

LIGHTS, SWITCHES & BATTERY SYSTEMS

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LIGHTS, SWITCHES & BATTERY SYSTEMS

BATTERY

GENERAL INFORMATION

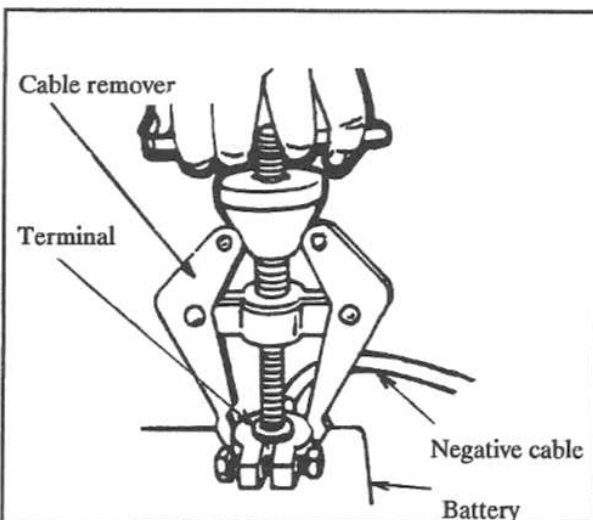
Battery acid is highly corrosive which may on contact, cause personal injury or damage paint surfaces. Any spillage must be immediately diluted and flushed away with clean water.

The battery electrolyte should be maintained at recommended level by topping up with distilled water.

Clean the battery terminal and the inside of the cable terminal using a suitable tool.

PERIODIC MAINTENANCE

1. Protect paint finish using suitable covers.
2. Disconnect battery cables at battery (negative first).



3. Remove battery hold down clamp and remove battery from vehicle.

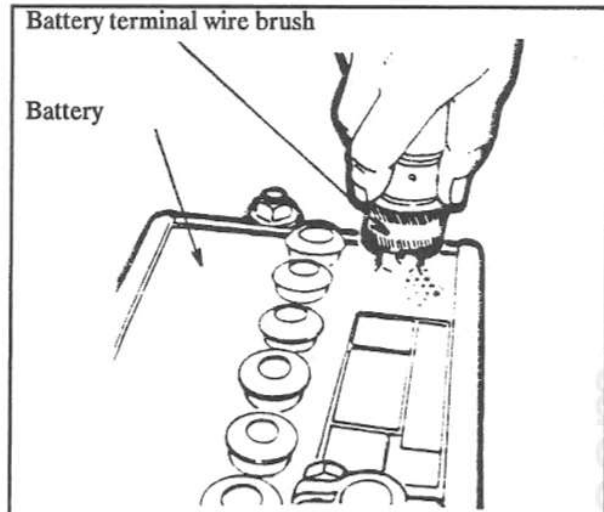
4. Inspect battery carrier for acid damage. If necessary remove corrosion by using a solution of bicarbonate of soda in warm water and scrubbing area with a stiff brush, taking care to avoid spreading corrosion residue, and flush area with clean water. Damaged areas should be repainted to avoid further corrosion.

5. Clean battery cover by same method.

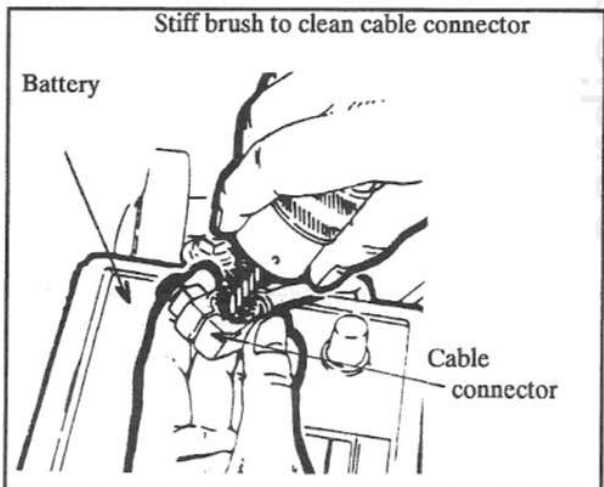
* Do not allow any cleaning solution or water to enter battery cells as this will dilute electrolyte.

