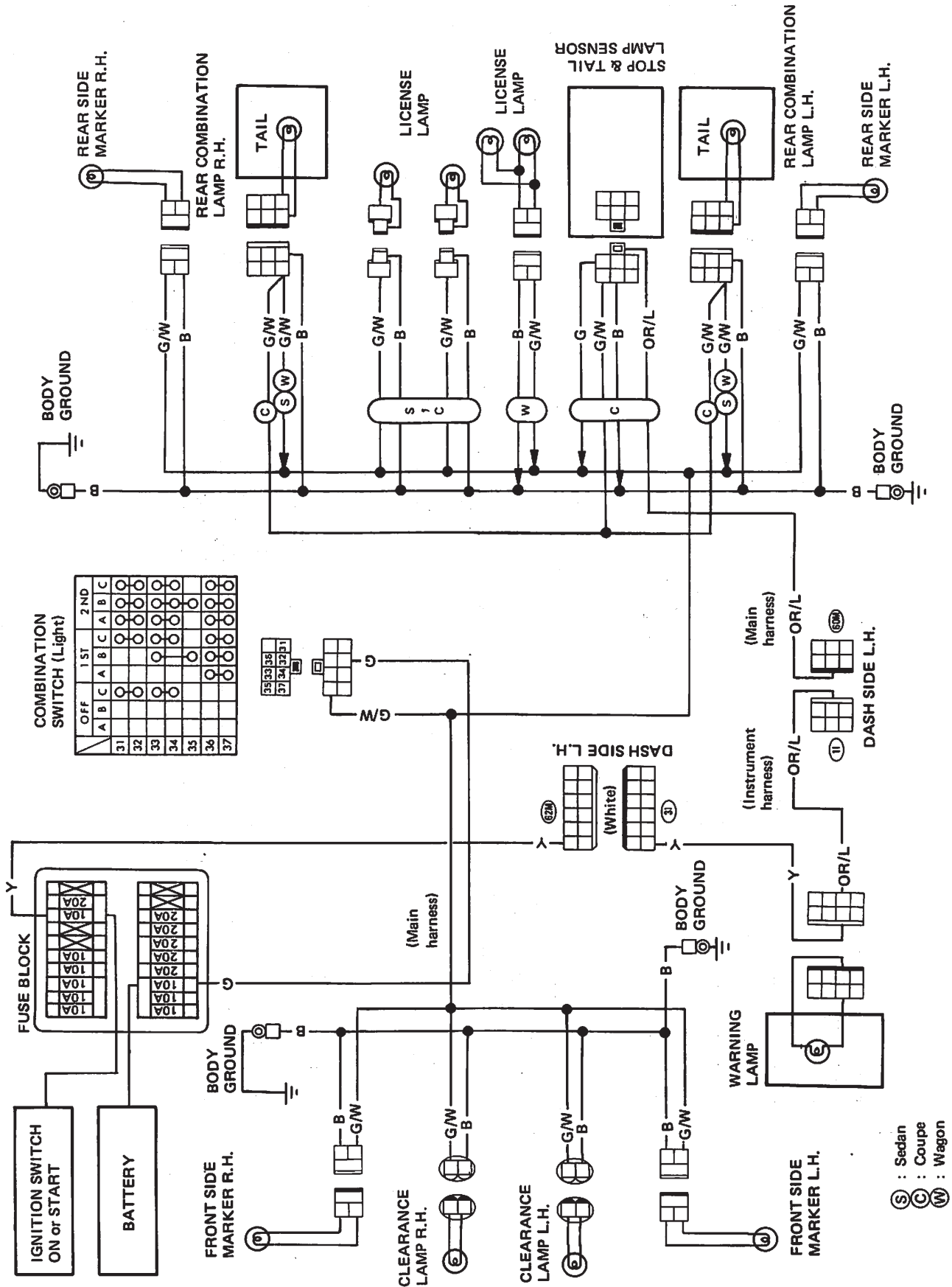
CAUTION: Do not wipe lens surface using cloth dampened with gasoline.

SCHEMATIC/EXTERIOR LAMPS



LIGHTING SYSTEM

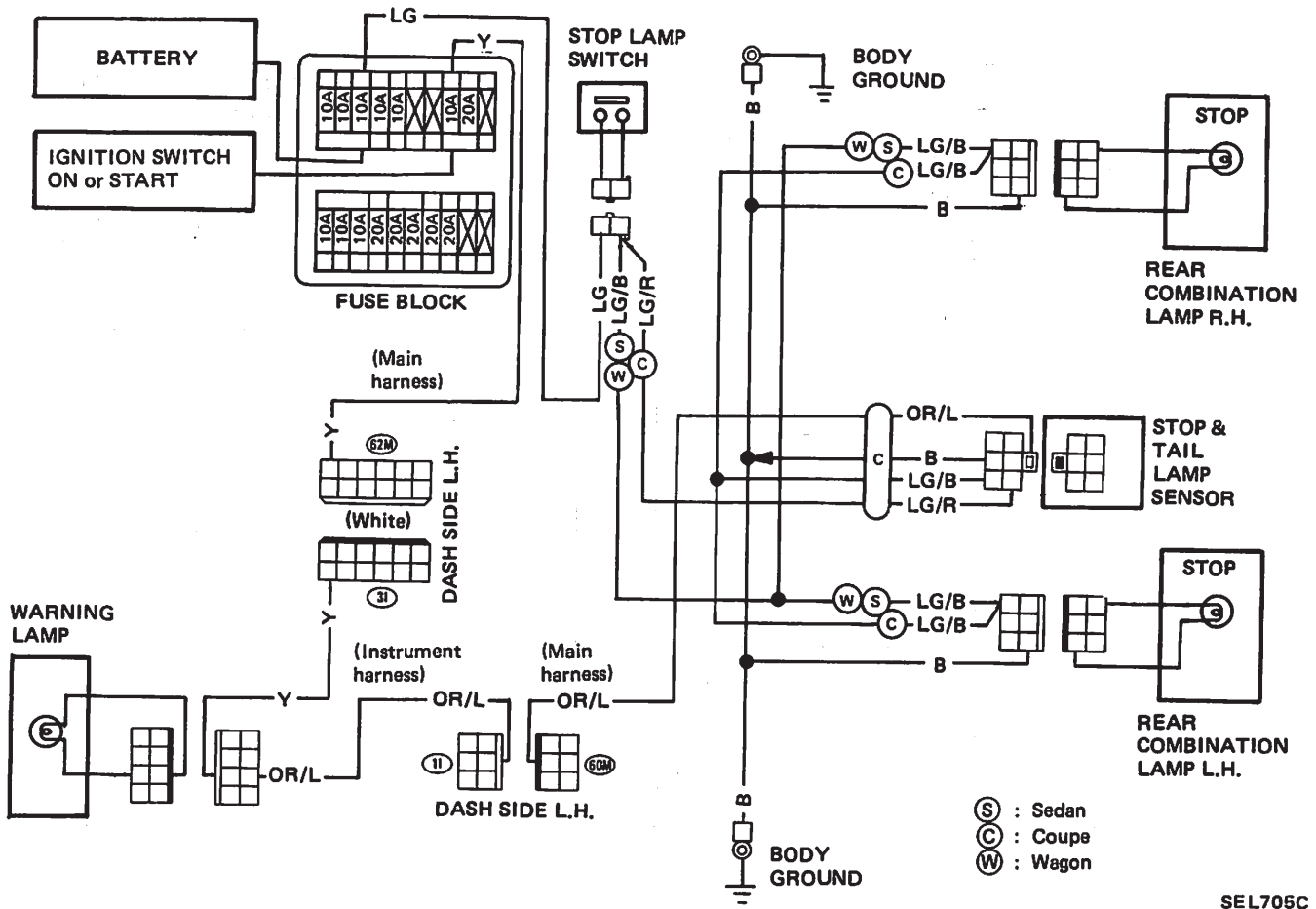
WIRING DIAGRAM/CLEARANCE, SIDE MARKER, LICENSE AND TAIL LAMPS



SEL704C

LIGHTING SYSTEM

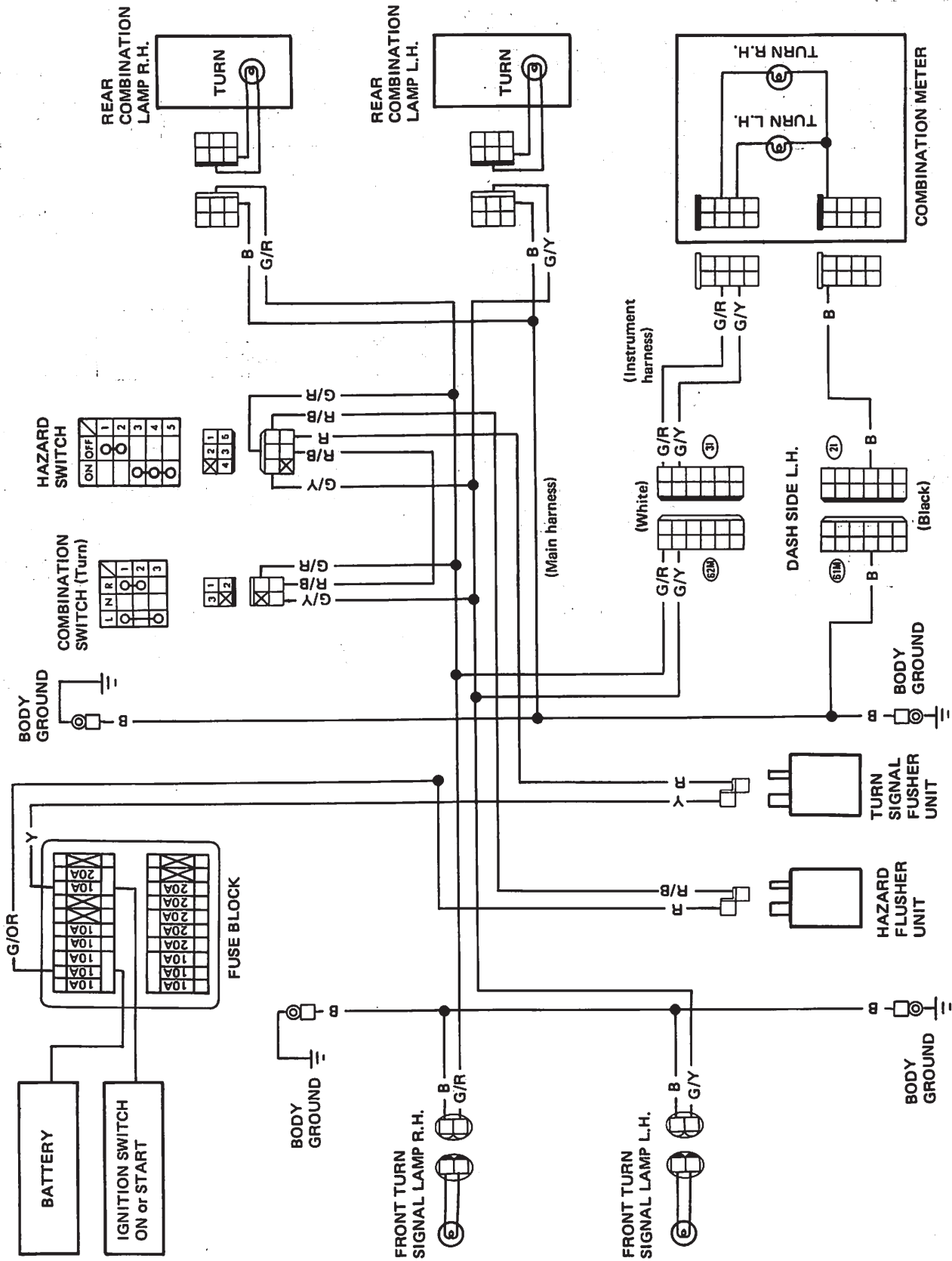
WIRING DIAGRAM/STOP LAMPS



SEL705C

LIGHTING SYSTEM

WIRING DIAGRAM/TURN SIGNAL AND HAZARD WARNING LAMPS



SEL706C

WIRING DIAGRAM/BACK-UP LAMPS



Clearance, side marker, license and tail lamps

Condition	Probable cause
Neither left nor right lamp lights.	Burnt fuse. Burnt fusible link. Loose connection or open circuit. Faulty lighting switch. Faulty stop lamp sensor.
Tail lamp on only one side lights.	Burnt bulb. Loose bulb. Loose connection or open circuit.
Front or rear side lamps do not light.	Loose connection or open circuit. No ground.

Condition	Probable cause
Neither left nor right lamp lights.	Burnt fuse. Faulty stop lamp switch. No ground. Loose connection or open circuit. Faulty stop lamp sensor.
Lamp on only one side lights.	Burnt bulb. Loose bulb. Loose connection or open circuit.

LIGHTING SYSTEM

Turn signal and hazard warning lamps

Condition	Probable cause
Turn signals do not operate. (Hazard warning lamps operate)	Burnt fuse. Loose connection or open circuit. Faulty turn signal flasher unit. Faulty turn signal switch. Faulty hazard switch.
Hazard warning lamps do not operate. (Turn signals operate)	Burnt fuse. Faulty hazard flasher unit. Faulty hazard switch.
Turn and hazard flasher lamps do not operate.	Faulty hazard switch. Loose connection.
No flasher click is heard.	Burnt bulb. Faulty flasher unit. Loose connection.

Condition	Probable cause
Flashing cycle is too slow (Pilot lamp does not go out.), or too fast.	Bulb other than specified wattage being used. Burnt bulb. Loose connection. Faulty flasher unit.
Flashing cycle is irregular.	Burnt bulb. Loose connection. Bulbs other than specified wattage being used. Faulty flasher unit.

Back-up lamps

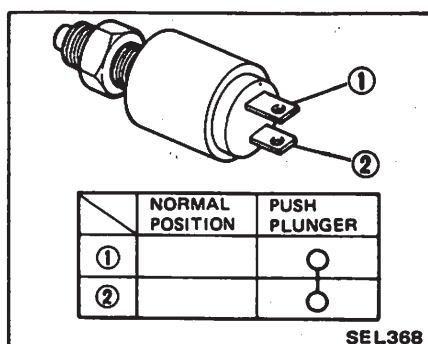
Condition	Probable cause
Neither left nor right lamp lights.	Faulty back-up lamp switch. Burnt fuse. Loose connection or open circuit.
Lamp on only one side lights.	Burnt bulb. Loose bulb. Loose connection or open circuit.

LIGHTING SWITCH

Refer to "COMBINATION SWITCH".

STOP LAMP SWITCH

Inspection



Adjustment

Refer to MA section.

STOP AND TAIL LAMP SENSOR

Location

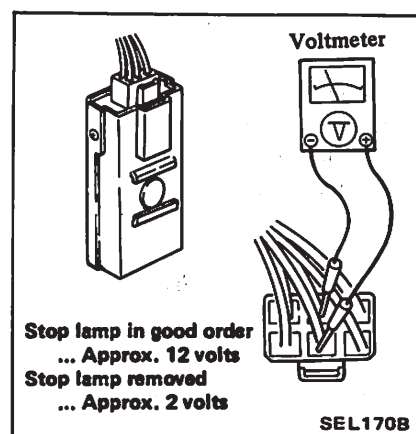
Stop and tail lamp sensor is attached to the left rear combination lamp unit. Refer to page EL-83.

Inspection

Before checking stop and tail lamp sensor, ensure that all bulbs meet specifications.

Stop lamp

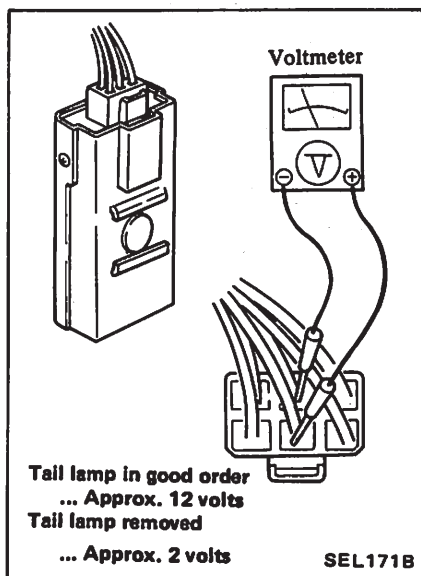
1. Start engine.
2. Stop lamp switch on.



LIGHTING SYSTEM

Tail lamp

1. Start engine.
2. Lighting switch on.

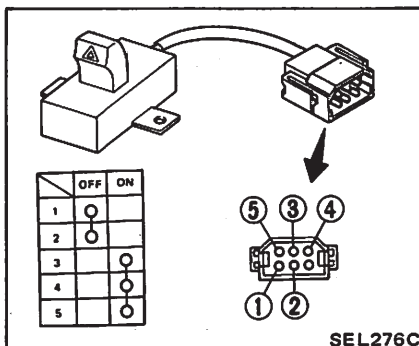


TURN SIGNAL SWITCH

Refer to "COMBINATION SWITCH".

HAZARD SWITCH

Inspection



TURN SIGNAL FLASHER UNIT HAZARD FLASHER UNIT

Location

Turn signal flasher unit and Hazard flasher unit are located on the steering

column support (back side of instrument panel). Refer to page EL-82.

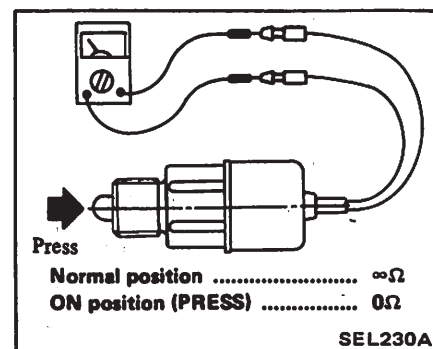
BACK-UP LAMP SWITCH

(Manual transaxle)

Location

Back-up lamp switch is installed on the manual transaxle case. Refer to MT section.

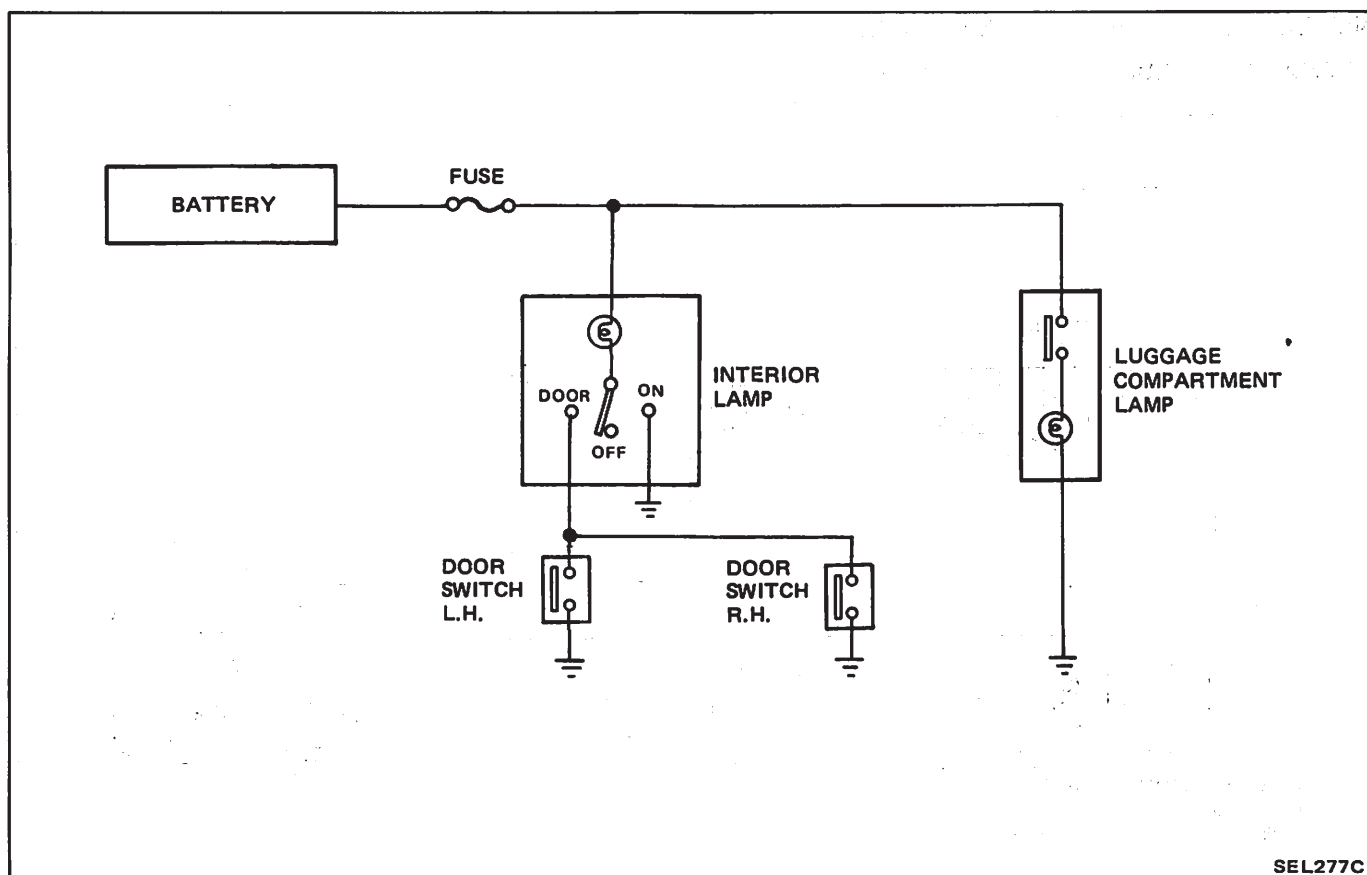
Inspection



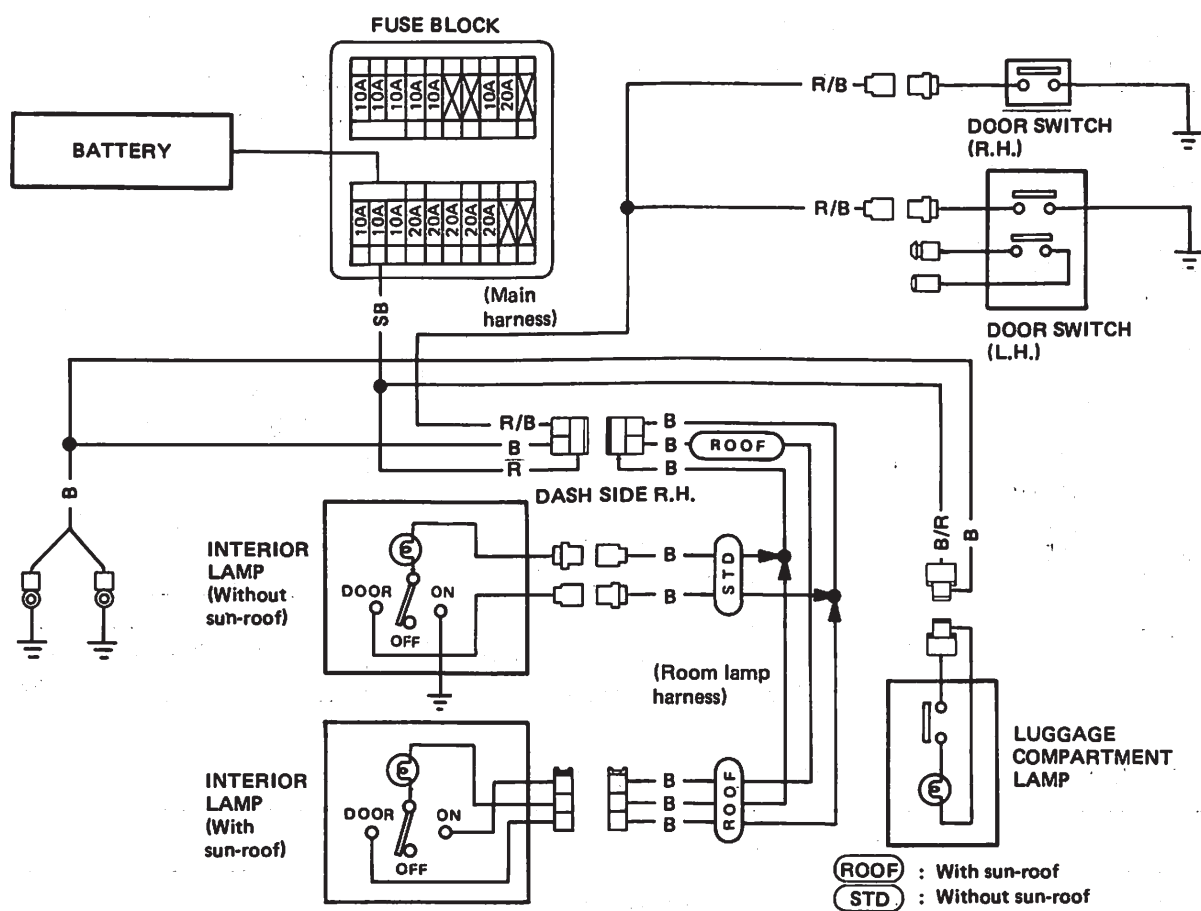
INTERIOR AND LUGGAGE COMPARTMENT LAMPS

CAUTION: Do not wipe lens surface using cloth dampened with gasoline.