6. Check battery cables for damage and fraying and replace if necessary.

7. Clean battery terminals. If necessary remove corrosion



by using a solution of bicarbonate of soda in warm water and scrubbing area with a stiff brush, taking care to avoid



spreading corrosion residue, and flush area with clean water.

8. Check battery case, cover and vents for damage.

9. Install battery and hold down clamp. Do not over-tighten hold down clamp as this could crack case.

10. Connect battery cables and tighten to specifications.

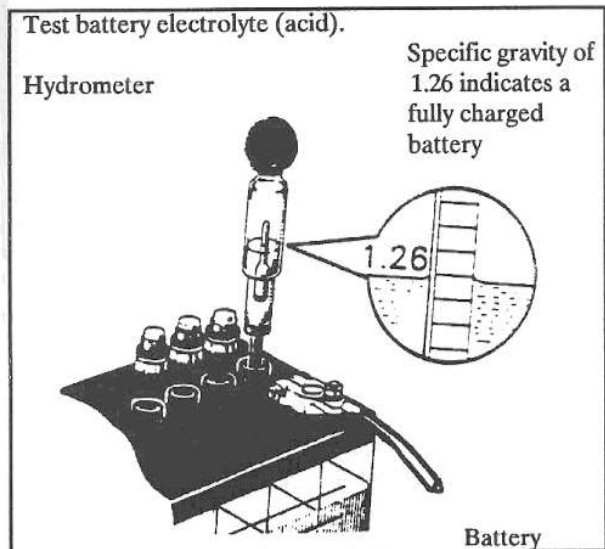
Tighten Battery Terminal: 6-8Nm

* Ensure battery polarity is not reversed.

11. Coat terminals with light mineral grease to avoid corrosion.

TESTING BATTERY ELECTROLYTE (ACID)

A hydrometer should be used to determine the specific gravity of battery electrolyte. The reading obtained indicates amount of unused sulphuric acid remaining in electrolyte and state of charge of battery.



The reading obtained will vary in relation to the temperature of the electrolyte. As the temperature rises the density of the electrolyte decreases and the specific gravity falls. As the temperature falls the density increases and the specific gravity rises.

USING THE HYDROMETER

1. Liquid level of battery cell should be at normal height and electrolyte should be thoroughly mixed with any battery water which may have just been added by charging battery before taking hydrometer readings.
2. Draw electrolyte in and out of hydrometer barrel several times to bring temperature of hydrometer float to that of the acid in the cell.
3. Draw sufficient electrolyte into hydrometer barrel with the pressure bulb fully expanded to lift float so that it does not touch the sides, bottom or top of barrel.
4. Read the hydrometer with the hydrometer in a vertical position.

TEST RESULT INDICATIONS

Electrolyte specific gravity	Battery Charge Level.
1.240 to 1.260	100%
1.210 to 1.240	75%
1.180 to 1.210	50%
Below 1.130	Completely discharged.

A battery should be charged if the specific gravity is less than 1.210.

If there is more than 0.25 specific gravity variation between cells then a fault is most likely with the battery itself.

If battery charge is low and battery is serviceable, check alternator operation and all electrical connections.

BATTERY CHARGING

WARNING: When batteries are being charged explosive gas mixture forms beneath the cover of each cell.

* Do not smoke near batteries on charge or which have recently been charged.

* Do not break live circuit at terminals of batteries on charge. A spark will occur where the live circuit is broken. Keep all open flames away from battery.

NB: Fast charging will provide sufficient charge after one hour to enable the battery and alternator to carry electrical load however, whenever possible, slow charging is preferable.

FAST CHARGING

Fast charging a battery in the vehicle is not recommended, however if this procedure is used it is most important that the battery is disconnected.

NB: A battery will be irretrievably damaged if following precautions are not taken.

1. Battery electrolyte temperature must NEVER exceed 45°C.

If this temperature is reached, battery should be cooled by reducing charging rate or remove battery from circuit.

2. As batteries approach full charge electrolyte in each cell will begin to gas or bubble. Excessive gassing must not be allowed.

3. Do not fast charge longer than one hour. If battery does not show a significant change in specific gravity after one hour of "FAST" charge, the slow charge method should be used.

SLOW CHARGING

Many discharged batteries can be brought back to good condition by slow charging; especially batteries that are sulphated. Battery should be tested with a hydrometer and a record kept of the readings taken at regular intervals throughout the charge. When a cell has a specific gravity reading that is 0.25 or more below other cells, that cell is faulty and battery should be replaced.

Safe slow charging rates can be calculated by allowing one ampere per positive plate per cell i.e. 4 amperes for a 9 plate battery and 5 amperes for an 11 plate battery.

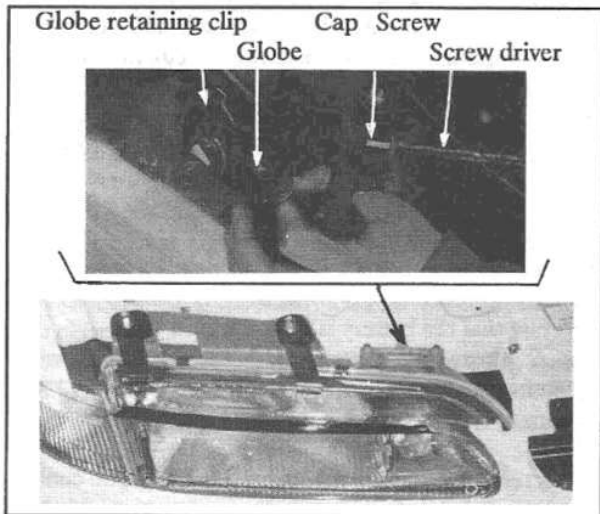
The average time required to charge a battery by the slow charge method at normal rates is from 12 to 16 hours, however, when a battery continues to show an increase in specific gravity, battery charge should be continued even if it takes 24 hours or more. Watch the temperature of batteries carefully and if temperature of any one of them reaches 43°C, lower the charging rate.

Battery will be fully charged when it is gassing freely and when there is no further rise in specific gravity after three successive readings taken at hourly intervals. Make sure hydrometer readings are corrected for temperature.

Many batteries can be brought back to a useful condition by slow charging at half the normal charging rate from 60 to 100 hours. This long charging cycle is necessary to reconvert crystalline lead sulphate in to active materials.

LIGHTS

HEADLIGHT GLOBE REPLACEMENT



CAUTION: Never touch bulb with bare hands while they are illuminated, or immediately after turning them off. Never hold halogen bulb with bare hands, dirty gloves, etc., or premature bulb failure will occur. If the glass surface is dirty, be sure to clean it with alcohol, and install after air drying thoroughly.

Hi/Low Beam Remove

1. Twist back cover anti-clockwise to unlock and remove cover.

2. Unclip globe retaining wire clip.

3. Remove globe.

Hi/Low Beam Install

1. Check that the specified globes are used to replace the old globe.

Headlight Globe Hi/Low Specification: 60/55W

2. Install back cover, twist cover clockwise to lock on. Check the cover is correctly installed to prevent water entry.

3. Check headlight pattern after globe replacement.

Hi Beam Remove

1. Use a phillips screw driver, remove 2 screws attaching the low beam globe unit cover from the top of the headlight assembly

2. Fold back the spring clip.

3. Remove the globe, pull out.

Hi Beam Install

1. Install new globe push-in fit.

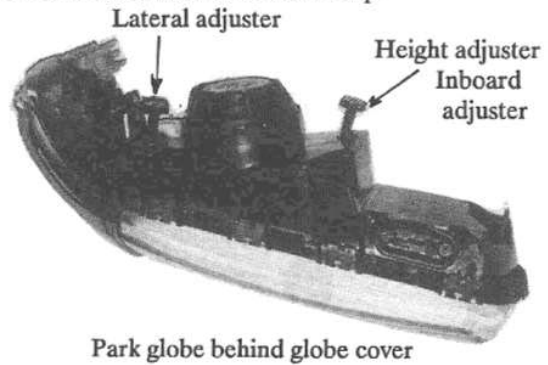
2. Place globe and socket back into position, place spring clip over socket.

3. Replace cover, tighten 2 phillips screws.

ADJUST HEADLIGHT PATTERN

Always adjust headlight pattern according to the state laws and regulations.

View on back of Left hand Headlamp.