SCHEMATIC/INTERIOR AND LUGGAGE COMPARTMENT LAMPS

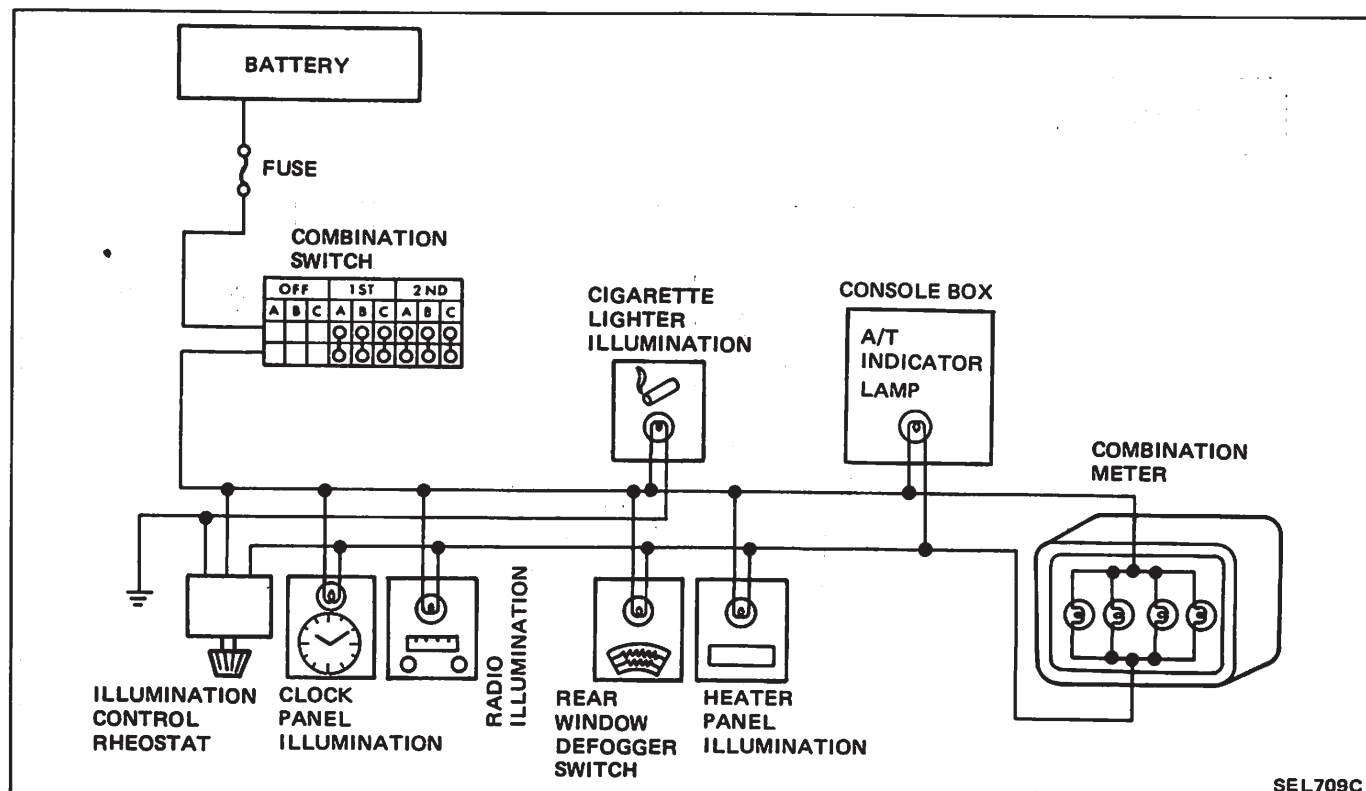


WIRING DIAGRAM/INTERIOR AND LUGGAGE COMPARTMENT LAMPS

**SEL708C**

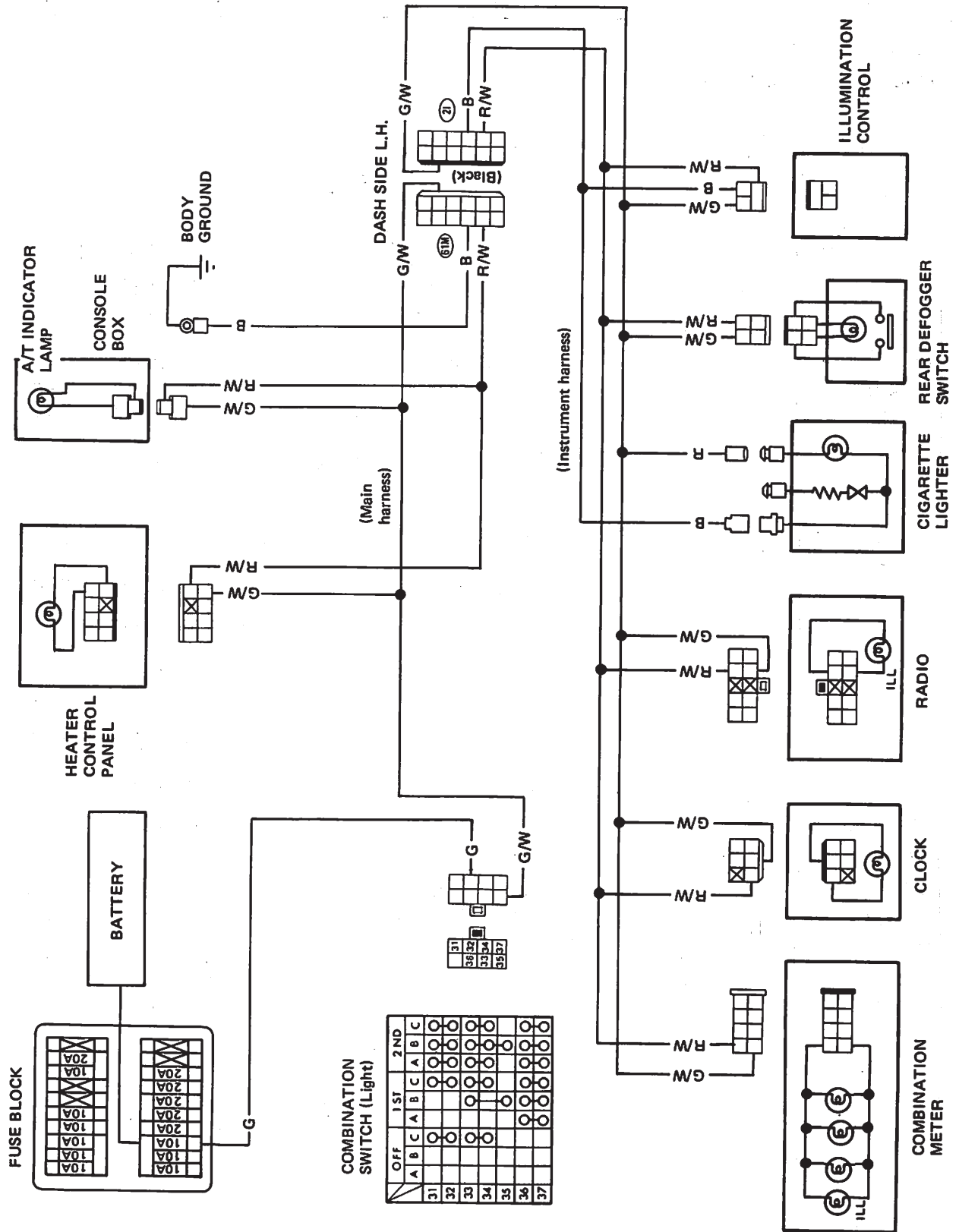
INSTRUMENT PANEL ILLUMINATION

SCHEMATIC/INSTRUMENT PANEL ILLUMINATION

**SEL709C**

LIGHTING SYSTEM

WIRING DIAGRAM/INSTRUMENT PANEL ILLUMINATION



SEL710C

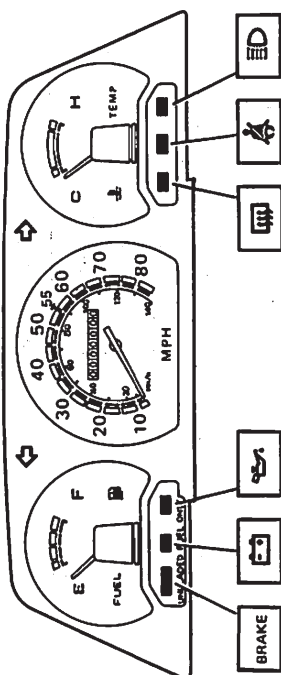
METERS, GAUGES AND WARNING SYSTEM

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

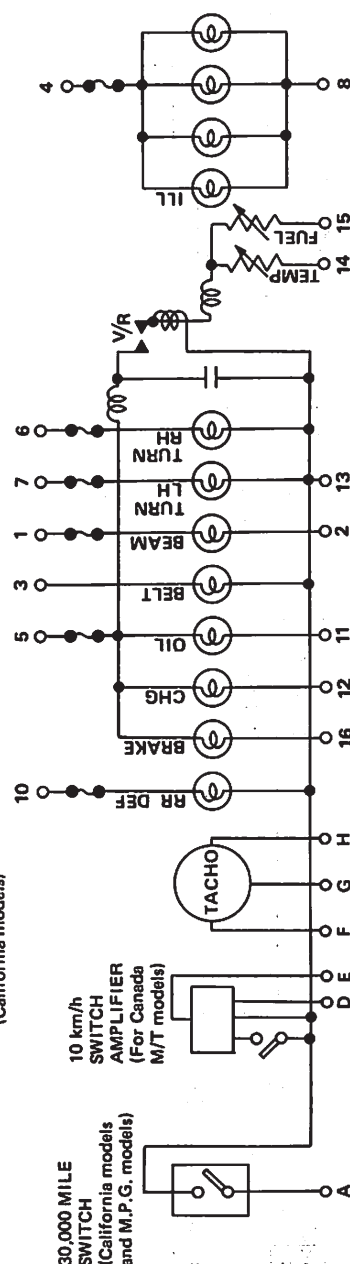
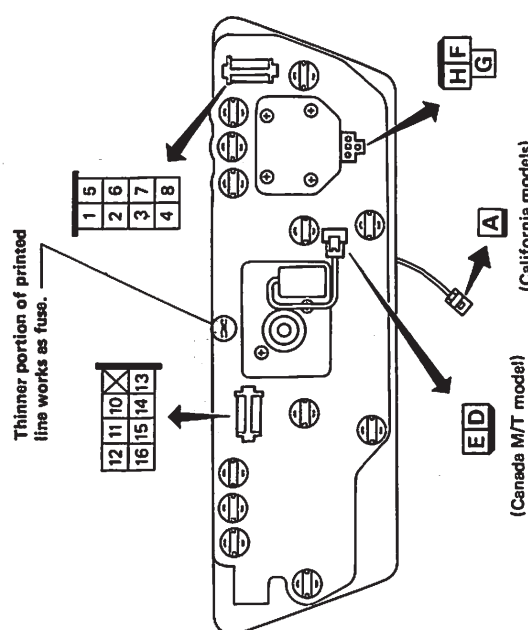
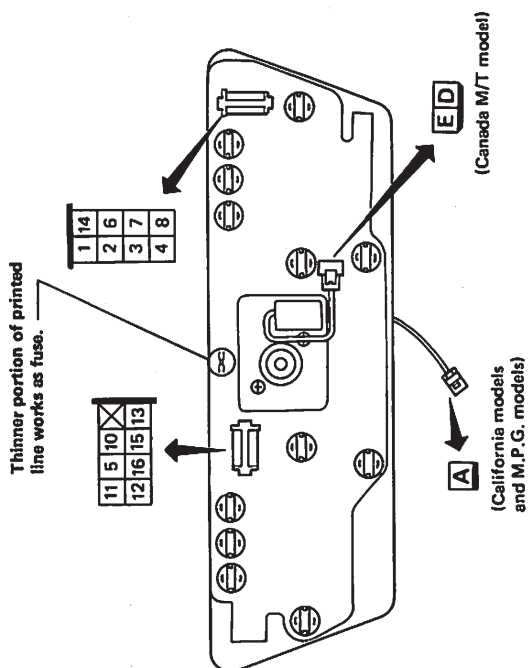
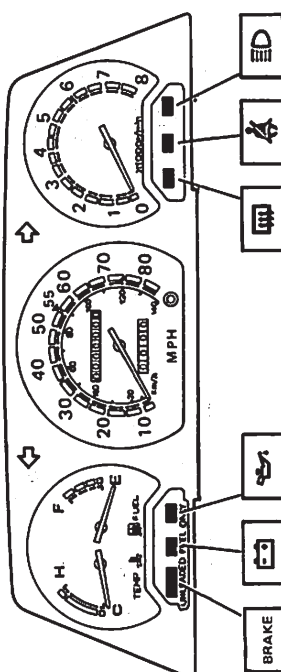
COMBINATION METER

SCHEMATIC/COMBINATION METER.

Without tachometer



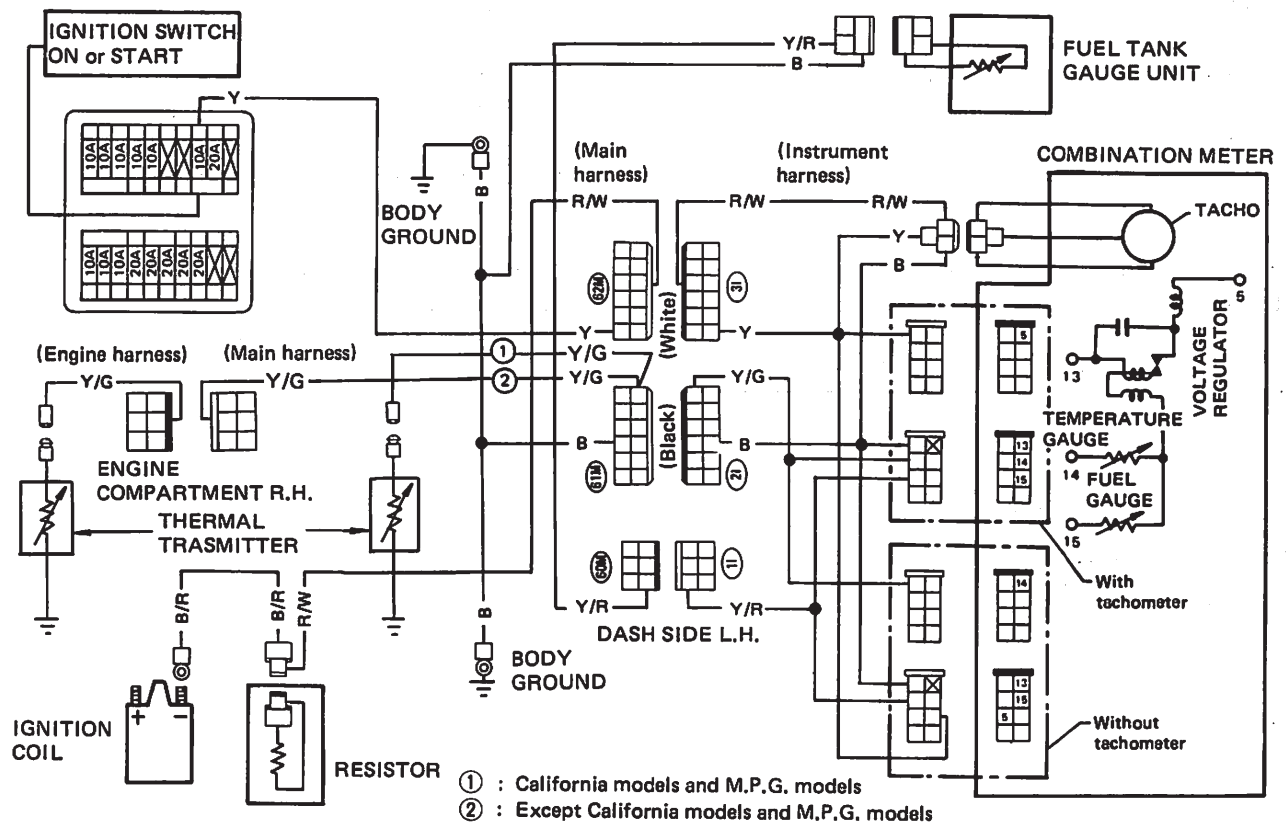
With tachometer



METERS, GAUGES AND WARNING SYSTEM

METER AND GAUGES

WIRING DIAGRAM/GAUGES AND TACHOMETER



SEL712C

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause
Water temperature gauge Gauge does not operate.	Faulty thermal transmitter or loose terminal connection. (When wire to thermal transmitter is grounded, gauge pointer fluctuates.) Faulty 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.)
Gauge does not operate accurately.	Faulty water temperature gauge. Loose or poor connection.

Condition	Probable cause
Fuel level gauge Fuel level gauge does not operate.	Faulty fuel tank gauge unit. (Pointer deflects when fuel tank gauge unit yellow wire is grounded.) Faulty fuel level gauge. Loose connection or open circuit.
Pointer indicates only "F" position.	Faulty fuel tank gauge unit. Faulty fuel level gauge.
Fuel level gauge does not operate accurately.	Faulty fuel tank gauge unit. Faulty fuel gauge. Poor or loose connection.
Tachometer Tachometer pointer deflects.	Loose or poor connection. Faulty tachometer.
Tachometer pointer will not move.	Loose or poor connection. Faulty tachometer.

METERS, GAUGES AND WARNING SYSTEM

Condition	Probable cause
Speedometer Neither speedometer pointer nor odometer operates.	Loose speedometer cable union nut. Broken speedometer cable. Damaged transmission speedometer pinion gear. Faulty speedometer.
Unstable speedometer pointer.	Loose speedometer cable nut. Damaged speedometer cable. Faulty speedometer.

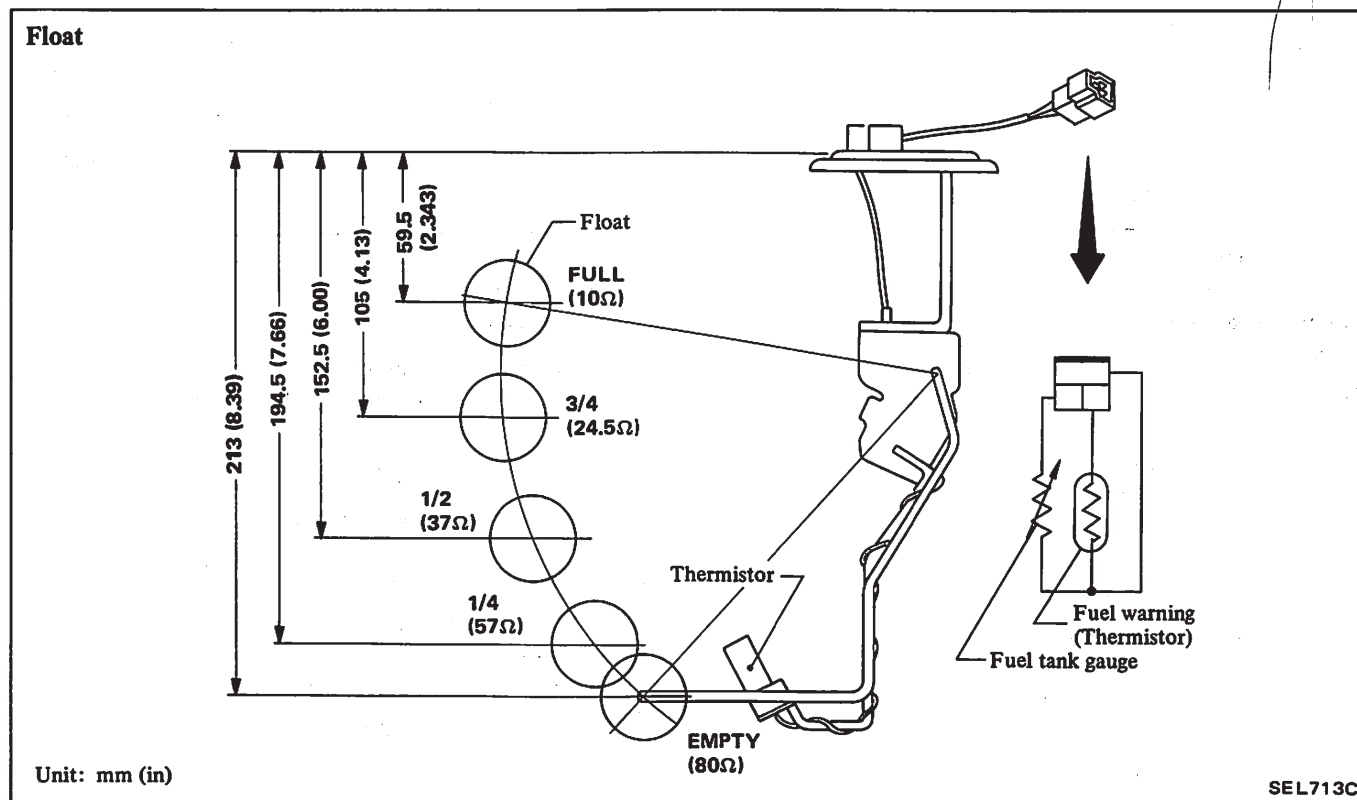
Condition	Probable cause
Unusual sound occurs in response to increase in driving speed.	Excessively bent or twisted speedometer cable inner wire or lack of lubrication. Faulty speedometer.
Inaccurate speedometer indication.	Faulty speedometer.
Inaccurate odometer operation.	Faulty speedometer.

FUEL TANK GAUGE UNIT

Removal and installation

Refer to FE section.

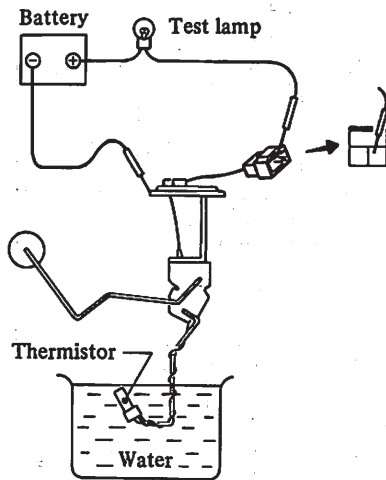
Inspection



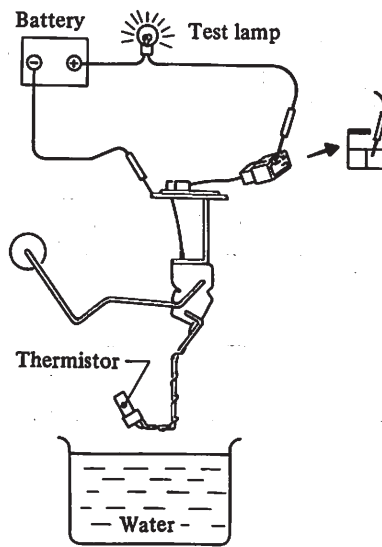
METERS, GAUGES AND WARNING SYSTEM

Thermistor (For warning lamp)

- (1) Dip thermistor in water.
Test lamp should not illuminate.



- (2) Remove thermistor from water.
Test lamp should illuminate after approx. 3 minutes.



SEL714C

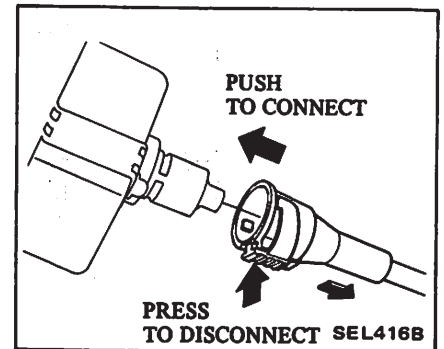
RESISTOR (For tachometer)

Location

Refer to Location of Electrical Units.

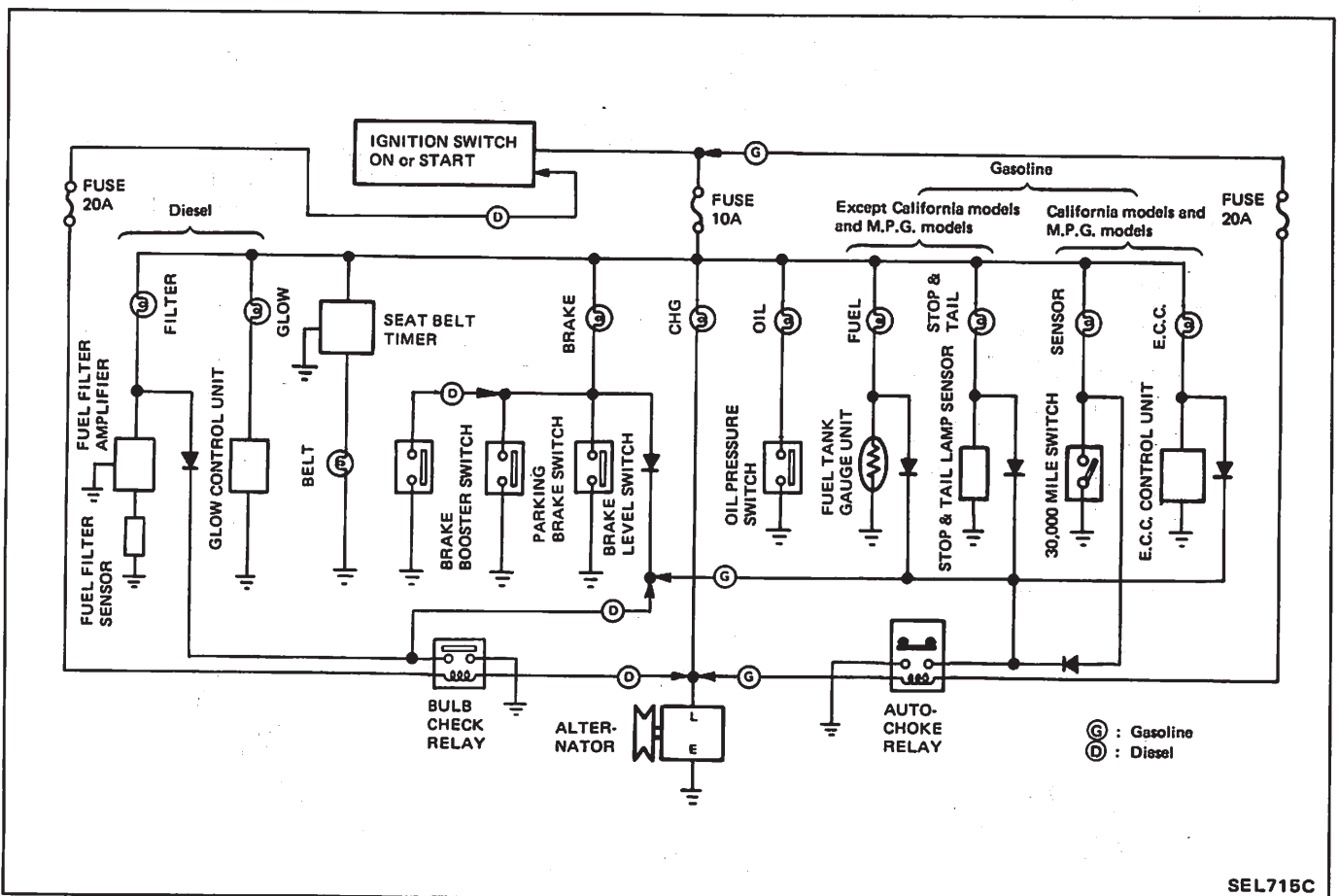
SPEEDOMETER CABLE

Removal and installation



WARNING LAMPS

SCHEMATIC/WARNING LAMPS



WIRING DIAGRAM/WARNING LAMPS (Gasoline)

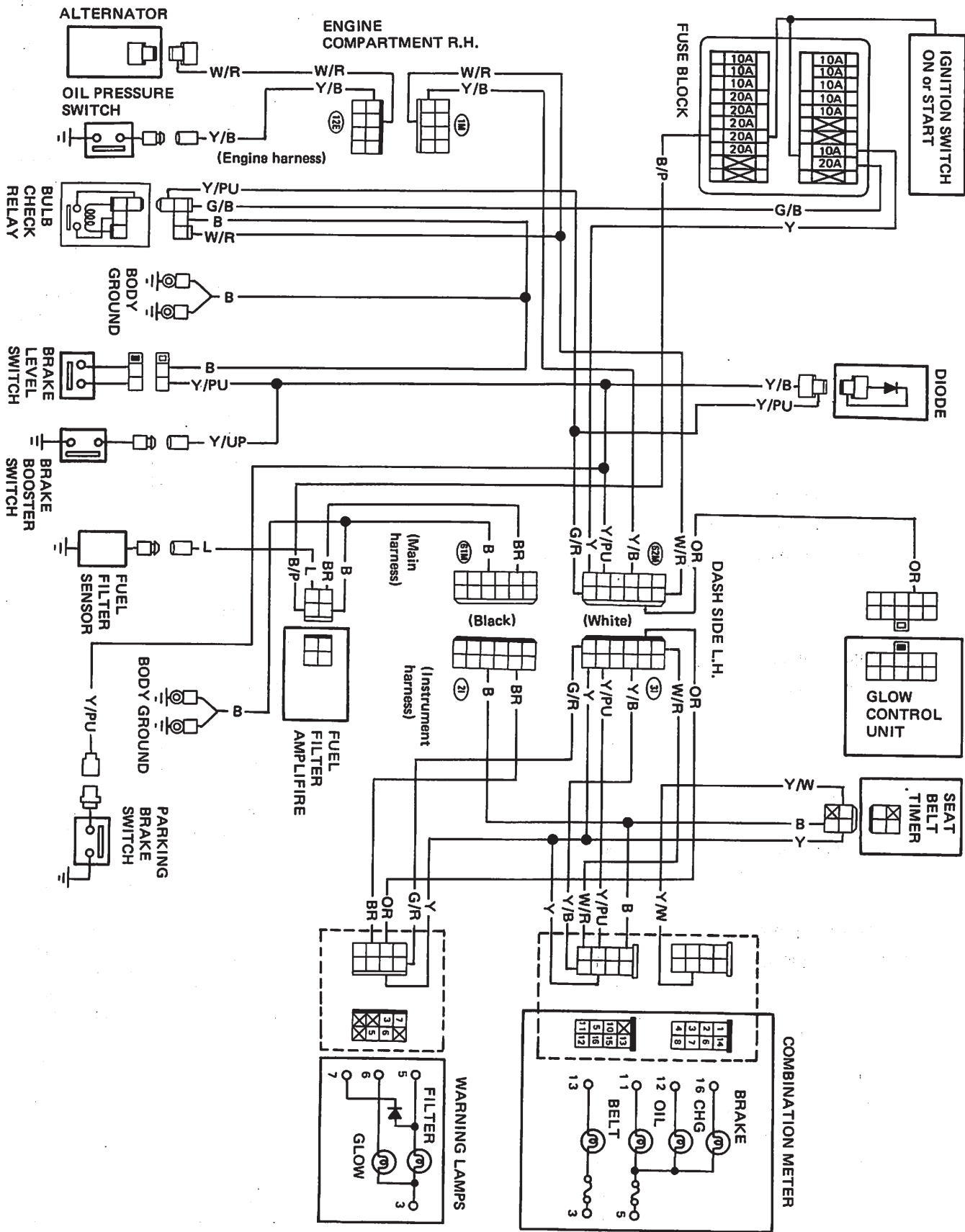


METERS, GAUGES AND WARNING SYSTEM

WIRING DIAGRAM/ WARNING LAMPS (Diesel)

EL-63

SEL717C



METERS, GAUGES AND WARNING SYSTEM

TROUBLE DIAGNOSES AND CORRECTIONS/ WARNING LAMPS

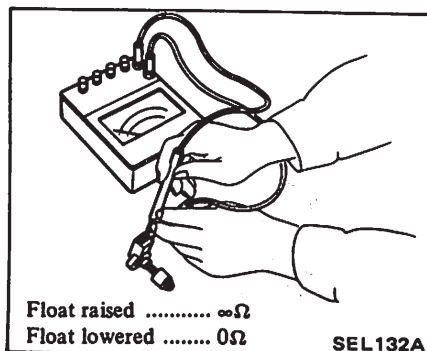
Condition	Probable cause
Charge warning lamp Lamp does not go out when engine is started.	Faulty charging system.
Lamp does not glow when ignition switch is turned "ON" without running engine.	Burnt bulb or loose bulb. Loose or poor connection. Faulty printed circuit sheet. Faulty alternator.
Oil pressure warning lamp Lamp does not light when ignition switch is set to "ON".	Faulty oil pressure switch or loose terminal connection. (When lead wire connected to oil pressure switch is grounded, warning lamp lights.) Burnt bulb or loose bulb. Loose connection or open circuit.
Lamp does not go out while engine is being operated.	Lack of engine oil. Oil pressure too low. Faulty oil pressure switch.
Brake warning lamp Lamp does not go out.	Faulty parking brake switch (When parking brake lever is released.) Faulty brake fluid level switch (When brake fluid level is normal). Faulty brake booster switch (When vacuum pressure is supplied)
Lamp does not glow when ignition switch is turned "ON" without running engine.	Burnt bulb or loose bulb. Faulty diode. Faulty auto-choke relay. Loose or poor connection.
Fuel warning lamp Lamp does not glow when fuel is almost empty.	Faulty fuel tank gauge unit. Burnt bulb or loose bulb.
Lamp does not go out with specified volume of fuel.	Faulty fuel tank gauge unit. Faulty auto-choke relay. Faulty alternator.

Condition	Probable cause
Stop & tail warning lamp Lamp does not glow when ignition switch is turned "ON" without running engine.	Burnt bulb or loose bulb. Faulty diode. Faulty auto-choke relay. Loose or poor connection.
Auto-glow warning lamp Lamp does not light when ignition switch is set to "ON".	Burnt bulb or loose connection. Faulty auto-glow system.
Lamp does not go out while engine is being operated.	Faulty auto-glow system.
Filter warning lamp Lamp does not go out after water is removed from fuel filter or engine is started.	Faulty fuel filter sensor. Faulty fuel filter amplifier.
Lamp does not glow when ignition switch is turned to "START" without engine running.	Burnt bulb or loose connection. Faulty bulb check relay. Faulty alternator.

METERS, GAUGES AND WARNING SYSTEM

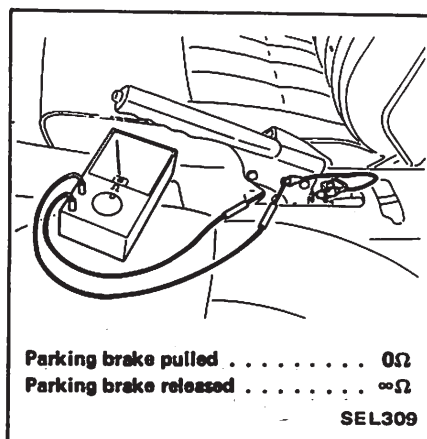
BRAKE FLUID LEVEL SWITCH

Inspection



PARKING BRAKE SWITCH

Inspection



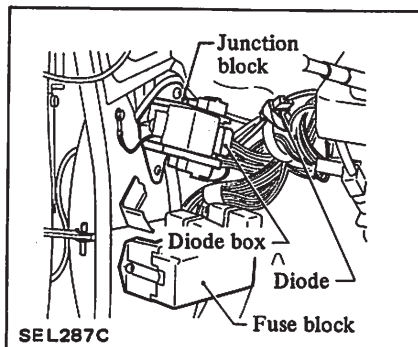
DIODE (For bulb check)

Location

For brake warning lamps

Diode for U.S.A. model is located in diode box which is mounted on junction block.

For Canada models, M.P.G. models and diesel models, it is attached with insulating tape to main harness near junction block as shown below.



For filter warning lamp (Diesel)

Diode is installed on the printed circuit board of combined warning lamps.

AUTO-CHOKE RELAY [For bulb check (Gasoline)]

Location

Auto choke relay is installed on the relay bracket. Refer to page EL-81.

Inspection

Auto-choke relay is 1M-1B standardized relay. Refer to page EL-7.

BULB CHECK RELAY (Diesel)

Location

Bulb check relay is installed on the relay bracket. Refer to page EL-81.

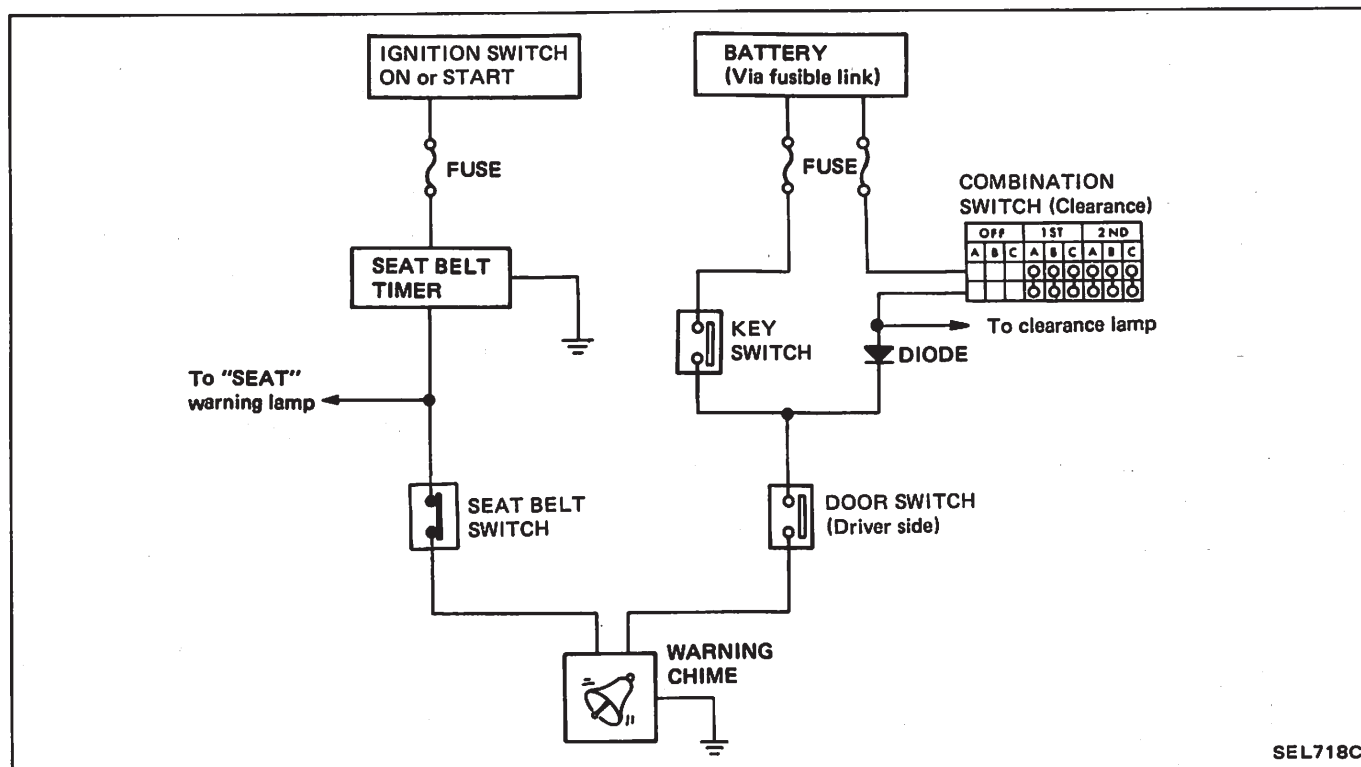
Inspection

Bulb check relay is 1M standardized relay.
Refer to page EL-7.

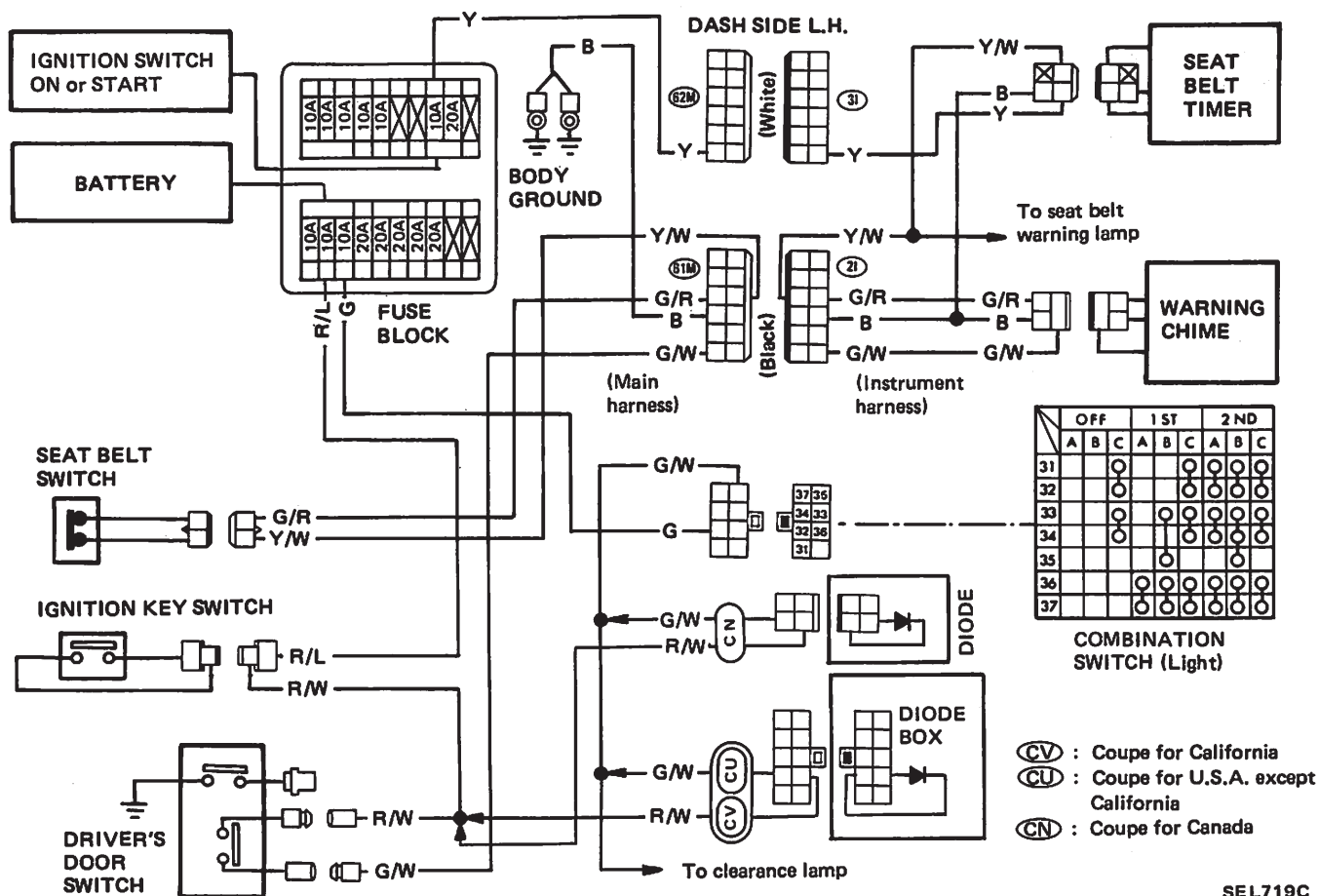
METERS, GAUGES AND WARNING SYSTEM

WARNING CHIME

SCHEMATIC/SEAT BELT, KEY AND LIGHT WARNING



WIRING DIAGRAM/SEAT BELT, KEY AND LIGHT WARNING



METERS, GAUGES AND WARNING SYSTEM

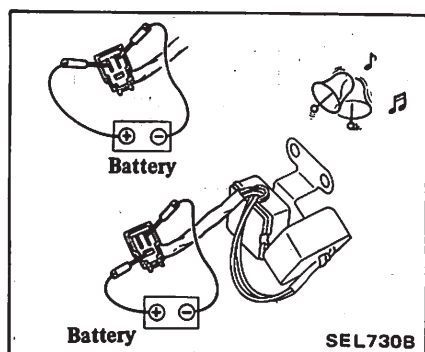
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause
Light and key Warning chime does not sound with ignition key in ignition switch or lighting switch on, when driver side door is open.	Faulty warning chime. Loose connection or open circuit. Faulty door switch. Faulty key warning chime switch. Faulty lighting system. (Clearance lamp does not light.)

Condition	Probable cause
Seat belt Chime does not sound and warning lamp does not glow with ignition switch on.	Faulty seat belt switch. Faulty seat belt warning timer. Loose connection or open circuit.
Either chime or warning lamp does not operate with proper condition	Loose connection or open circuit. Burnt bulb. Faulty chime.

WARNING CHIME

Inspection



KEY SWITCH

Location

Key switch is installed in ignition switch.

Inspection

Refer to page EL-6.

SEAT BELT TIMER

Location

Seat belt timer is installed behind the radio. Refer to page EL-82.

WIPER AND WASHER

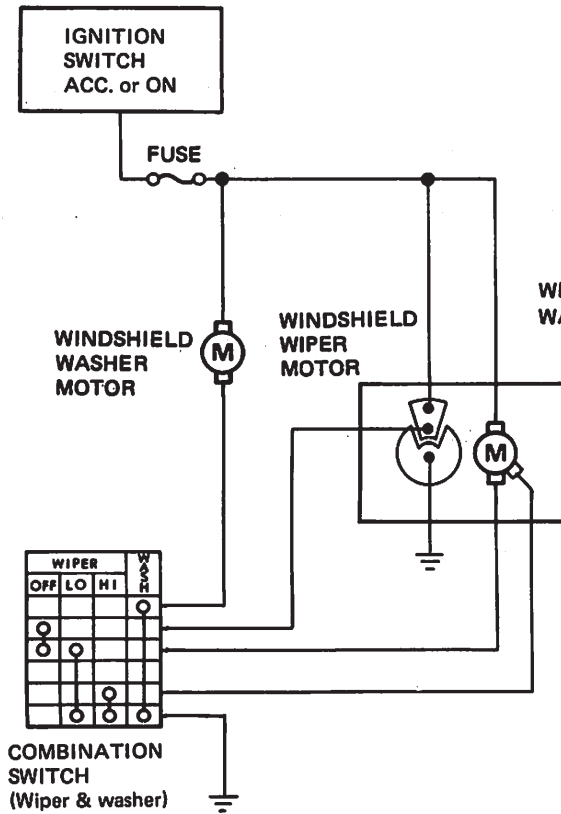
WIPER AND WASHER

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

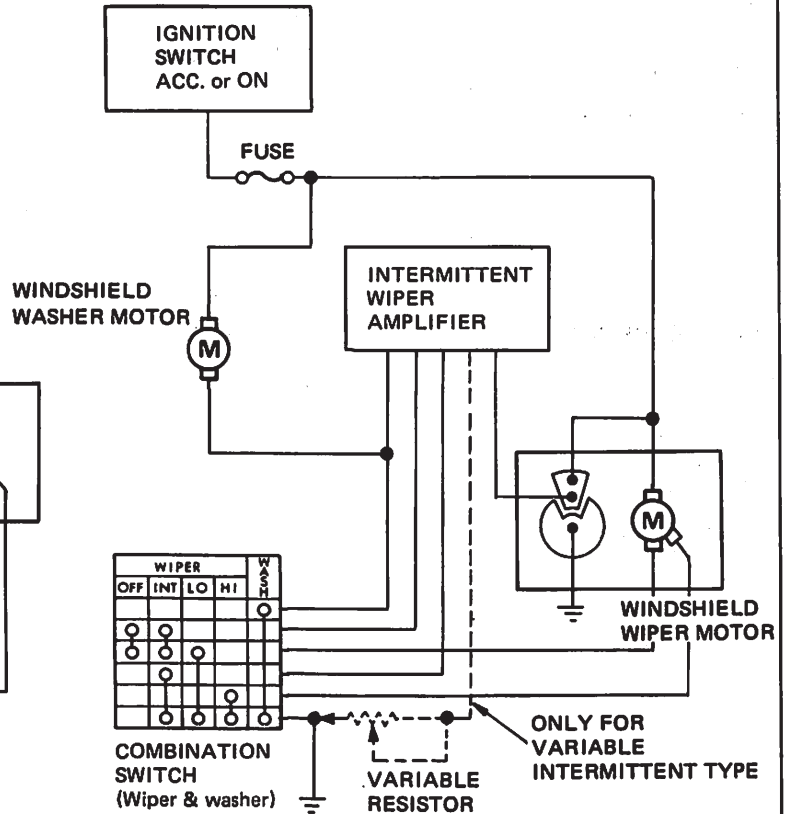
WINDSHIELD WIPER AND WASHER

SCHEMATIC/WINDSHIELD WIPER AND WASHER

Without intermittent wiper



With intermittent wiper



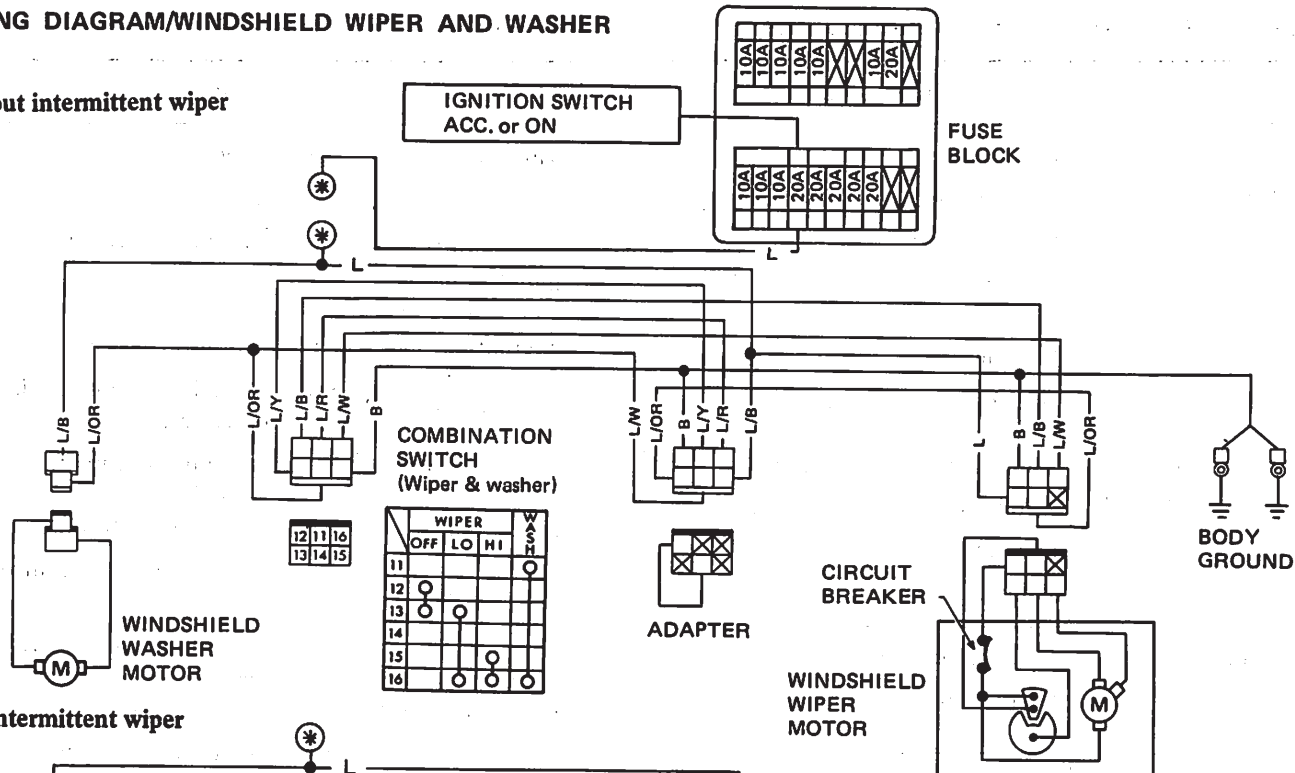
	Stop position	In operation
Wiper arm		
Auto stop device	<p>Continuity exists between A and B.</p>	<p>Continuity exists between B and C.</p>