Before adjusting headlight take note of the following procedure:

1. Ensure tyres are inflated correctly.
2. Clean headlight lenses.
3. Check the vehicle is positioned on a level floor.
4. Bounce vehicle to ensure vehicle is at normal height.
4. Place sufficient weight in vehicle to simulate full load conditions (1 litre of fuel = 0.72 kg).

ADJUSTMENT

Adjusting screws are located at rear of headlight assembly in engine compartment under bonnet.

Adjust as follows:

OUTER LIGHT

Adjust vertically and horizontally by turning screw.

INNER LIGHT

Adjust vertically and horizontally by turning screw.

USING A WALL

1. Manufacture an aiming target on a light colored wall as shown on next page.

2. With vehicle up against wall, align vehicle centre line with centre line of screen.

3. With vehicle up against wall, mark head light height and centre of light lense on wall.

4. Place vehicle 3.5 meters in front of screen ensuring the vehicle is aligned with vehicle centre line mark on screen.

5. Switch headlights onto low beam and aim outer lights.

a. To adjust the height of the light beam turn the inside adjuster knob.

b. To adjust the light beam laterallyvcturn the inside adjuster knob.

6. Switch headlights onto high beam, mask outer lights and aim inner lights.

a. To adjust the height of the light beam turn the inside adjuster knob.

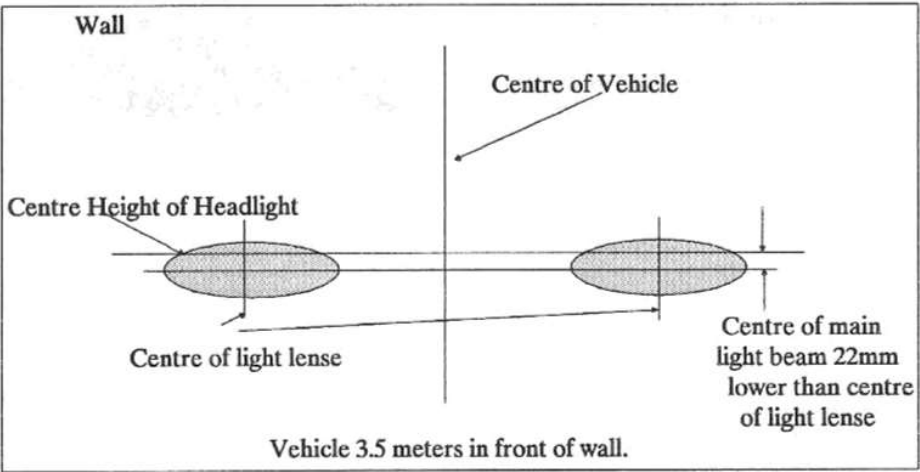
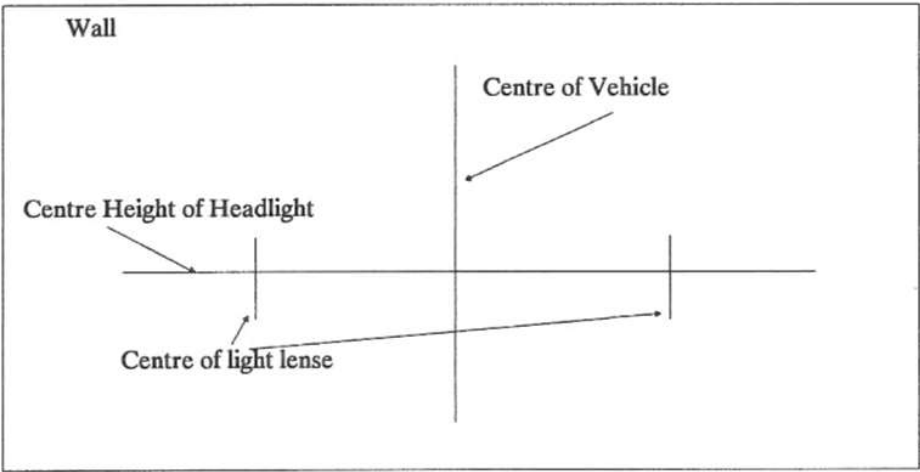
b. To adjust the light beam laterallyvcturn the inside adjuster knob.