SEL344C

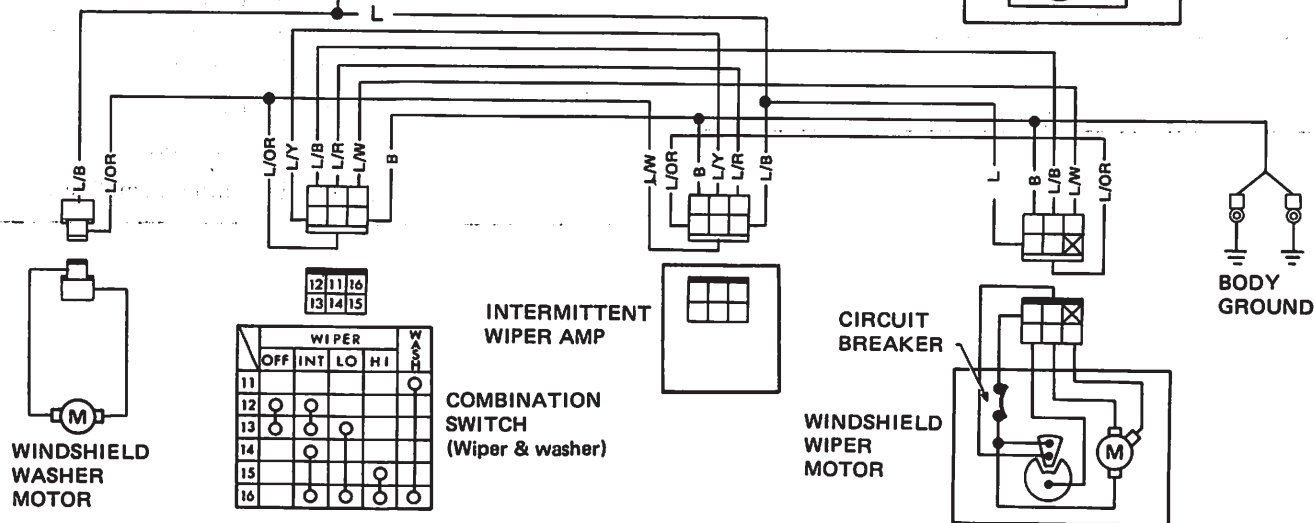
WIPER AND WASHER

WIRING DIAGRAM/WINDSHIELD WIPER AND WASHER

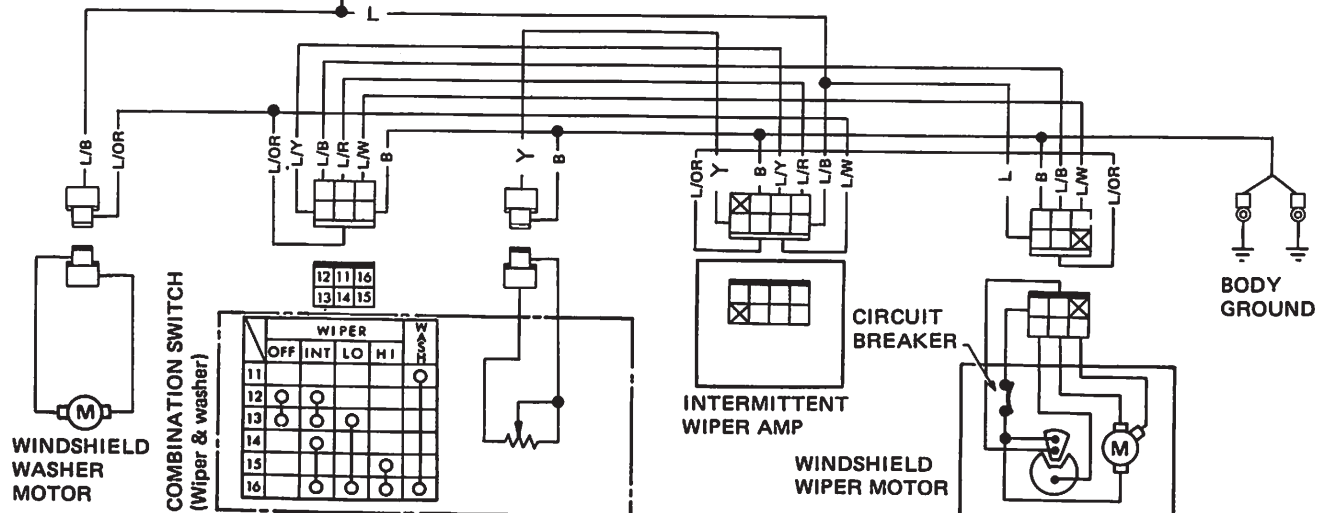
Without intermittent wiper



With intermittent wiper



With variable intermittent wiper



SEL720C

WIPER AND WASHER

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause
Windshield wiper does not operate.	Burnt fuse. Loose connection or open circuit. Improper switch contact. Foreign material interrupts link mechanism. Disconnected rod. Seized or rusted arm shaft.
Windshield wiper operating speed is too slow.	Short circuit of motor armature. Worn brushes or seized shaft. Low source voltage. Humming of motor.
Windshield wiper does not stop correctly.	Faulty auto-stop device. Faulty wiper switch.
Washer fluid does not eject (Washer motor operates).	Clogged washer nozzle or hose.

Intermittent windshield wiper

Condition	Probable cause
Wiper does not operate inter- mittently but operates at low and high speeds.	Faulty wiper switch. Faulty wiring. Faulty intermittent amplifier.
Intermittent speed is too short for proper wiping.	Faulty auto-stop device. Faulty variable intermittent time control rheostat. Faulty intermittent amplifier.
Intermittent speed is too long for proper wiping.	Line voltage below 10 volts. Faulty intermittent time control rheostat. Faulty intermittent amplifier.
Wipers do not shut off.	Faulty wiper motor. Faulty intermittent amplifier.
Intermittent speed is erratic.	Faulty wiper switch. Faulty wiring. Faulty wiper motor. Faulty intermittent amplifier.

WIPER AND WASHER

INTERMITTENT WIPER AMPLIFIER (IC built-in)

Location

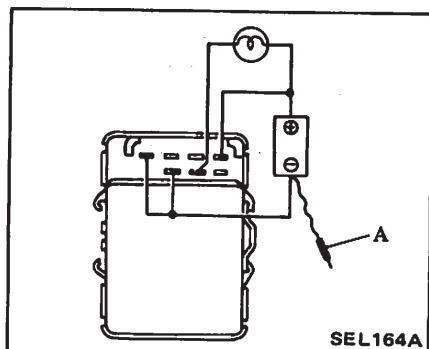
The intermittent wiper amplifier is located on the dash upper. Refer to page EL-81.

Inspection

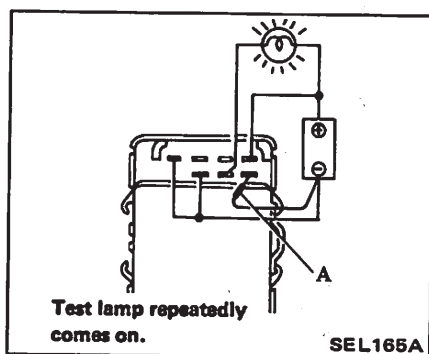
Variable intermittent type

Be careful not to connect lead wires to incorrect terminals.

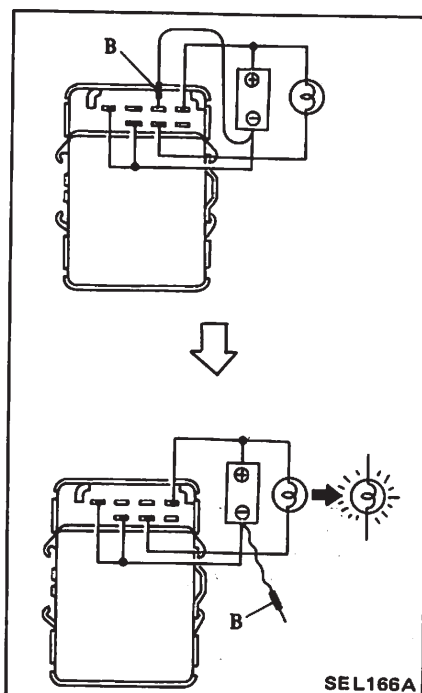
1. Connect test lead wires.



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



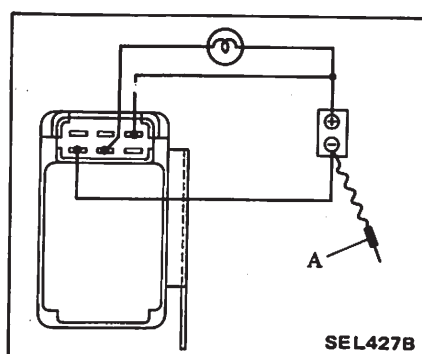
3. Disconnect lead wire (B).
Test lamp should go out and come back on in a few seconds.



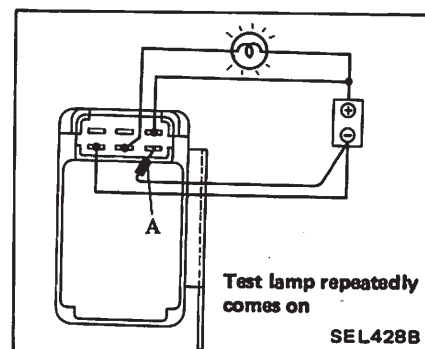
Intermittent type

Be careful not to connect lead wires to incorrect terminals.

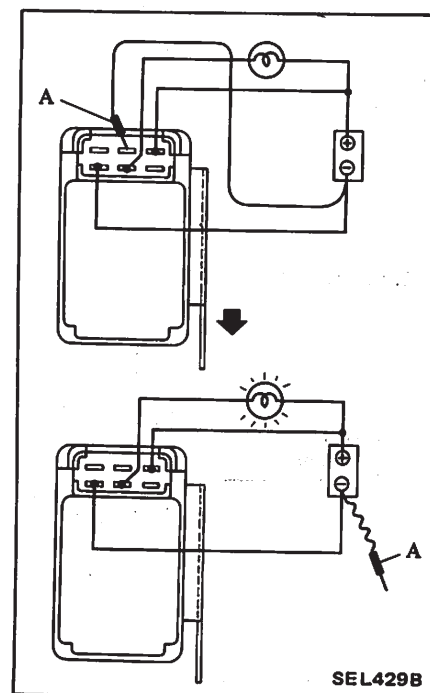
1. Connect test lead wires.



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



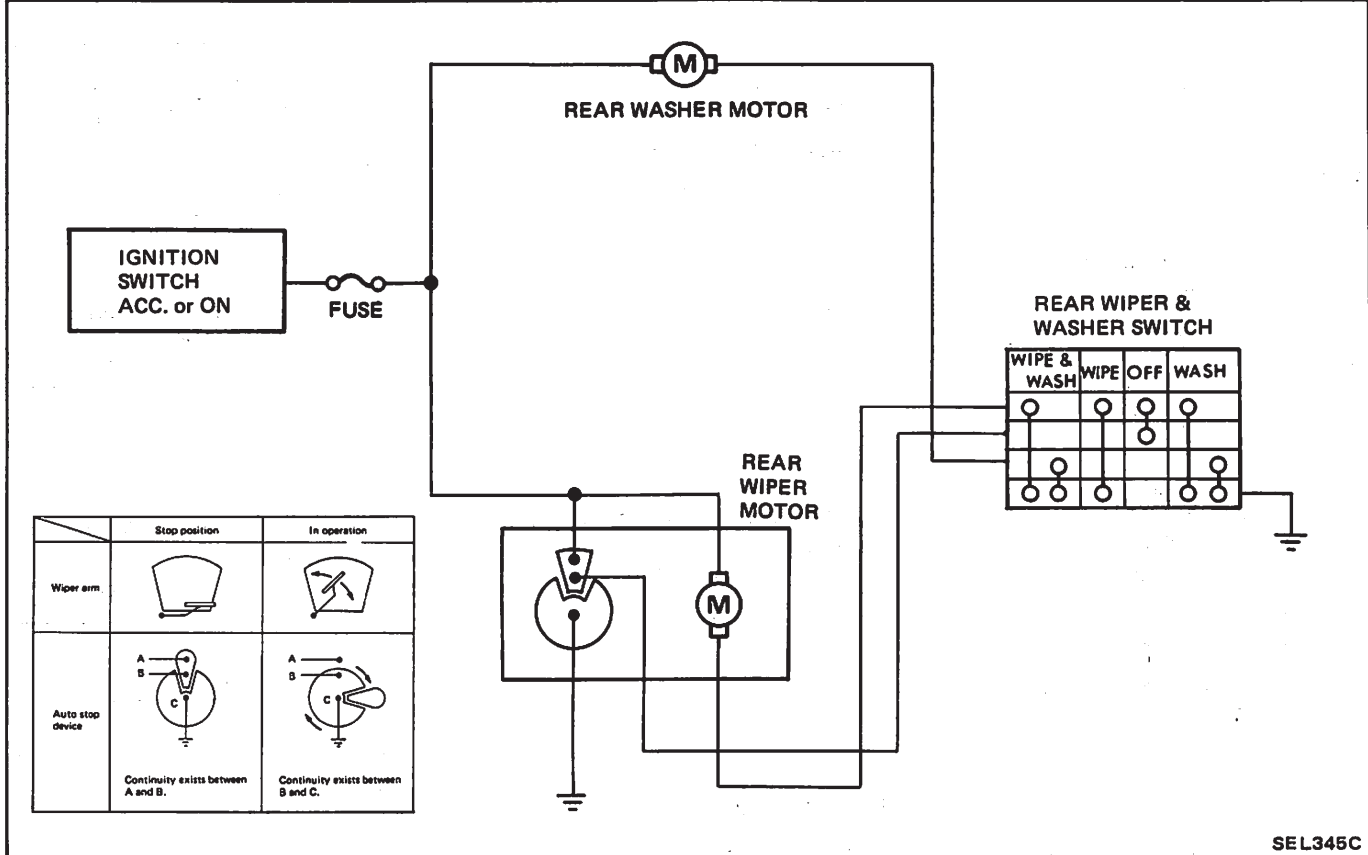
3. Reconnect lead wire (A) and disconnect lead wire (A).
Test lamp comes on in a few seconds.



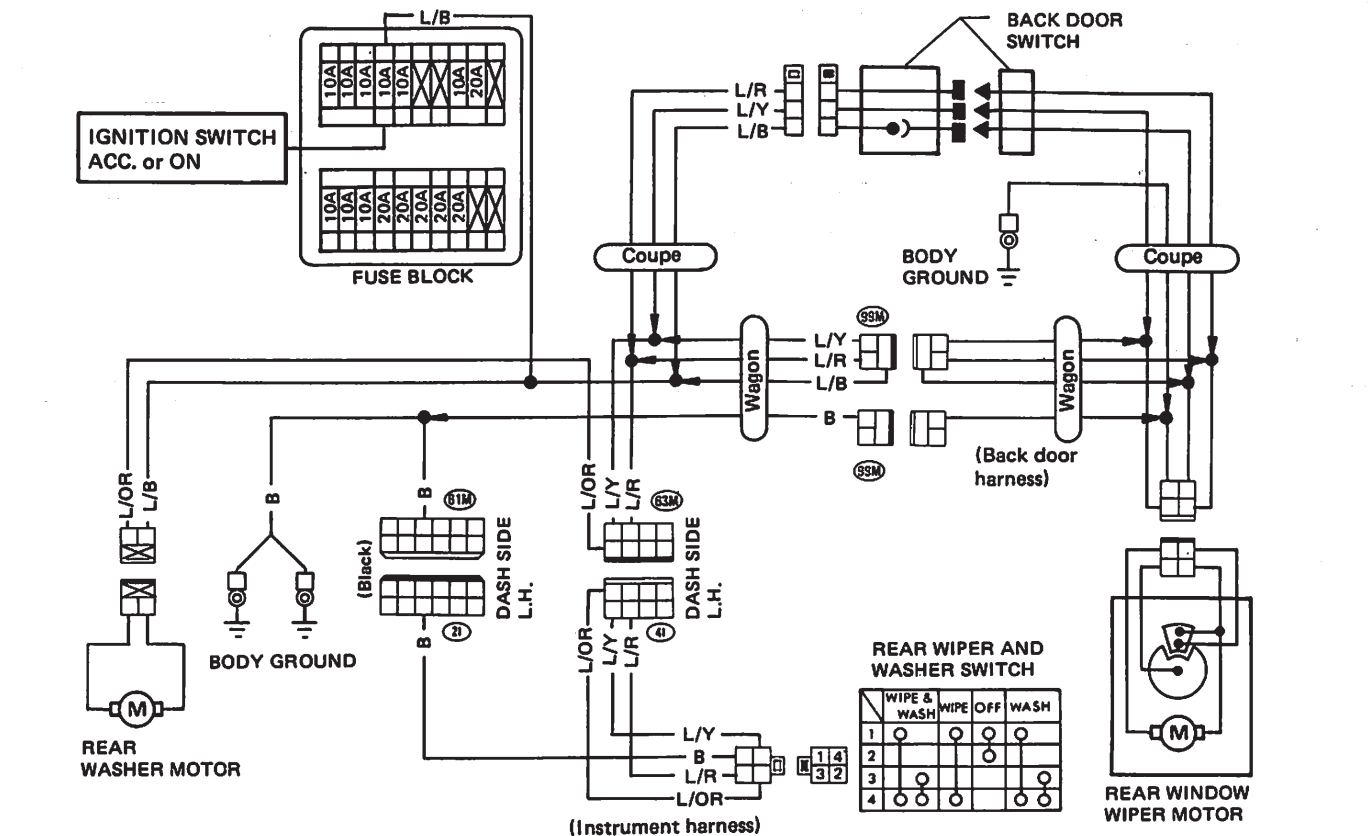
WIPER AND WASHER

REAR WINDOW WIPER AND WASHER

SCHEMATIC/REAR WINDOW WIPER AND WASHER



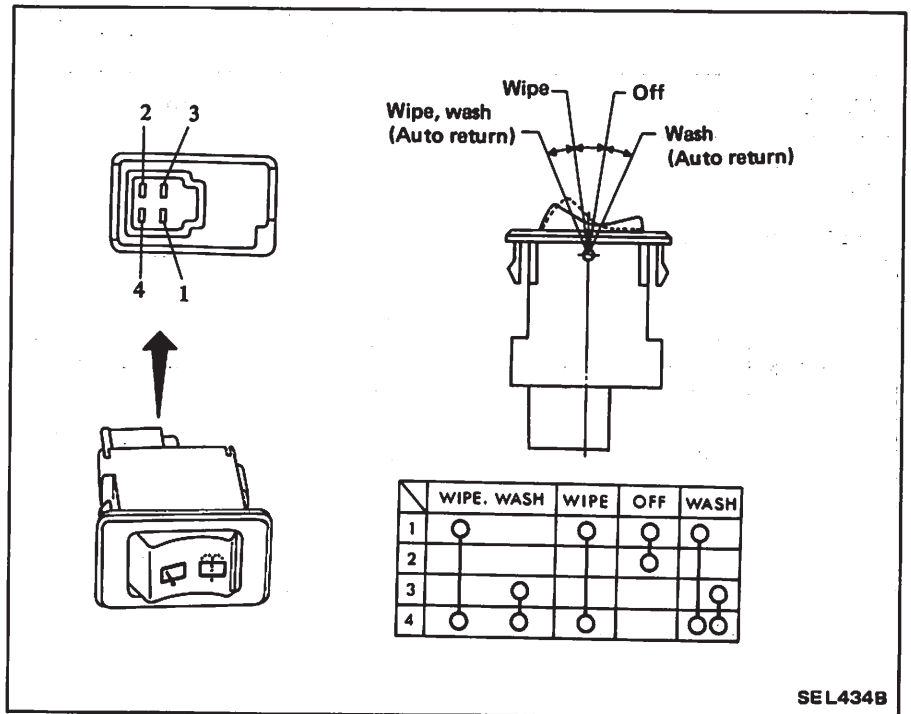
WIRING DIAGRAM/REAR WINDOW WIPER AND WASHER



WIPER AND WASHER

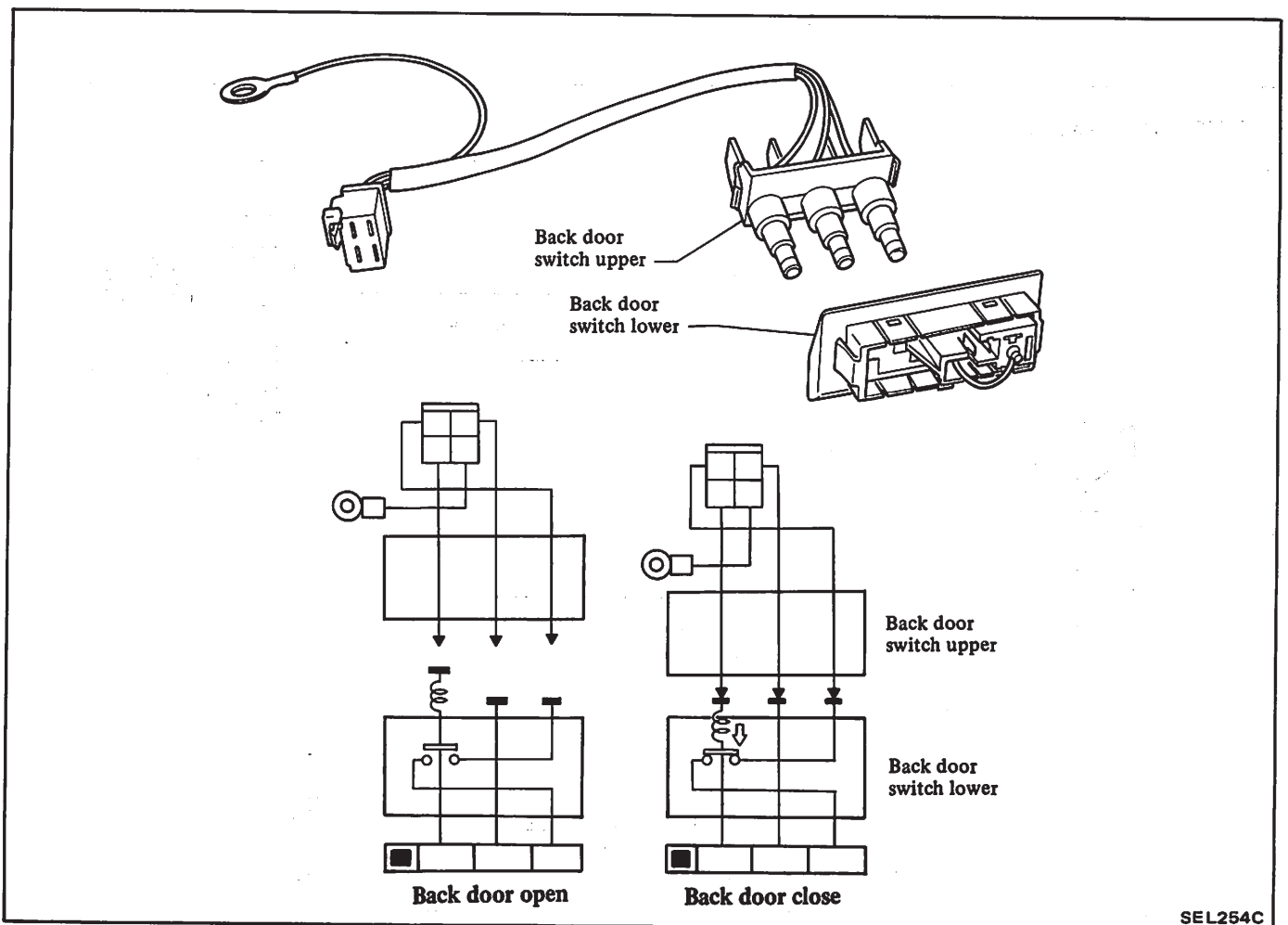
REAR WINDOW WIPER SWITCH

Inspection



BACK DOOR SWITCH (Coupe)