PARK LIGHT GLOBE

Replace

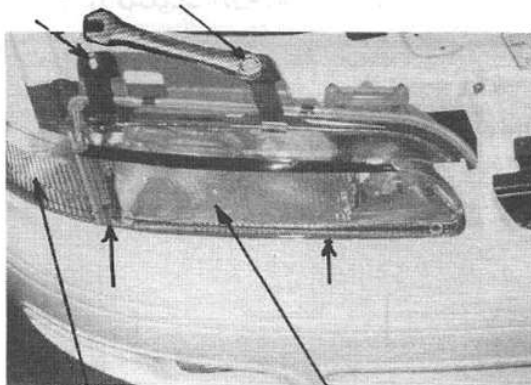
1. Twist back cover of headlight assembly anti-clockwise to unlock and remove.

WALL HEADLIGHT AIMING CHART



Head Light Assembly

Two bolts as seen and two screws below light assembly attach light.



Parking Light

Head Light

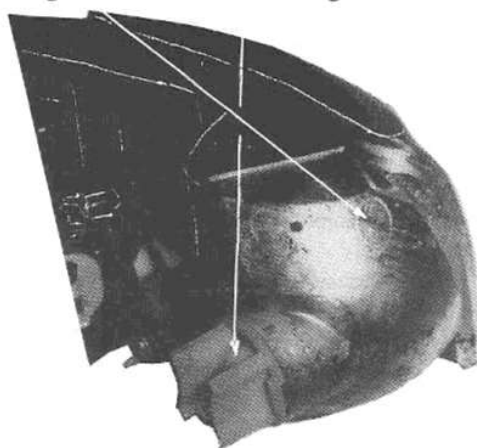
HEADLIGHT ASSEMBLY**Remove**

1. Lift bonnet to gain access to the back of the light assembly.
2. Push in connector locking tab on the underside of the wiring loom connector, pull connector apart. Pull the turning connector back to remove wiring loom.
3. Remove two screws at base of light assembly.
4. Remove the two bolts from the top of the headlight assembly.
5. Gently remove the light from the body of the car.

Install

1. Install the headlight assembly into the body of the vehicle.
2. Replace the nuts onto the light assembly.
3. Install the two bolts at the top of the light.
4. Connect both the headlight and turning indicator wiring loom.
5. Check operation of all the lights.
6. Check headlamp aim.

Turning Indicator Indicator globe

**FRONT TURNING INDICATOR LIGHT ASSEMBLY****Remove**

1. Lift bonnet to gain access to the back of the light assembly.
2. Remove the headlight assembly as described above.
3. Remove the screw attaching the turning light to the headlight assembly, slide lights apart.
4. Remove the turning indicator light from the headlight assembly.

Install

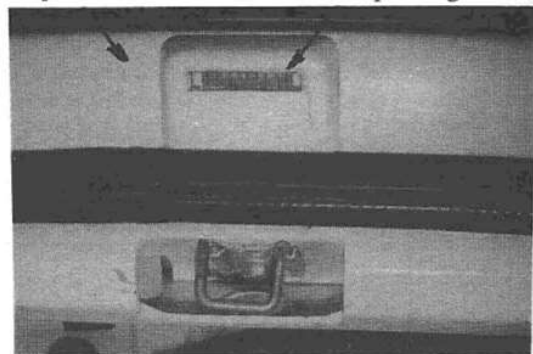
1. Install the turning indicator light to the headlight assembly and fit lugs together & install the attaching screw.
2. Install the headlight assembly as described above.
4. Test operation of all lights and close bonnet.

LICENCE PLATE LIGHT - Sedan

Use a small screw driver or blade and lever the light from the bumper moulding.

Bumper

Licence plate light

**Remove**

1. Use a small screw driver or blade and lever the light from the bumper moulding.
2. Disconnect the light wiring loom at the connector inside the boot.
3. Remove globe from the light if necessary.

Install

1. Install light into bumper by pushing the assembly into the bumper moulding.
2. Connect the wiring loom inside the boot.
3. Inspect operation of the light.

LICENCE PLATE LIGHT - STATION WAGON**Replacement of Globes**

1. Remove the phillip head screws from either end of the light glass lenses.
2. Install new globes of the same wattage if required.
3. Replace the lenses, install the phillip head screws.