Inspection



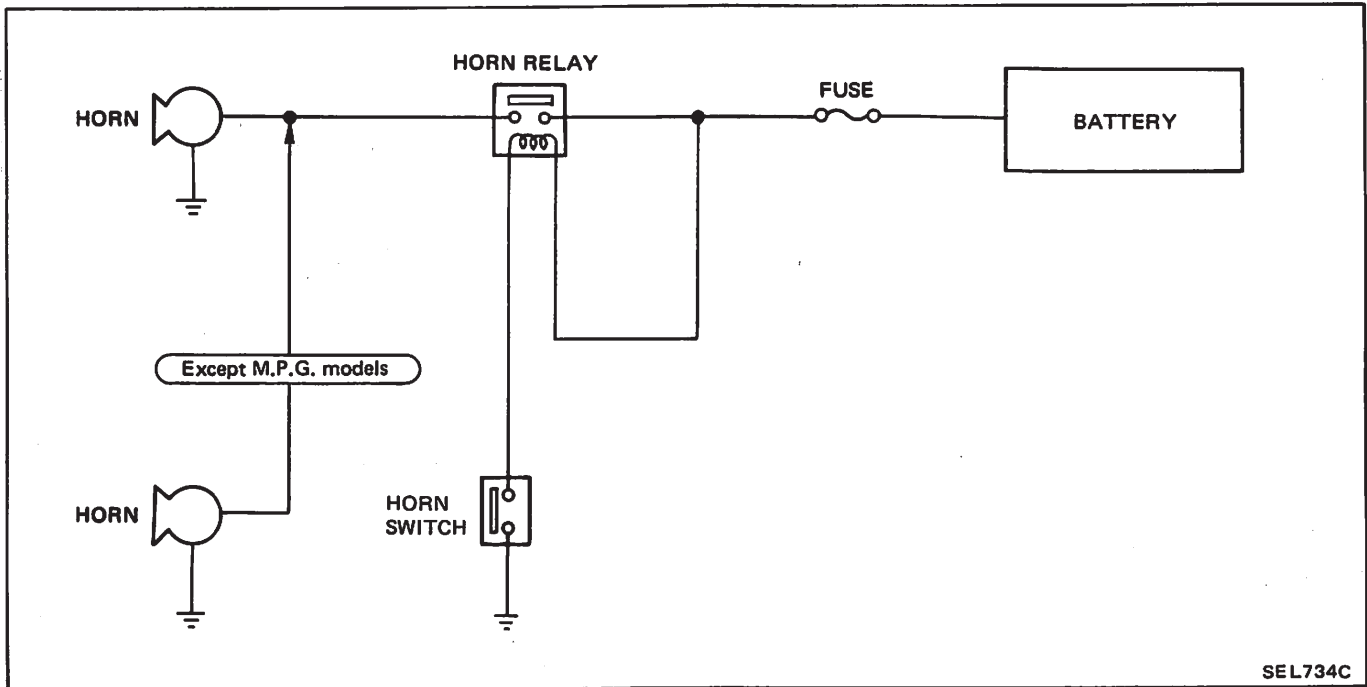
ELECTRICAL ACCESSORIES

ELECTRICAL ACCESSORIES

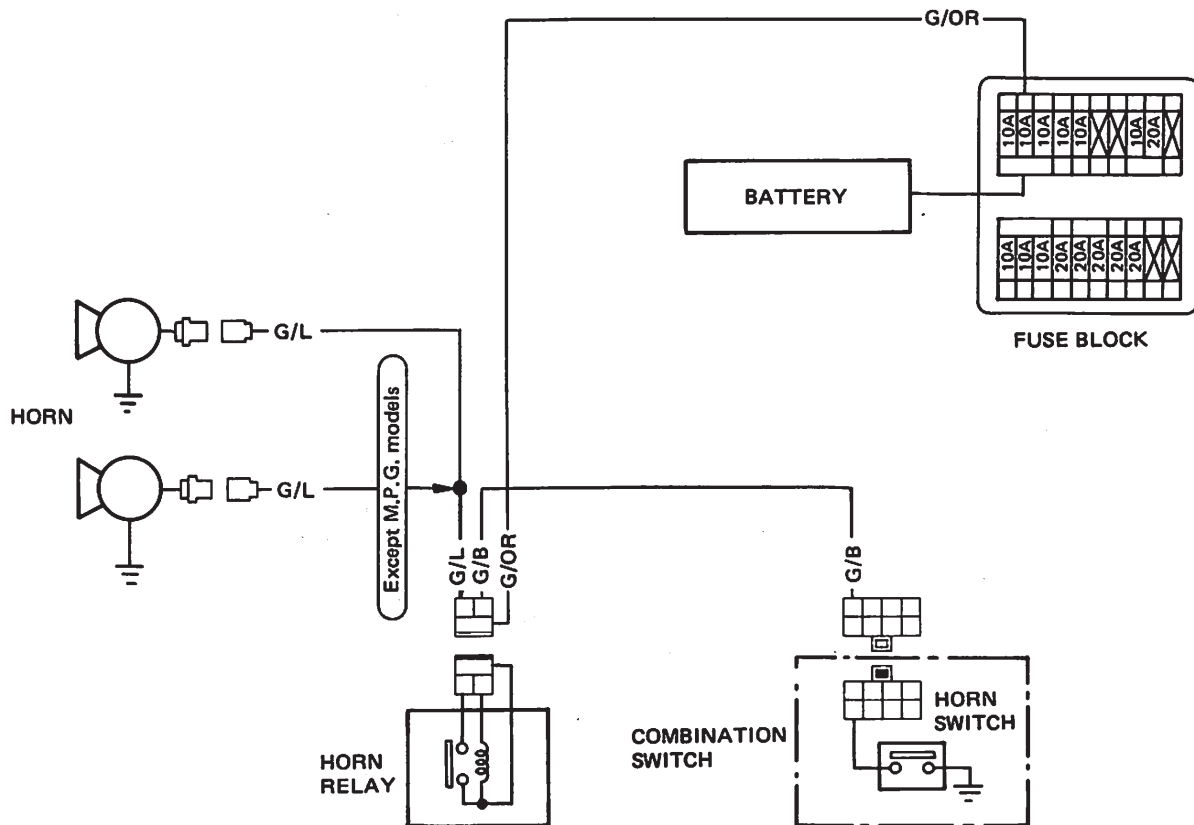
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

HORN

SCHEMATIC/HORN

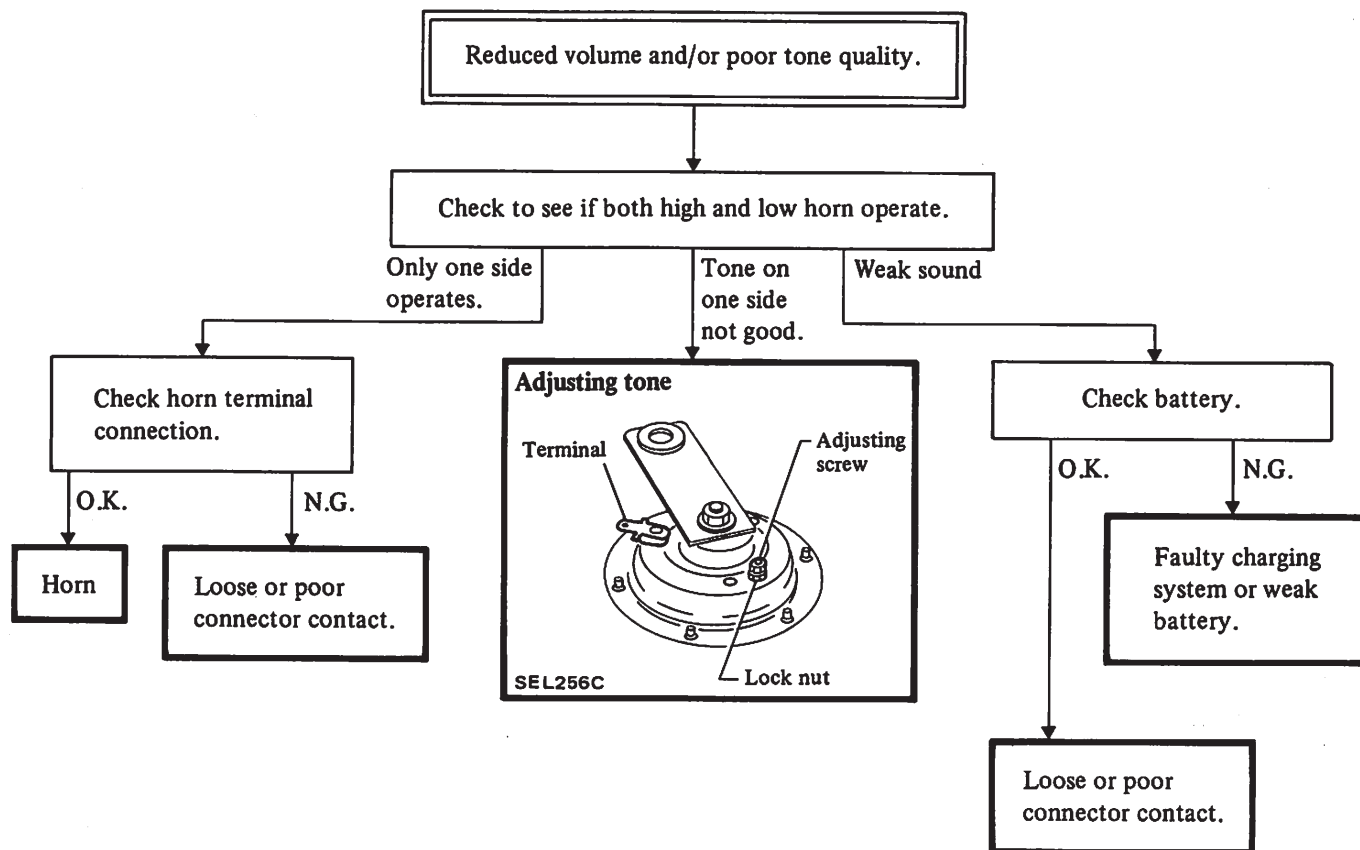


WIRING DIAGRAM/HORN



ELECTRICAL ACCESSORIES

TROUBLE DIAGNOSES AND CORRECTIONS



HORN BUTTON

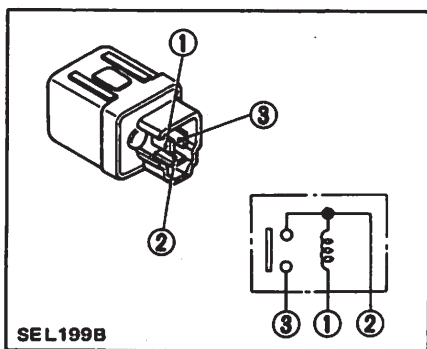
Refer to "COMBINATION SWITCH".

HORN RELAY

Location

Horn relay is installed on the relay bracket. Refer to page EL-81.

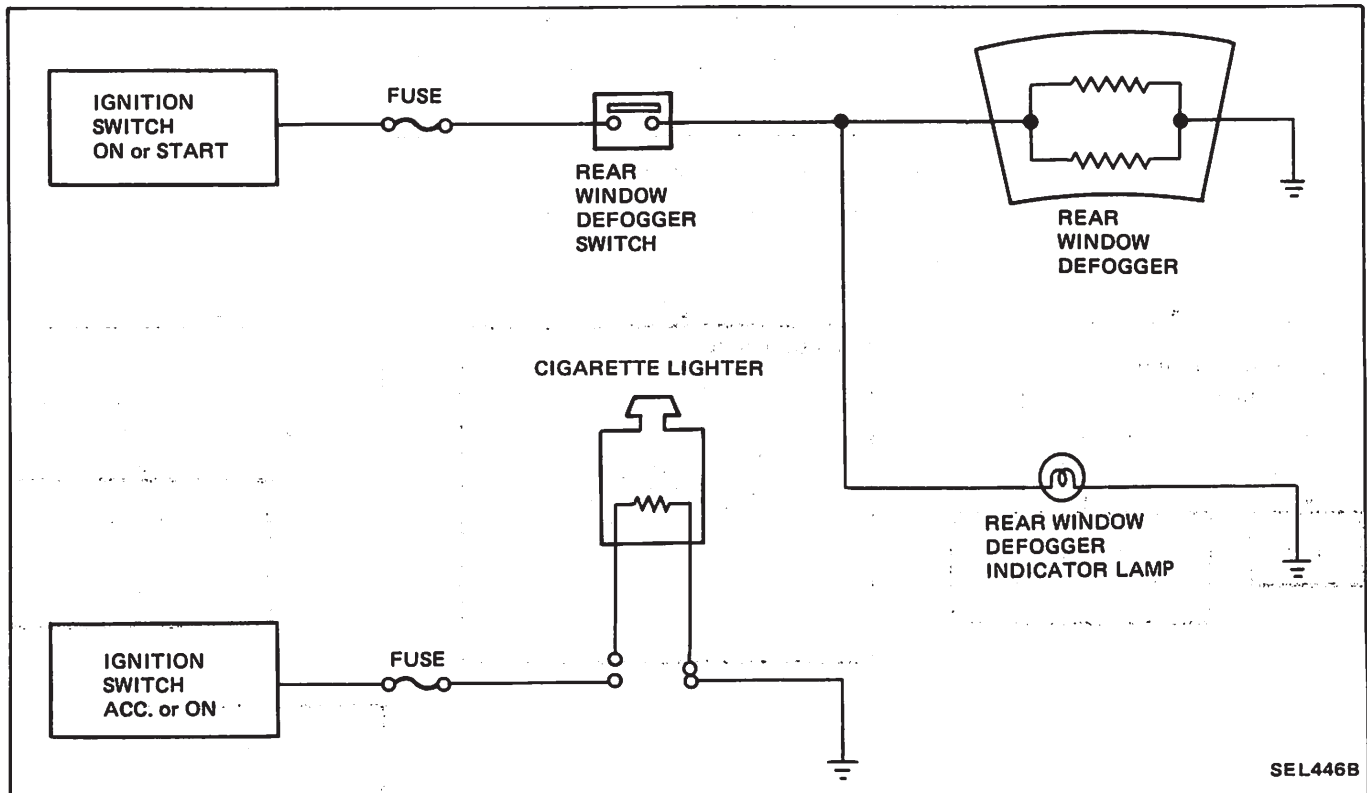
Inspection



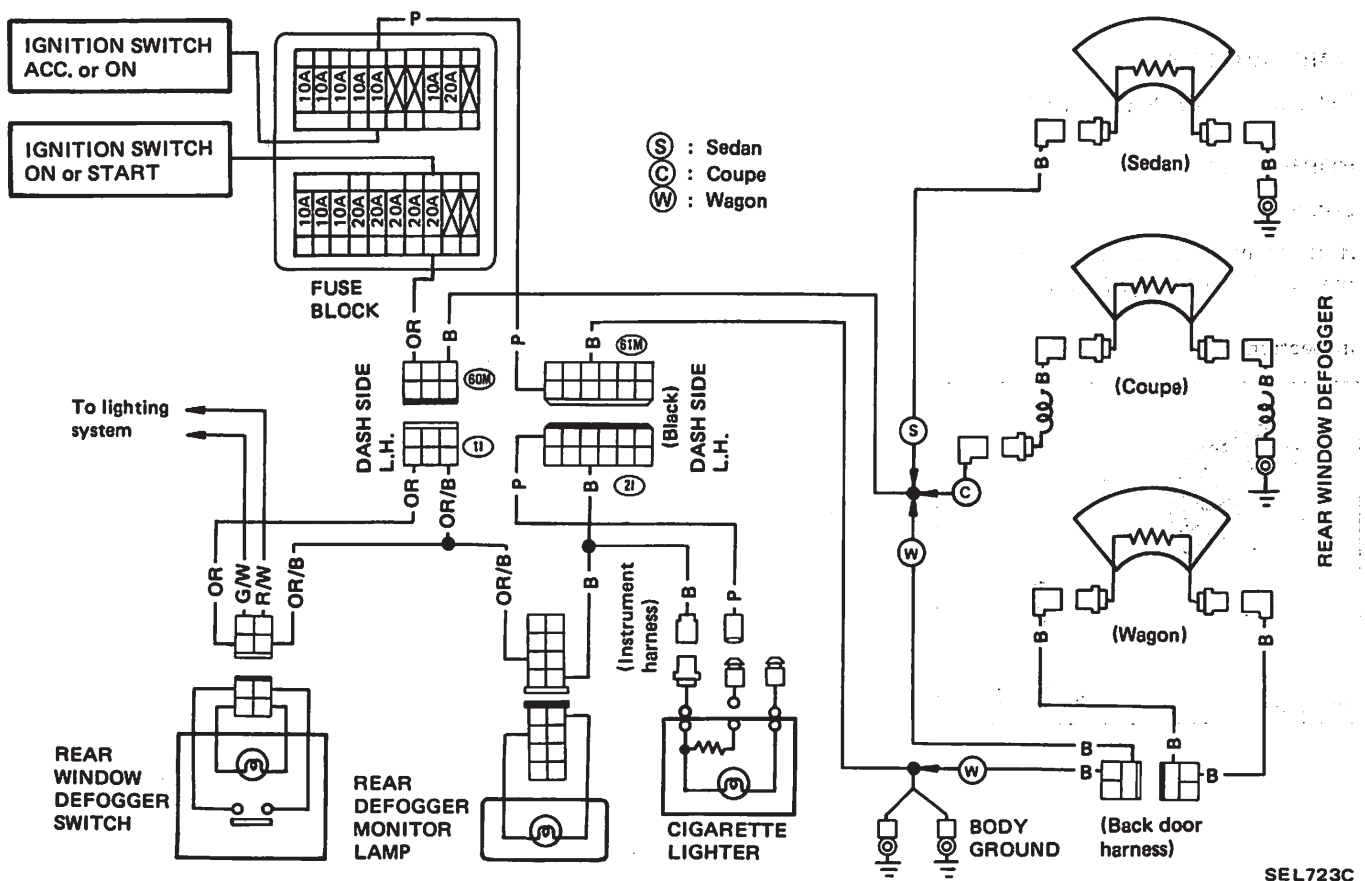
ELECTRICAL ACCESSORIES

REAR WINDOW DEFOGGER AND CIGARETTE LIGHTER 2000 1999 1998 1997 1996 1995 1994 1993 1992 1991 1990 1989 1988 1987 1986 1985 1984 1983 1982 1981 1980 1979 1978 1977 1976 1975 1974 1973 1972 1971 1970 1969 1968 1967 1966 1965 1964 1963 1962 1961 1960 1959 1958 1957 1956 1955 1954 1953 1952 1951 1950 1949 1948 1947 1946 1945 1944 1943 1942 1941 1940 1939 1938 1937 1936 1935 1934 1933 1932 1931 1930 1929 1928 1927 1926 1925 1924 1923 1922 1921 1920 1919 1918 1917 1916 1915 1914 1913 1912 1911 1910 1909 1908 1907 1906 1905 1904 1903 1902 1901 1900

SCHEMATIC/REAR WINDOW DEFOGGER AND CIGARETTE LIGHTER



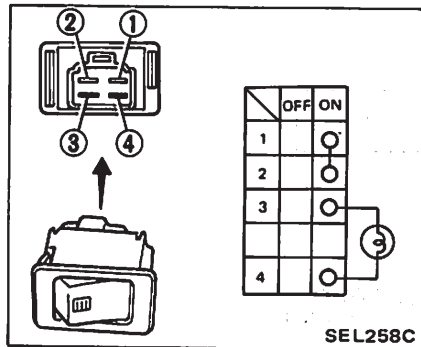
WIRING DIAGRAM/REAR WINDOW DEFOGGER AND CIGARETTE LIGHTER



ELECTRICAL ACCESSORIES

REAR WINDOW DEFOGGER SWITCH

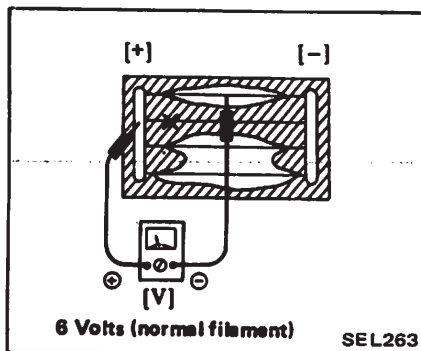
Inspection



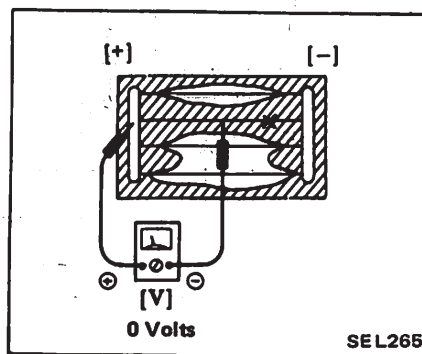
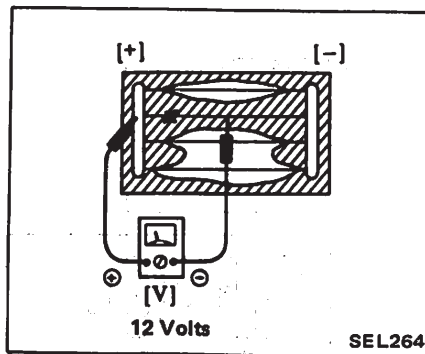
REAR WINDOW DEFOGGER FILAMENTS

Inspection

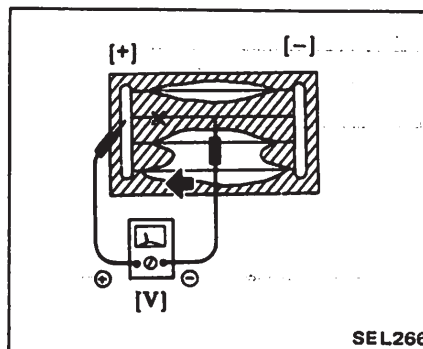
1. Attach probe circuit tester (in volt range) to middle portion of each filament.



2. If a filament is burned out, circuit tester registers 0 or 12 volts.



3. To locate burned out point, move probe to left and right along filament to determine point where tester needle swings abruptly.



Filament maintenance

Repair equipment

1. Conductive silver composition (Dupont No. 4817 or equivalent)
2. Ruler, 30 cm (11.8 in) long
3. Drawing pen
4. Heat gun

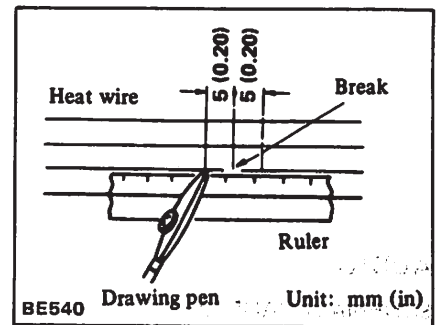
5. Alcohol
6. Cloth

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. 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.



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.

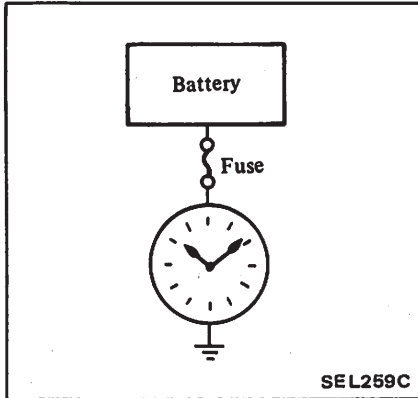
Do not touch repaired area while test is being conducted.

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.

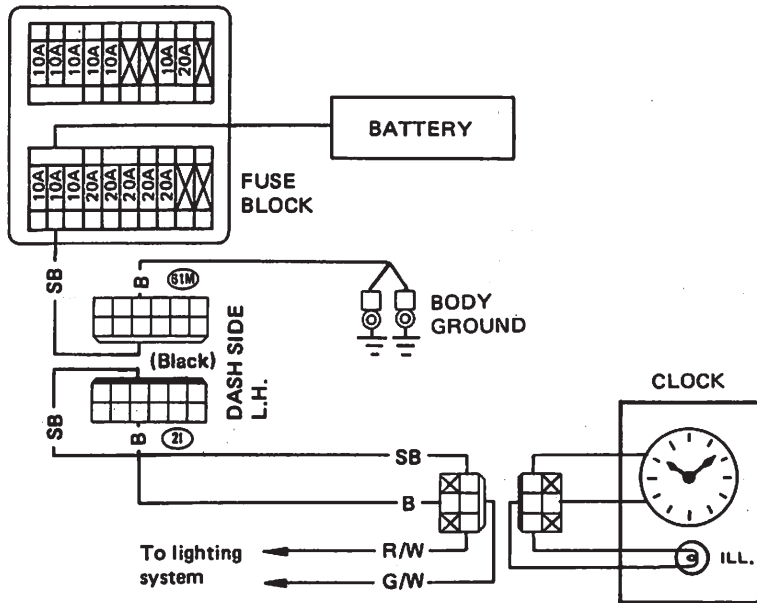
ELECTRICAL ACCESSORIES

CLOCK

SCHEMATIC/CLOCK

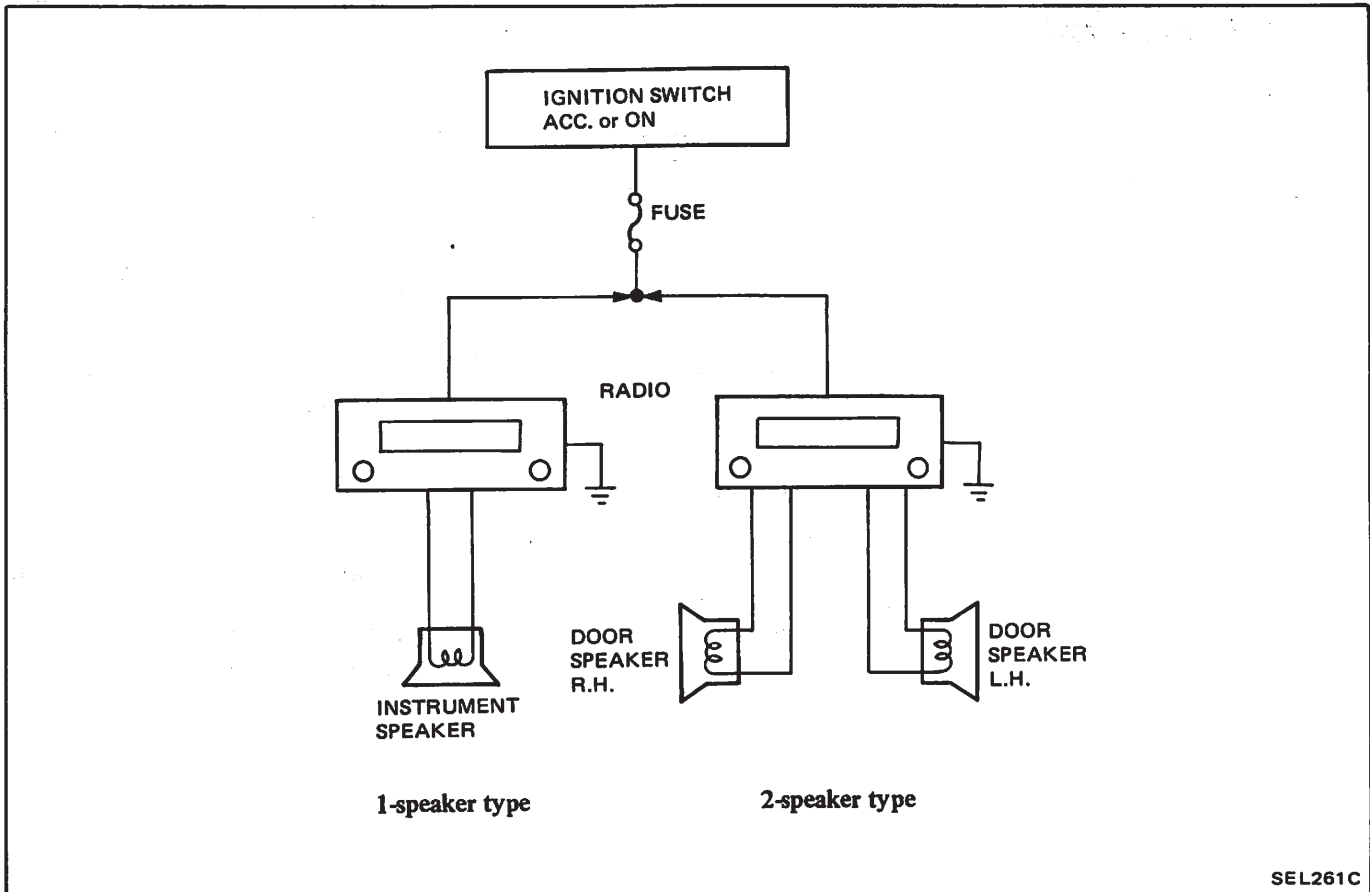


WIRING DIAGRAM/CLOCK



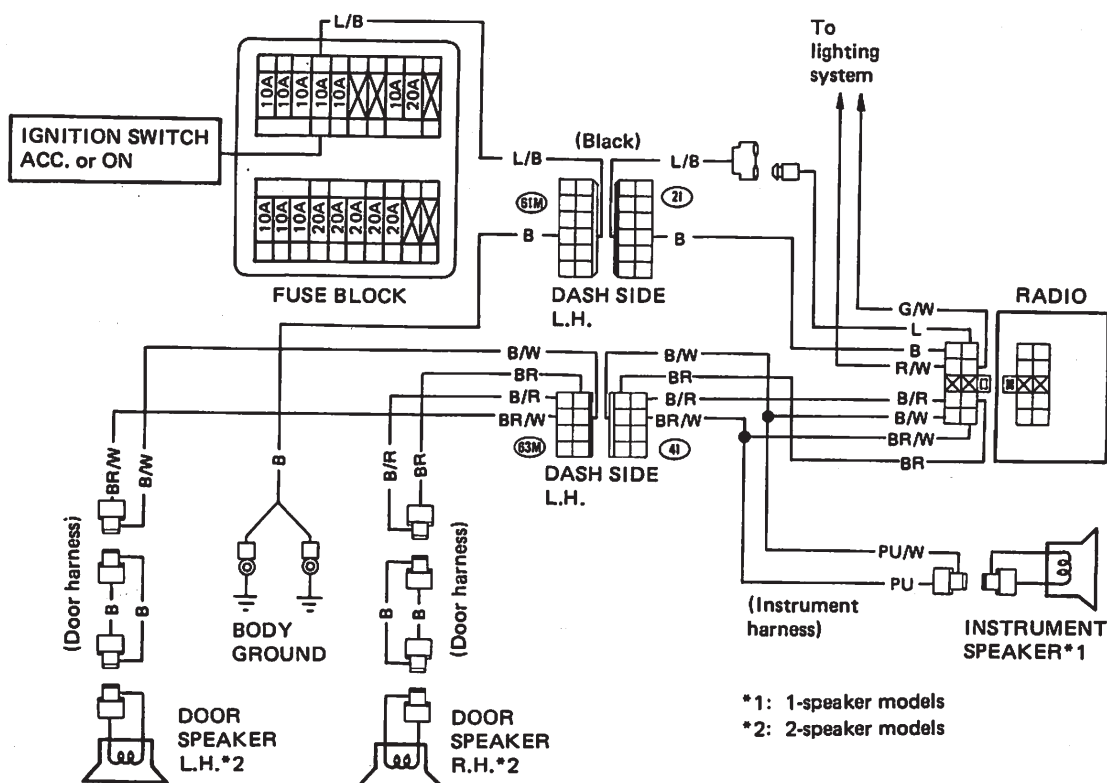
AUDIO

SCHEMATIC/AUDIO



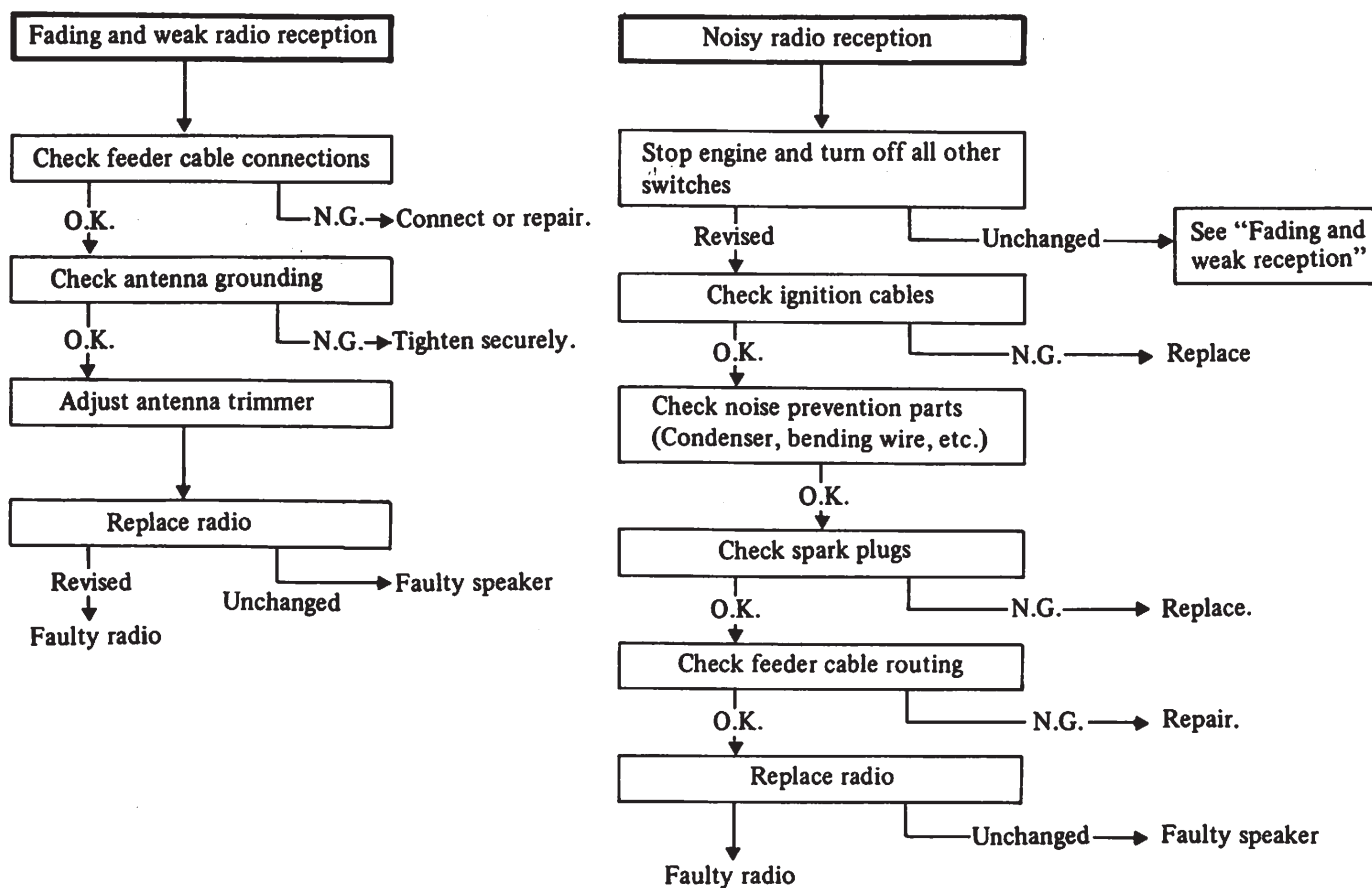
ELECTRICAL ACCESSORIES

WIRING DIAGRAM/AUDIO



SEL725C

TROUBLE DIAGNOSES AND CORRECTIONS

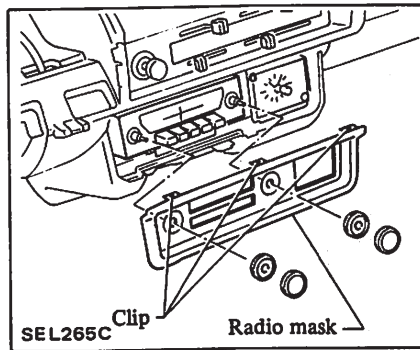
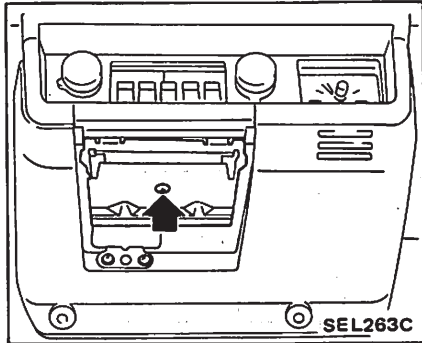


ELECTRICAL ACCESSORIES

RADIO

Removal and installation

1. Remove ash tray and ash tray bracket.



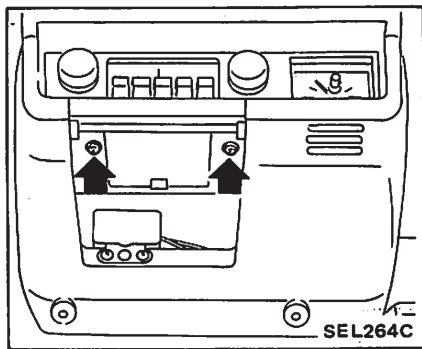
4. Installation is in the reverse order of removal.

- Fading and weak MW (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.

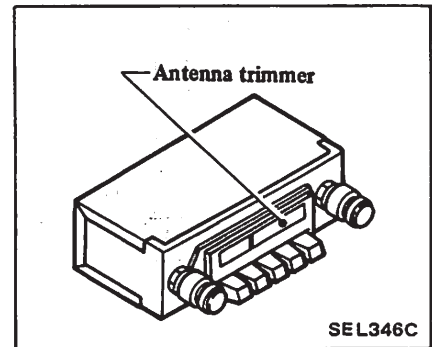
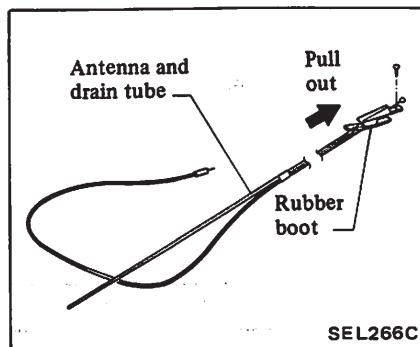
1. Extend antenna completely.
2. Turn radio on, and turn volume control to increase speaker volume.
3. Tune in the weakest station (barely audible) on dial at the range around 14 (1,400 kHz).
4. Turn antenna trimmer to left or right slowly, and set it in the position where reception is strongest.

2. Remove radio mounting bolts.



ANTENNA

Removal and installation



3. Remove radio mask.

ADJUSTING ANTENNA TRIMMER

The antenna trimmer should be adjusted in the following cases:

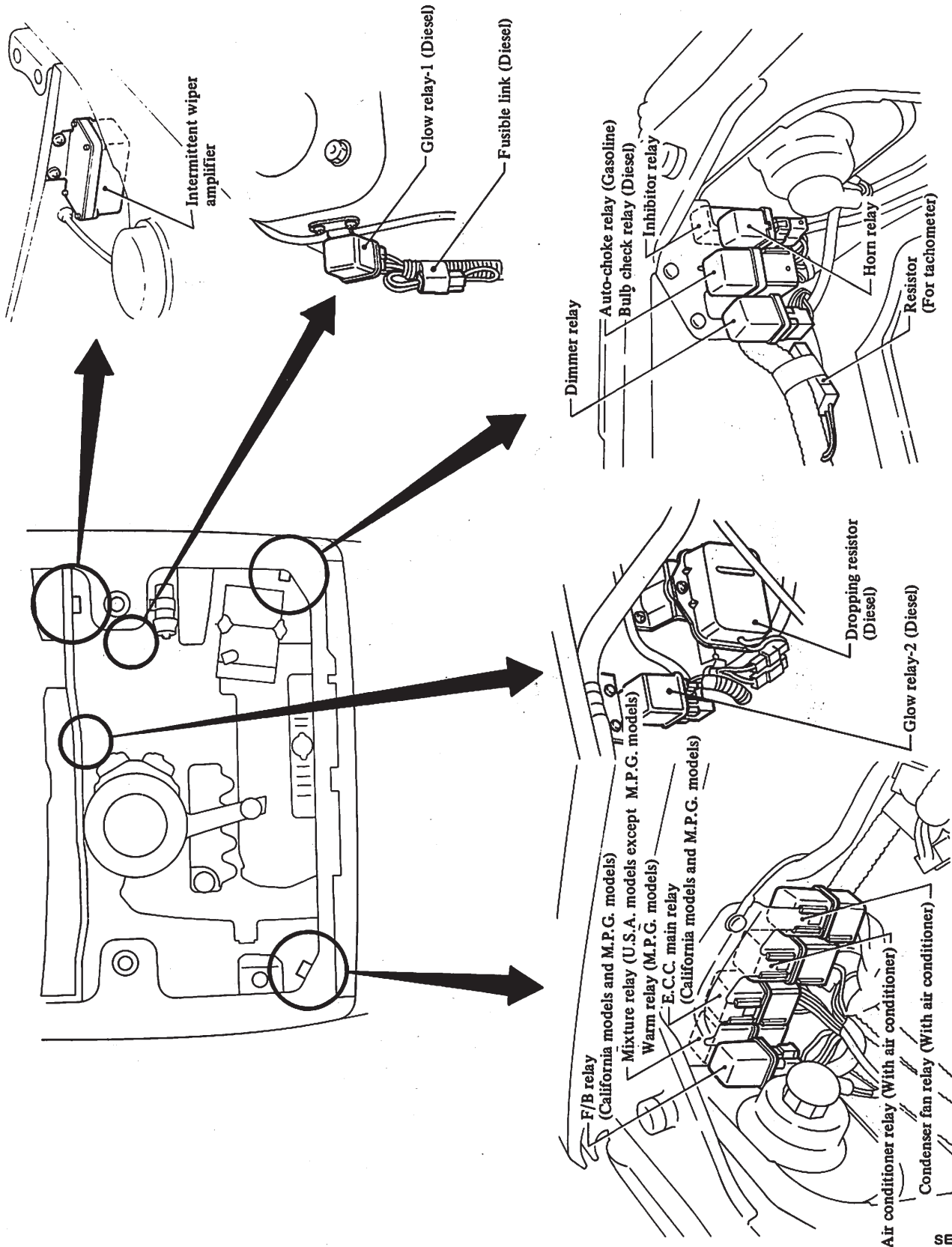
CAUTION:

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

LOCATION OF ELECTRICAL UNITS

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

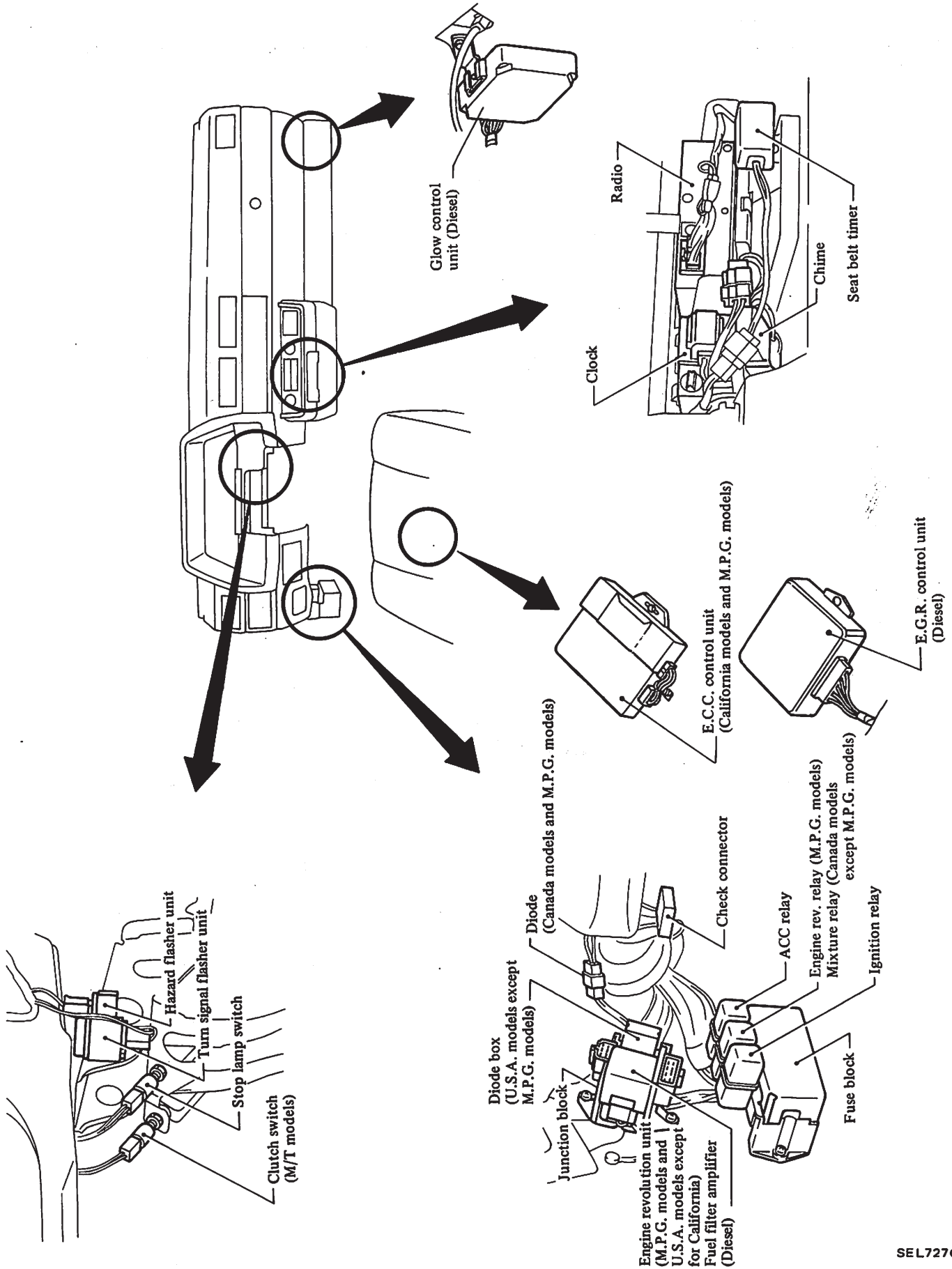
ENGINE COMPARTMENT



SEL726C

LOCATION OF ELECTRICAL UNITS

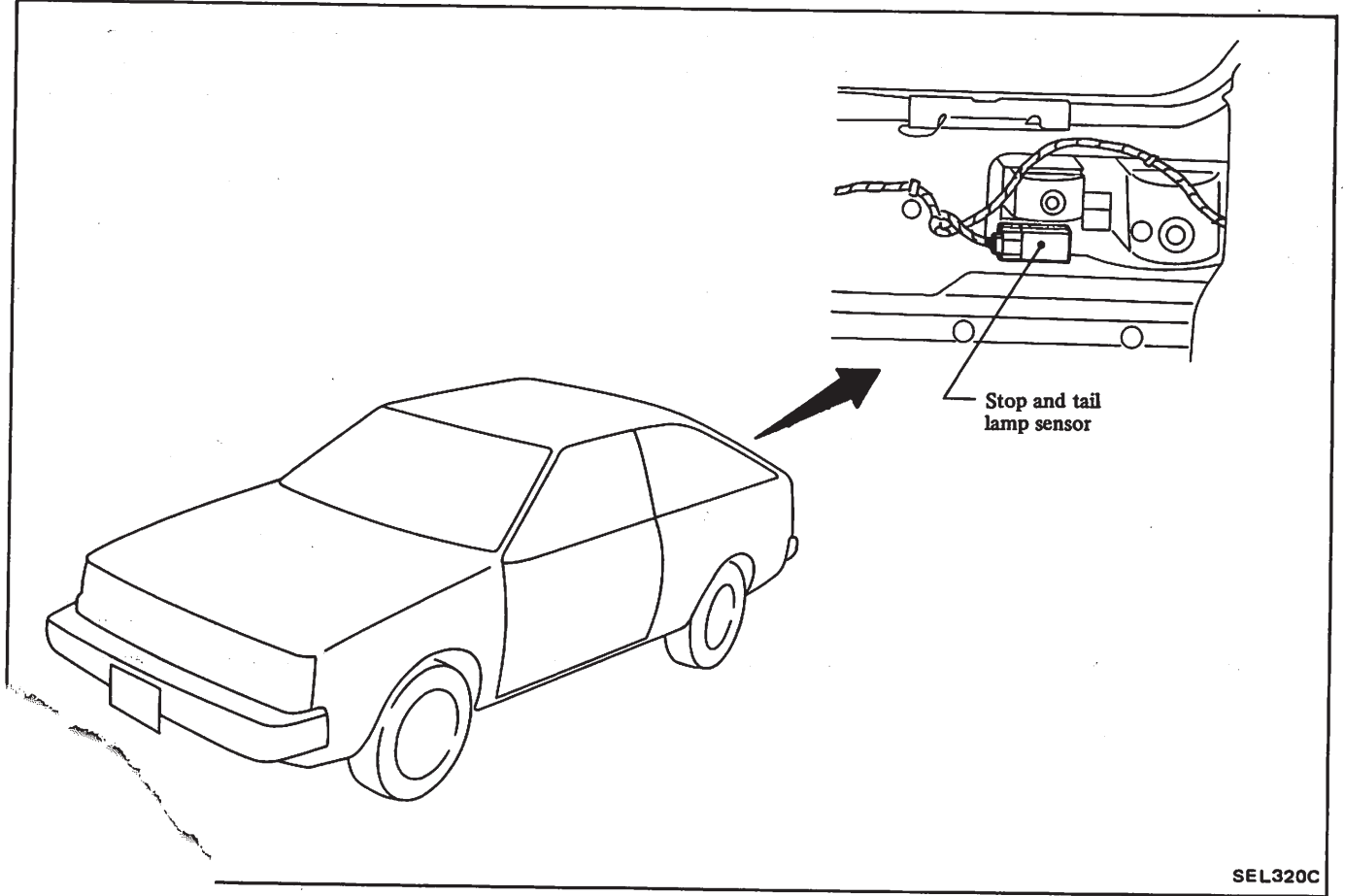
PASSENGER COMPARTMENT



SEL727C

LOCATION OF ELECTRICAL UNITS

LUGGAGE COMPARTMENT

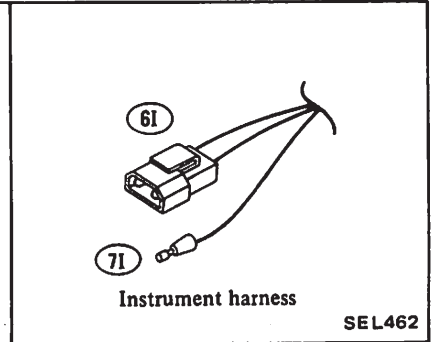
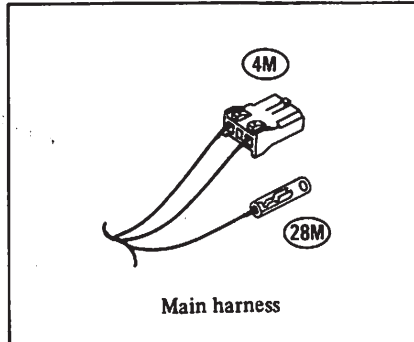
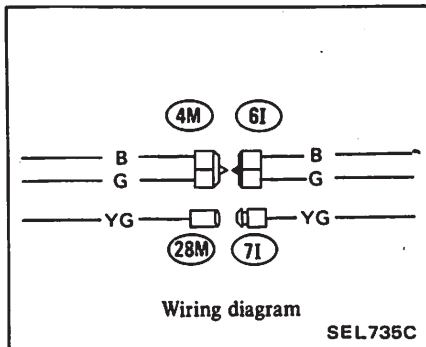


HARNESS LAYOUT

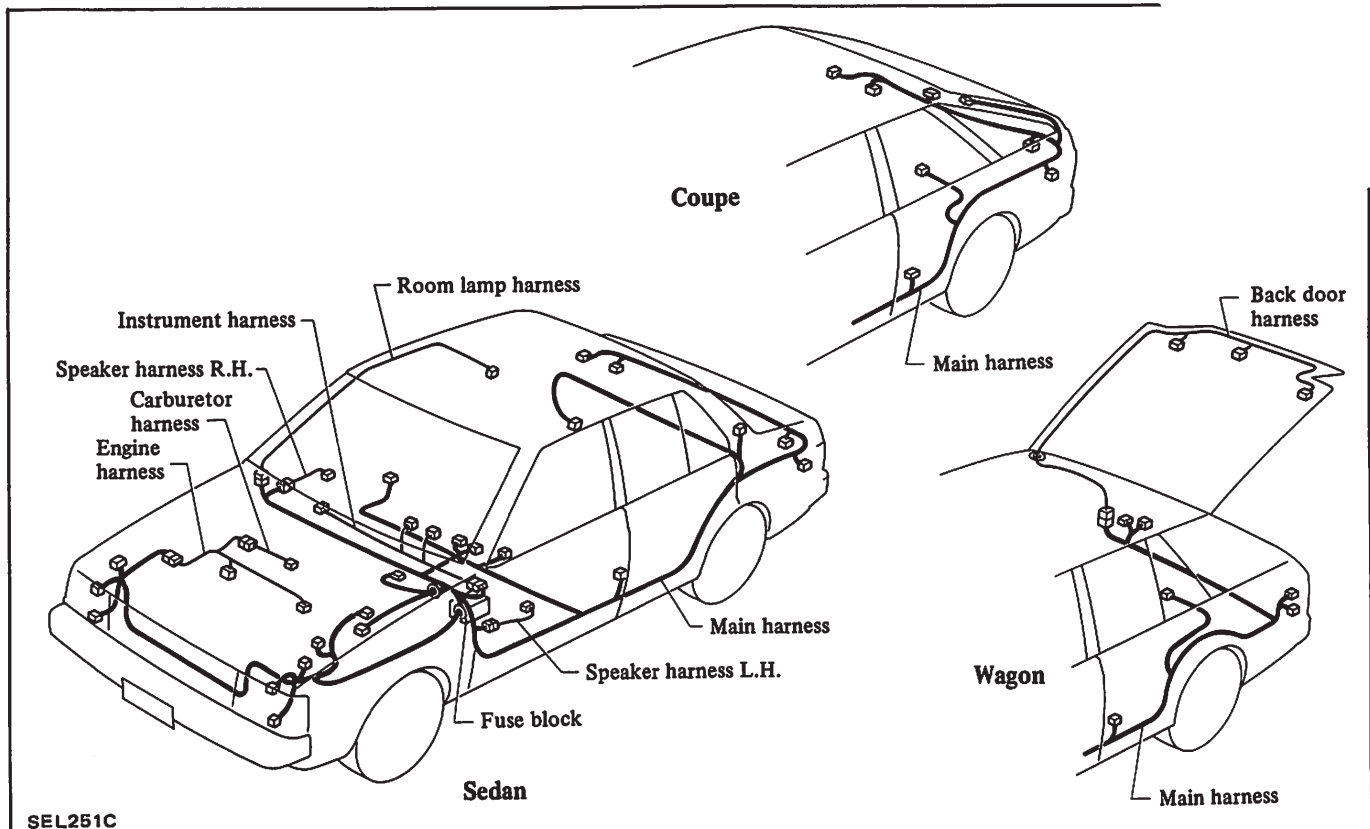
HARNESS LAYOUT

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

For easy identification, connectors indicated in the system wiring diagram have the same numbers as those used in the harness layout schematic.



DESCRIPTION

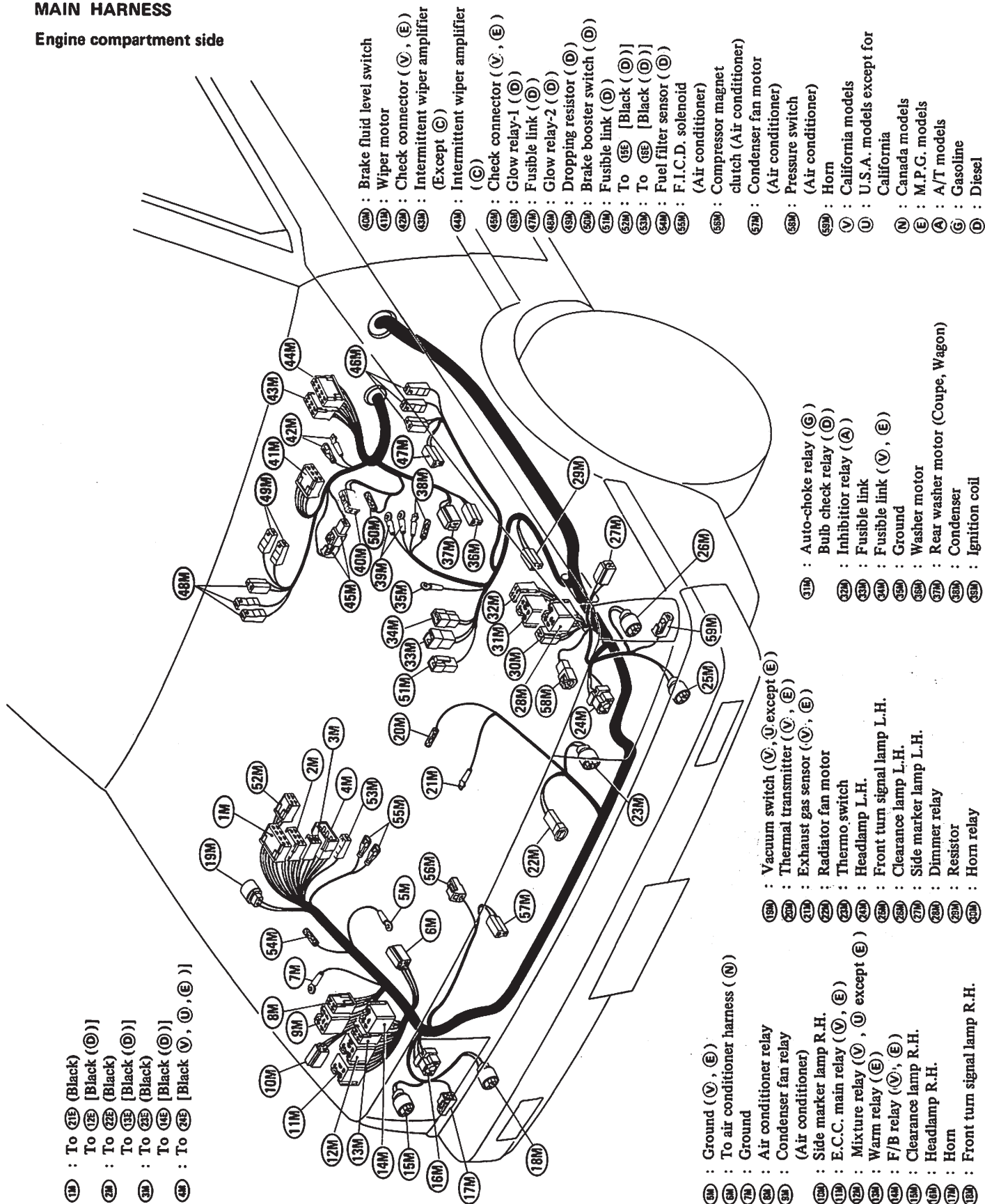


HARNESS LAYOUT

HARNESS DETAILS

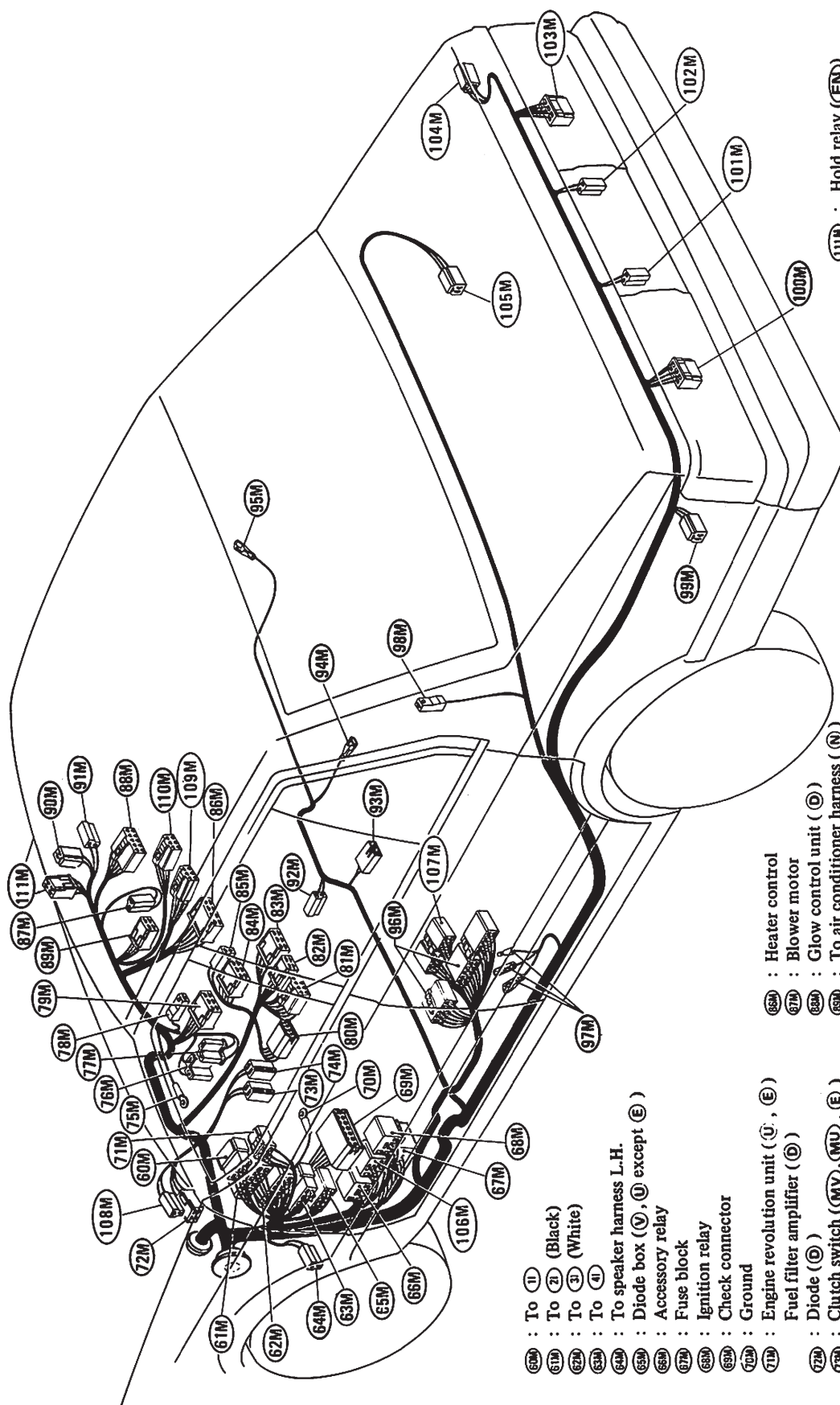
MAIN HARNESS

Engine compartment side



HARNESS LAYOUT

Passenger compartment side (Sedan)



- 60M : To 11
- 61M : To 21 (Black)
- 62M : To 31 (White)
- 63M : To 41
- 64M : To speaker harness L.H.
- 65M : Diode box (V, U except E)
- 66M : Accessory relay
- 67M : Fuse block
- 68M : Ignition relay
- 69M : Check connector
- 70M : Ground
- 71M : Engine revolution unit (U, E)
- 72M : Fuel filter amplifier (D)
- 73M : Diode (D)
- 74M : Clutch switch (MV, MU, E)
- 75M : Stop lamp switch
- 76M : Ground
- 77M : Hazard flasher unit
- 78M : Turn signal flasher unit
- 79M : F.I.C.D. (E)
- 80M : Resistor
- 81M : Hazard switch
- 82M : Combination switch (Light)
- 83M : Combination switch (Turn)
- 84M : Combination switch (Wiper)
- 85M : Ignition switch
- 86M : Steering lock switch

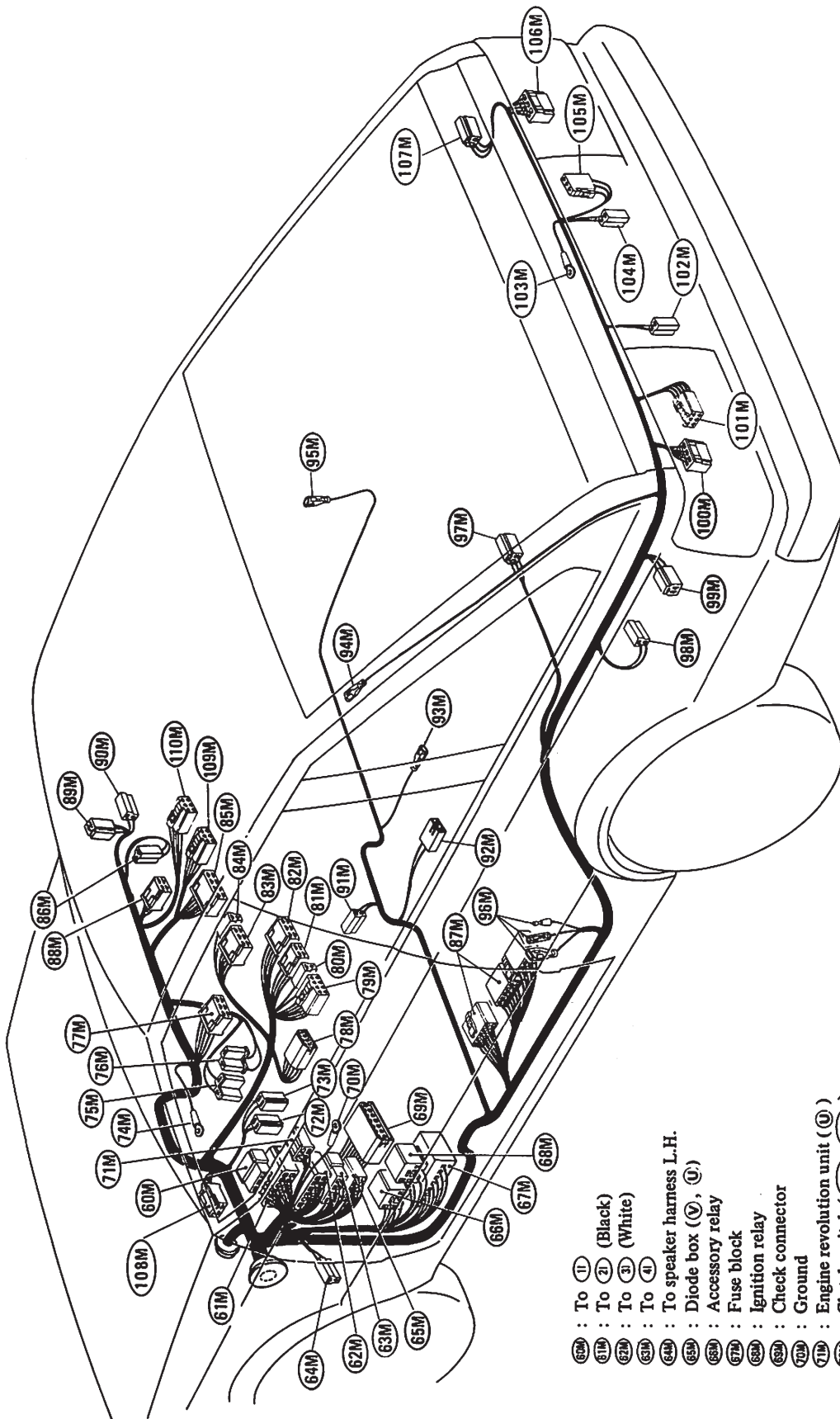
- 87M : Heater control
- 88M : Blower motor
- 89M : Glow control unit (D)
- 90M : To air conditioner harness (N)
- 91M : To room lamp harness
- 92M : To speaker harness R.H.
- 93M : A/T indicator lamp (A)
- 94M : Seat belt switch
- 95M : Parking brake switch
- 96M : Door switch R.H.
- 97M : E.C.C. control unit (V, E)
- 98M : Door switch L.H.
- 99M : Rear defogger
- 100M : Rear side marker lamp L.H.
- 101M : Rear combination lamp L.H.
- 102M : License plate lamp L.H.

- 103M : License plate lamp R.H.
- 104M : Rear combination lamp R.H.
- 105M : Rear side marker lamp R.H.
- 106M : Fuel tank gauge unit
- 107M : Engine revolution relay (E)
- 108M : Mixture relay (N except E)
- 109M : E.G.R. control unit (D)
- 110M : Diode (E, N, D)
- 111M : A/C switch
- 112M : Thermo control switch (Air conditioner)

- 113M : Hold relay (EN)
- V : California models
- U : U.S.A. models except for California
- N : Canada models
- E : M.P.G. models
- EN : M.P.G. models for Canada
- A : A/T models
- MV : M/T models for California
- MU : M/T models for U.S.A. except for California
- D : Diesel

HARNESS LAYOUT

Passenger compartment side (Coupe)

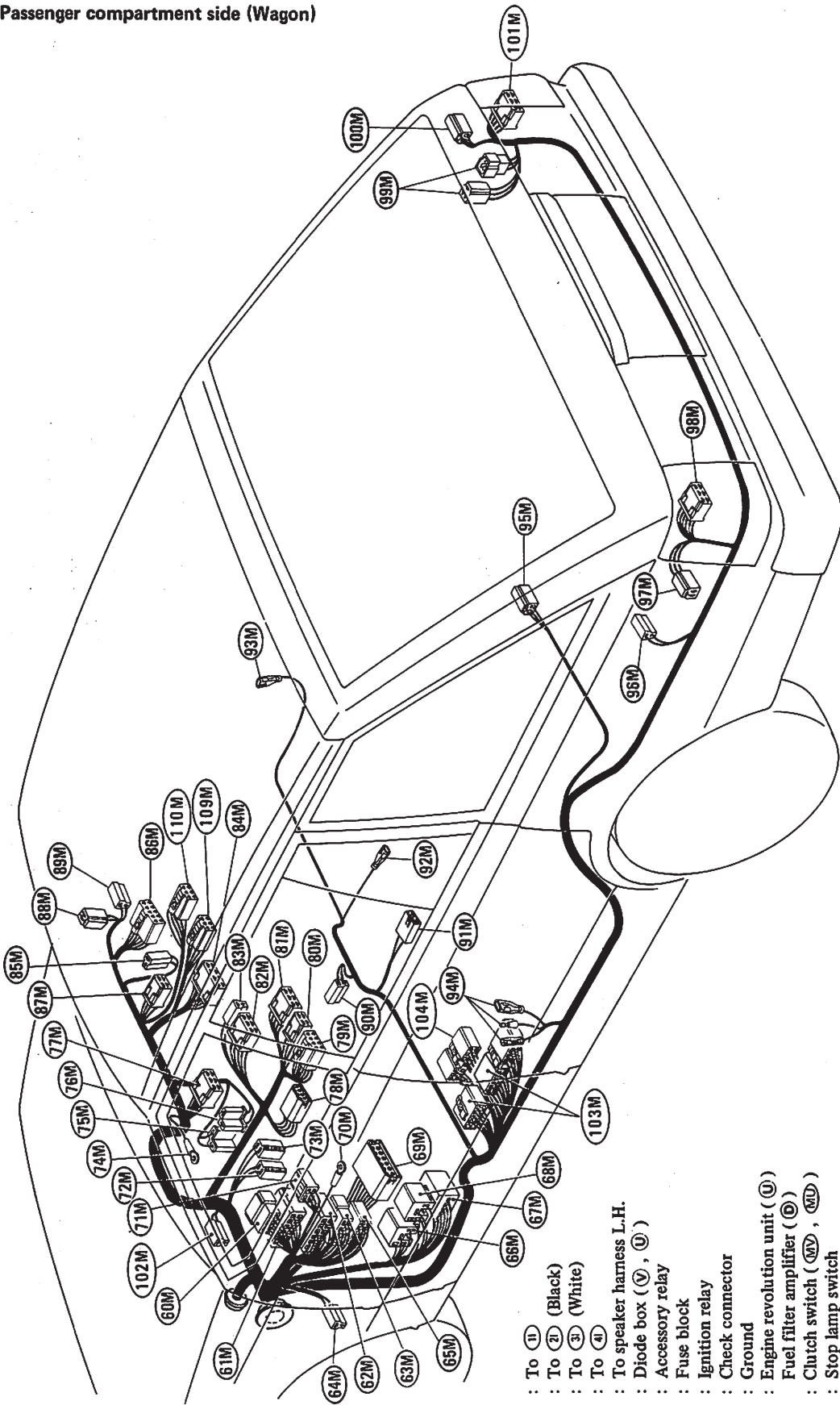


- 61M : To ① (Black)
- 62M : To ② (White)
- 63M : To ③ (Black)
- 64M : To ④ (White)
- 65M : To speaker harness L.H.
- 66M : Diode box (V, U)
- 67M : Accessory relay
- 68M : Fuse block
- 69M : Ignition relay
- 70M : Check connector
- 71M : Ground
- 72M : Engine revolution unit (U)
- 73M : Clutch switch (MV, MU)
- 74M : Stop lamp switch
- 75M : Ground
- 76M : Hazard flasher unit
- 77M : Turn signal flasher unit
- 78M : Resistor
- 79M : Hazard switch
- 80M : Combination switch (Light)
- 81M : Combination switch (Wiper)
- 82M : Combination switch (Turn)
- 83M : Combination switch (Wiper)
- 84M : Ignition switch
- 85M : Steering lock switch
- 86M : Heater control

- 87M : Blower motor
- 88M : E.C.C. control unit (V)
- 89M : To air conditioner harness (N)
- 90M : To room lamp harness
- 91M : To speaker harness R.H.
- 92M : A/T indicator lamp (A)
- 93M : Seat belt switch
- 94M : Parking brake switch
- 95M : Rear defogger
- 96M : Door switch R.H.
- 97M : Door switch L.H.
- 98M : Fuel tank gauge unit
- 99M : Luggage compartment lamp
- 100M : Rear side marker lamp L.H.
- 101M : Rear combination lamp L.H.
- 102M : Stop and tail lamp sensor
- 103M : License plate lamp L.H.
- 104M : Ground
- 105M : License lamp R.H.
- 106M : Back door switch
- 107M : Rear combination lamp R.H.
- 108M : Rear side marker lamp R.H.
- 109M : Diode (N)
- 110M : A/C switch
- 111M : Thermo control switch (Air conditioner)
- 112M : California models
- 113M : U.S.A. models except for California
- 114M : Canada models
- 115M : A/T models
- 116M : M/T models for California
- 117M : M/T models for U.S.A. except for California

HARNESS LAYOUT

Passenger compartment side (Wagon)

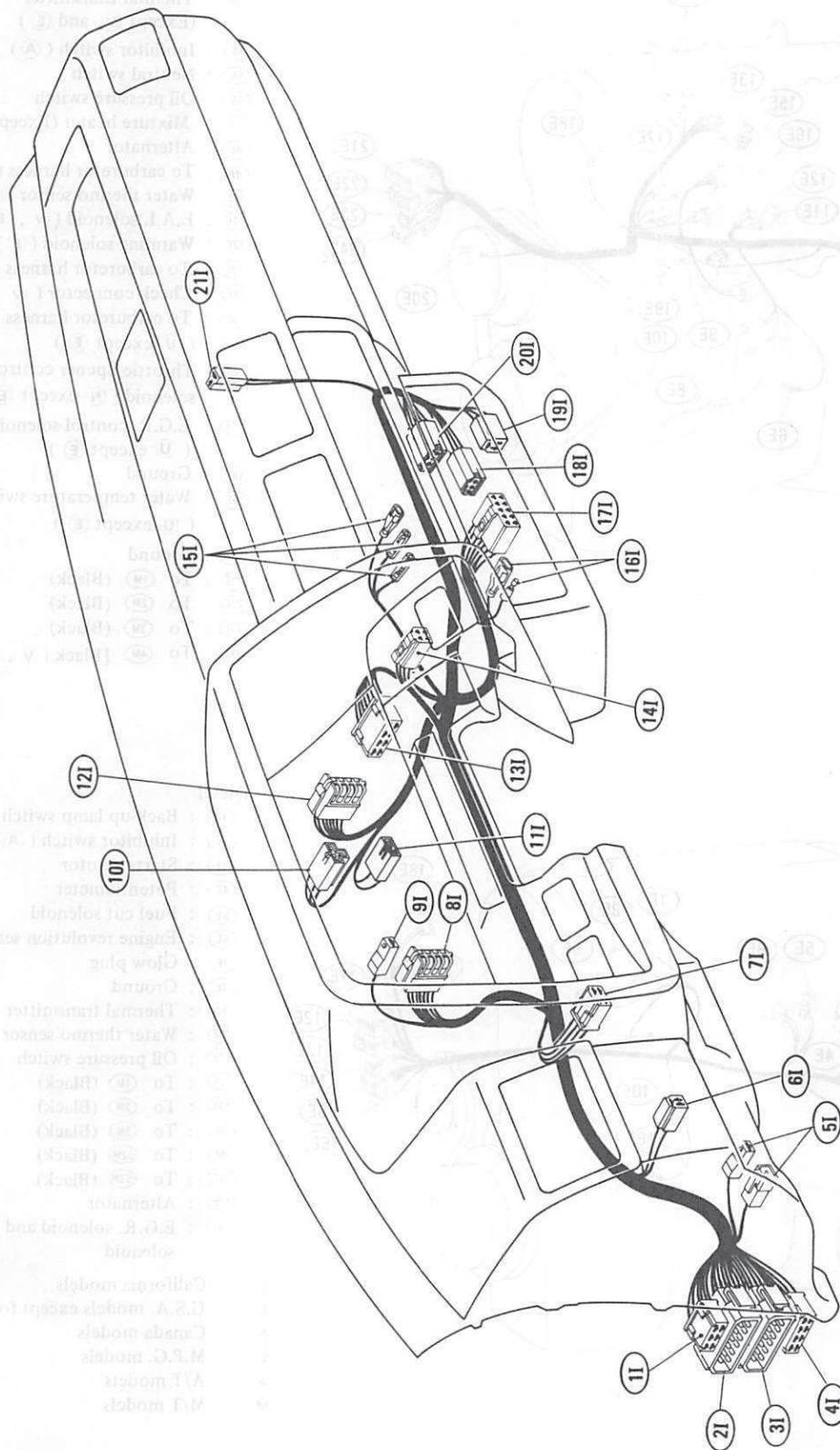


- 61M : To 11
- 62M : To 31 (Black)
- 63M : To 32 (White)
- 64M : To 41
- 65M : To speaker harness L.H.
- 66M : Diode box (V, U)
- 67M : Accessory relay
- 68M : Fuse block
- 69M : Ignition relay
- 70M : Check connector
- 71M : Ground
- 72M : Engine revolution unit (U)
- 73M : Fuel filter amplifier (U)
- 74M : Clutch switch (MV, MD)
- 75M : Stop lamp switch
- 76M : Ground
- 77M : Hazard flasher unit
- 78M : Turn signal flasher unit
- 79M : Resistor
- 80M : Hazard switch
- 81M : Combination switch (Light)
- 82M : Combination switch (Turn)
- 83M : Combination switch (Wiper)
- 84M : Ignition switch
- 85M : Steering lock switch
- 86M : Heater control
- 87M : Blower motor
- 88M : Glow control unit (U)
- 89M : To air conditioner harness (N)
- 90M : To room lamp harness
- 91M : To speaker harness R.H.
- 92M : A/T indicator lamp
- 93M : Seat belt switch
- 94M : Parking brake switch
- 95M : Door switch R.H.
- 96M : Door switch L.H.
- 97M : Fuel tank gauge unit
- 98M : Luggage compartment lamp (Except U)
- 99M : Rear side marker lamp L.H.
- 100M : Rear combination lamp L.H.
- 101M : To back door harness
- 102M : Rear side marker lamp R.H.
- 103M : Rear combination lamp R.H.
- 104M : Diode (N, U)
- 105M : E.C.C. control unit (V)
- 106M : E.G.R. control unit (U)
- 107M : A/C switch
- 108M : Thermo control switch (Air conditioner)
- 109M : California models
- 110M : U.S.A. models except for California
- 111M : Canada models
- 112M : M/T models for California
- 113M : M/T models for U.S.A. except for California
- 114M : Diesel

SEL731C

HARNESS LAYOUT

INSTRUMENT HARNESS



- (V) : California models
- (N) : Canada models
- (E) : M.P.G. models
- (CV) : Coupe for California
- (CU) : Coupe for U.S.A.
- (SU) : Sedan for U.S.A.
- (WU) : Wagon for U.S.A.

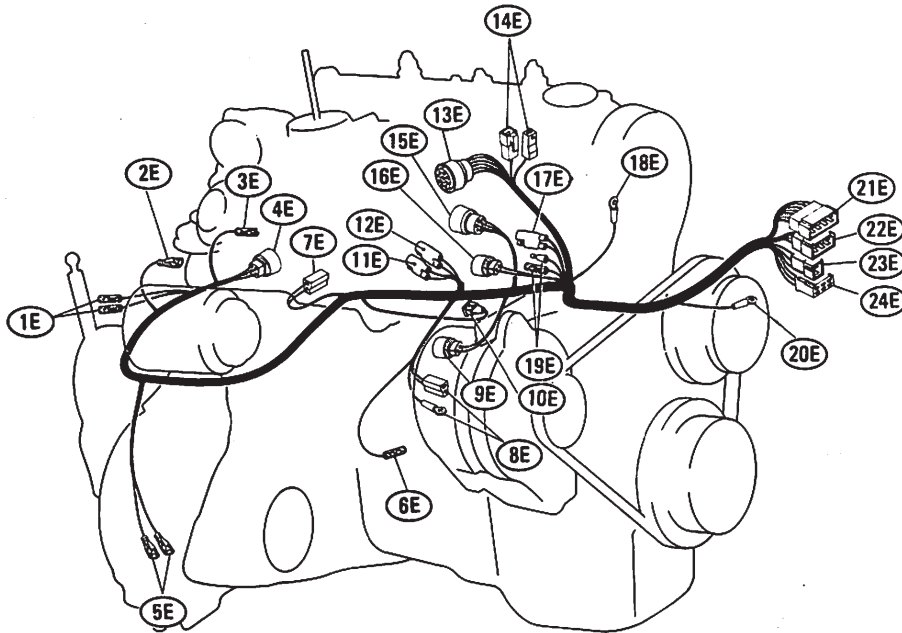
- (11) : 10 km/h switch amplifier (N)
- (21) : Combination meter
- (31) : Warning lamp (Except (SU) and (WU))
- (41) : Rear wiper and washer switch
- (51) : Cigarette lighter
- (61) : Stereo
- (71) : Radio
- (81) : Seat belt timer
- (91) : Warning chime
- (101) : Clock
- (111) : Front speaker

- (11) : To (60M) (Black)
- (21) : To (61M) (Black)
- (31) : To (62M) (White)
- (41) : To (63M)
- (51) : Check joint (V, E)
- (61) : Illumination control rheostat
- (71) : Rear defogger switch
- (81) : Combination meter
- (91) : 30,000 mile switch (V, E)
- (101) : Tachometer (CV, CU)

HARNESS LAYOUT

ENGINE HARNESS

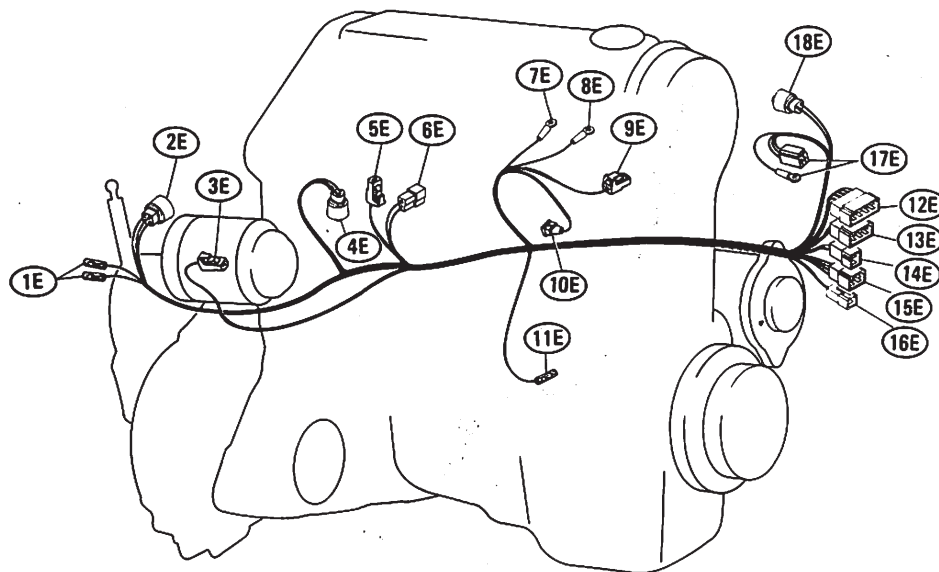
Gasoline engine



Gasoline

- ①E : Back-up lamp switch (M)
- ②E : Starter motor
- ③E : Thermal transmitter (Except V and E)
- ④E : Inhibitor switch (A)
- ⑤E : Neutral switch
- ⑥E : Oil pressure switch
- ⑦E : Mixture heater (Except E)
- ⑧E : Alternator
- ⑨E : To carburetor harness (N)
- ⑩E : Water thermo sensor (V , E)
- ⑪E : E.A.I. solenoid (V , E)
- ⑫E : Warming solenoid (E)
- ⑬E : To carburetor harness (V , E)
- ⑭E : Check connector (V , E)
- ⑮E : To carburetor harness (U except E)
- ⑯E : Throttle opener control solenoid (N except E)
- ⑰E : E.G.R. control solenoid (U except E)
- ⑱E : Ground
- ⑲E : Water temperature switch (U except E)
- ⑳E : Ground
- ㉑E : To 1M (Black)
- ㉒E : To 2M (Black)
- ㉓E : To 3M (Black)
- ㉔E : To 4M [Black (V , U , E)]

Diesel engine



Diesel

- ①E : Back-up lamp switch (M)
 - ②E : Inhibitor switch (A)
 - ③E : Starter motor
 - ④E : Potentiometer
 - ⑤E : Fuel cut solenoid
 - ⑥E : Engine revolution sensor
 - ⑦E : Glow plug
 - ⑧E : Ground
 - ⑨E : Thermal transmitter
 - ⑩E : Water thermo sensor
 - ⑪E : Oil pressure switch
 - ⑫E : To 1M (Black)
 - ⑬E : To 2M (Black)
 - ⑭E : To 3M (Black)
 - ⑮E : To 52M (Black)
 - ⑯E : To 53M (Black)
 - ⑰E : Alternator
 - ⑱E : E.G.R. solenoid and throttle solenoid
- V : California models
 U : U.S.A. models except for California
 N : Canada models
 E : M.P.G. models
 A : A/T models
 M : M/T models

HARNESS DIAGRAM

HARNESS DIAGRAM

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

HOW TO READ HARNESS DIAGRAMS

WIRE NUMBER:

For identification, all wires are numbered and generally, numbers are classified by system.

- 100 ~ 199 Engine electrical system
- 200 ~ 299 Headlamp system
- 300 ~ 399 Meter, gauges and Warning system
- 400 ~ 499 Signal system
- 500 ~ 599 Accessory system
- 600 ~ 899 Supplemental numbers
- 900 ~ 999 Ground wire (Earth)

COLOR:

- W White
- B Black
- R Red
- Y Yellow
- G Green
- L Blue
- BR Brown
- LG Light green
- OR Orange
- P Pink
- PU Purple
- GY Gray
- SB Sky blue

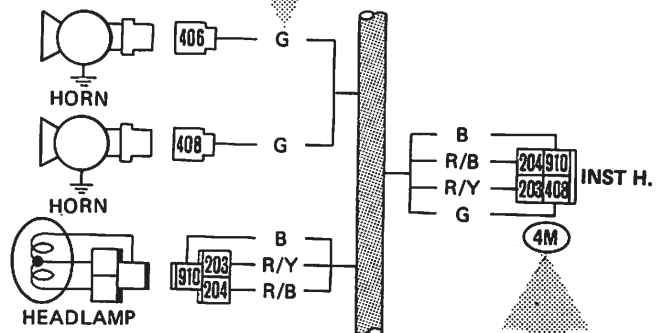
In the case of two-tone color wires, the wire colors are indicated as follows.

- B/R Black with Red stripe
- L/OR Blue with Orange stripe

Indicates that No. 406 wire is found only in harness of GL models.

NISSAN MAIN HARNESS

NO.	FROM	TO	REMARKS
203	HEADLAMP	INST H	GL
204	HEADLAMP	INST H	
406	HORN	408	
408	HORN	INST H	
910	HEADLAMP	INST H	

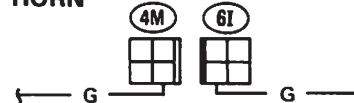


Indicates that No. 406 wire stems from the horn and is connected to No. 408 wire.

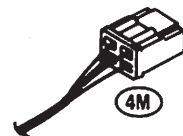


For easy identification, connectors indicated in the harness diagrams have the same code numbers as those used in the harness layout and system wiring diagram.

HORN



System wiring diagram



Harness layout

This harness diagram indicates harnesses and connectors to be used with all optional, as well as standard, equipment.

INCH TO METRIC CONVERSION TABLE

(Rounded-off for automotive use)

inches	mm	inches	mm
.100	2.54	.610	15.49
.110	2.79	.620	15.75
.120	3.05	.630	16.00
.130	3.30	.640	16.26
.140	3.56	.650	16.51
.150	3.81	.660	16.76
.160	4.06	.670	17.02
.170	4.32	.680	17.27
.180	4.57	.690	17.53
.190	4.83	.700	17.78
.200	5.08	.710	18.03
.210	5.33	.720	18.29
.220	5.59	.730	18.54
.230	5.84	.740	18.80
.240	6.10	.750	19.05
.250	6.35	.760	19.30
.260	6.60	.770	19.56
.270	6.86	.780	19.81
.280	7.11	.790	20.07
.290	7.37	.800	20.32
.300	7.62	.810	20.57
.310	7.87	.820	20.83
.320	8.13	.830	21.08
.330	8.38	.840	21.34
.340	8.64	.850	21.59
.350	8.89	.860	21.84
.360	9.14	.870	22.10
.370	9.40	.880	22.35
.380	9.65	.890	22.61
.390	9.91	.900	22.86
.400	10.16	.910	23.11
.410	10.41	.920	23.37
.420	10.67	.930	23.62
.430	10.92	.940	23.88
.440	11.18	.950	24.11
.450	11.43	.960	24.38
.460	11.68	.970	24.64
.470	11.94	.980	24.89
.480	12.19	.990	25.15
.490	12.45	1.000	25.40
.500	12.70	2.000	50.80
.510	12.95	3.000	76.20
.520	13.21	4.000	101.60
.530	13.46	5.000	127.00
.540	13.72	6.000	152.40
.550	13.97	7.000	177.80
.560	14.22	8.000	203.20
.570	14.48	9.000	228.60
.580	14.73	10.000	254.00
.590	14.99	20.000	508.00
.600	15.24		

METRIC TO INCH CONVERSION TABLE

(Rounded-off for automotive use)

mm	inches	mm	inches
1	.0394	51	2.008
2	.079	52	2.047
3	.118	53	2.087
4	.157	54	2.126
5	.197	55	2.165
6	.236	56	2.205
7	.276	57	2.244
8	.315	58	2.283
9	.354	59	2.323
10	.394	60	2.362
11	.433	61	2.402
12	.472	62	2.441
13	.512	63	2.480
14	.551	64	2.520
15	.591	65	2.559
16	.630	66	2.598
17	.669	67	2.638
18	.709	68	2.677
19	.748	69	2.717
20	.787	70	2.756
21	.827	71	2.795
22	.866	72	2.835
23	.906	73	2.874
24	.945	74	2.913
25	.984	75	2.953
26	1.024	76	2.992
27	1.063	77	3.031
28	1.102	78	3.071
29	1.142	79	3.110
30	1.181	80	3.150
31	1.220	81	3.189
32	1.260	82	3.228
33	1.299	83	3.268
34	1.339	84	3.307
35	1.378	85	3.346
36	1.417	86	3.386
37	1.457	87	3.425
38	1.496	88	3.465
39	1.535	89	3.504
40	1.575	90	3.543
41	1.614	91	3.583
42	1.654	92	3.622
43	1.693	93	3.661
44	1.732	94	3.701
45	1.772	95	3.740
46	1.811	96	3.780
47	1.850	97	3.819
48	1.890	98	3.858
49	1.929	99	3.898
50	1.969	100	3.937

QUICK REFERENCE CHART : SENTRA 1983

ENGINE TUNE-UP DATA E15 & E16

		U.S.A.		CANADA		
		Except M.P.G.		M.P.G.	Except M.P.G.	
		Manual Transmission	Automatic Transmission	Manual Transmission	M/T	A/T
Engine model		E16		E15	E16	
Firing order		1-3-4-2				
Ignition timing/Idle speed (A-T.D.C. degree/rpm)		5±2°/750±50*1	5±2°/650±50*1 (in "D" position)	2±2°/700±50*1	5±2°/750±50*1	5±2°/650±50*1 (in "D" position)
"CO" % at idle speed		Idle mixture screw is preset and sealed at factory			2±1	2±1 (in "D" position)
Valve clearance (Hot) mm (in)	Intake	0.28 (0.011)				
	Exhaust	0.28 (0.011)				
Drive belt deflection (Cold)		Used*2			New*3	
Alternator	mm (in)	13 - 17 (0.51 - 0.67)			10 - 14 (0.39 - 0.55)	
Air conditioner	mm (in)	9 - 11 (0.35 - 0.43)			7 - 9 (0.28 - 0.35)	
Power steering	mm (in)	7 - 9 (0.28 - 0.35)			6.5 - 8.5 (0.256 - 0.335)	
Pushing force N (kg, lb)		98 (10, 22)				
Engine compression pressure kPa (kg/cm ² , psi)/rpm Standard		1,245 (12.7, 181)/350				
Minimum		981 (10.0, 142)/350				
Spark plug	Type	BPR5ES-11			BPR5ES	
	Gap mm (in)	1.0 - 1.1 (0.039 - 0.043)			0.8 - 0.9 (0.031 - 0.035)	
Tightening torque		N-m		kg-m	ft-lb	
Valve rocker adjusting nut		16 - 21		1.6 - 2.1	12 - 15	
Oil pan drain plug		35 - 47		3.6 - 4.8	26 - 35	
Spark plug		20 - 29		2.0 - 3.0	14 - 22	

*1: Measure with distributor vacuum hose disconnected and vacuum hose plugged up.

*2: Adjust deflection of used belt

*3: Set deflection of new belt

ENGINE TUNE-UP DATA CD17

Engine model		CD17		
Firing order		1-3-4-2		
Idle speed rpm		M/T	750 ⁺¹⁰⁰ ₋₅₀	
		A/T	750 ⁺¹⁰⁰ ₋₅₀ (in "D" position)	
Plunger lift mm (in)	For low altitudes	M/T	0.94±0.03 (0.0370±0.0012)	
		A/T	0.88±0.03 (0.0346±0.0012)	
	For high altitudes	M/T	1.00±0.03 (0.0394±0.0012)	
		A/T	0.94±0.03 (0.0370±0.0012)	
Valve clearances (Hot) mm (in)		Intake	0.20 - 0.30 (0.008 - 0.012)	
		Exhaust	0.40 - 0.50 (0.016 - 0.020)	
Drive belt deflection (Cold)		Adjust deflection of used belt		Set deflection of new belt
Fan, Alternator mm (in)		9 - 11 (0.35 - 0.43)		11 - 12 (0.43 - 0.47)
Air conditioner compressor mm (in)		11 - 13 (0.43 - 0.51)		12 - 14 (0.47 - 0.55)
Applied pressed force N (kg, lb)		98 (10, 22)		
Radiator cap relief pressure kPa (kg/cm ² , psi)		88 (0.9, 13)		
Cooling system leakage testing pressure kPa (kg/cm ² , psi)		157 (1.6, 23)		
Compression pressure kPa (kg/cm ² , psi)/rpm		Standard	3,138 (32, 455)/200	
		Minimum	1,961 (20, 284)/200	
Tightening torque		N-m	kg-m	ft-lb
Cylinder head		99 - 108	10 - 11	72 - 80
Manifold bolt and nut		18 - 22	1.8 - 2.2	13 - 16

BRAKE

Unit: mm (in)

Disc brake	
Pad minimum thickness	2.0 (0.079)
Rotor repair limit	Less than 0.07 (0.0028)
Run out	
Parallelism	Less than 0.03 (0.0012)
circumferential direction	
Minimum thickness	10.0 (0.394)*1 16.0 (0.630)*2
Drum brake	
Lining minimum thickness	1.5 (0.059)
Drum repair limit	
Maximum inner diameter	181 (7.13)*1 204.5 (8.05)*2
Radial runout	Less than 0.05 (0.0020)
Out-of-roundness	Less than 0.03 (0.0012)
Taper	Less than 0.04 (0.0016)

*1: Gasoline model

*2: Diesel model

CLUTCH PEDAL

Unit: mm (in)

Height	194 - 204 (7.64 - 8.03)
Free travel	11 - 21 (0.43 - 0.83)

WHEEL ALIGNMENT (Unladen)*

Camber	degree	-35' - 1°05'		
Caster	degree	45' - 2°15'		
Toe-in	mm (in)	3 - 5 (0.12 - 0.20)		
	degree	9' - 15' (On both sides)		
Turning angle	degree	E15 & E16	CD17 M/T	CD17 A/T
Toe-out-turns (Inside/Outside)		20°/17°30'		
Inside		40° - 44°	37° - 41°	33° - 37°
Outside		31° - 35°	29° - 33°	27° - 31°

*: Tankful of fuel, radiator coolant and engine oil full. Spare tire, jack, band tools, mats in designed position.

REAR WHEEL BEARING

Tightening torque	N-m (kg-m, ft-lb)	39 - 44 (4.0 - 4.5, 29 - 33)
Return angle	degree	90°

WHEEL AND TIRE

Tire size	155SR13	175/70SR13	P155/80D13
Inflation pressure*1 psi (kPa)	28 (200)*2, 26 (180)	26 (180)	35 (240)
Wheel nut tightening torque N-m (kg-m, ft-lb)	78 - 98 (8 - 10, 58 - 72)		

*1: Tire pressure should be checked when tires are COLD.

*2: Only front wheels of E15 and CD17 equipped model.

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