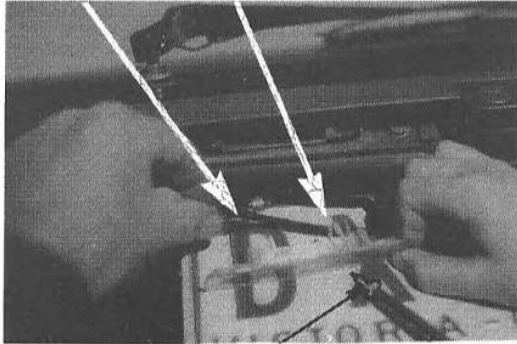
Remove

1. Open the tailgate and prize the inside trim from the tailgate.
2. Remove the nuts from the licence plate light.

Licence plate light

Two lights, one either side of tail gate key lock

Globe Globe cover



3. Disconnect the wiring loom connectors and remove the light assembly.

Install

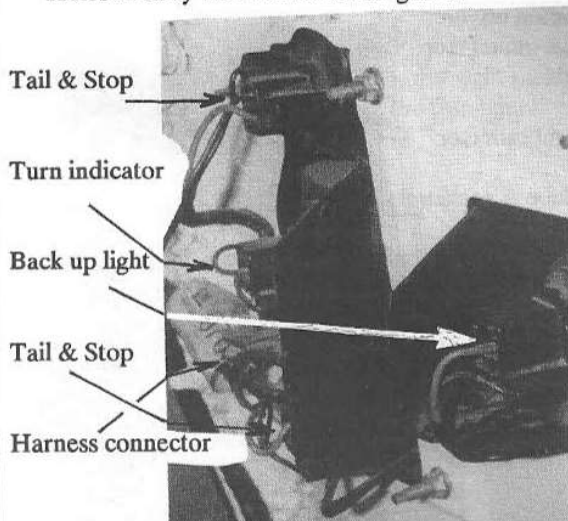
1. Install the light assembly to the inside of the tailgate, tighten the attaching nuts.
2. Connect the wiring loom.

BACK PARK LIGHT, TURNING INDICATOR & STOP LIGHT - SEDAN**Replacement of Globes**

1. Open boot, turn the faulty globe and socket anti-clockwise to remove the socket from the back of the light assembly.
2. Remove the globe from the light socket.
3. Replace the globe with one of the same wattage.
4. Install the socket and new globe into the light assembly, turn clockwise to lock into place.
5. Inspect the lights.

Sedan Rear Light Assembly

Holes in body work for access to globes

**Remove**

1. Open boot.
2. As the globes and sockets are connected directly to the wiring loom, remove the globes and sockets from the rear of the light assembly.
3. Remove the nuts attaching the light assembly to the boot panel, remove the light assembly.

Install

1. Install the light assembly into the boot panel.
2. Install the nuts attaching light assembly to boot panel.
3. Install the light sockets and lock into place by turning the socket clockwise.
4. Check the function of the lights.

BACK PARK LIGHT, TURNING INDICATOR & STOP LIGHT - Station Wagon & Utility**Replacement of Globes**

The light assembly needs to be removed from the vehicle to replace globes.

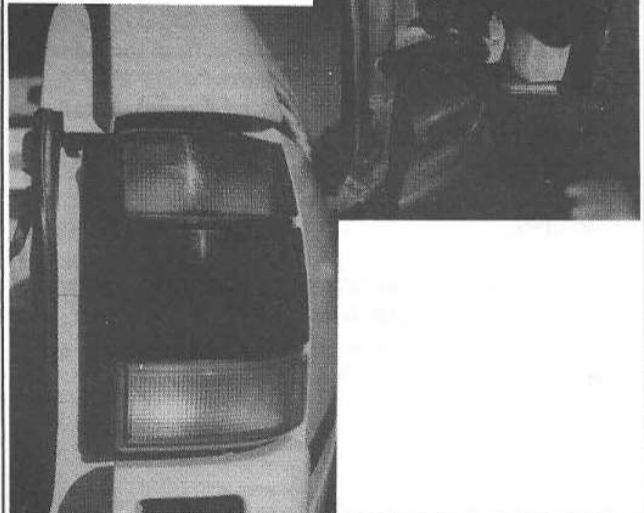
Remove

1. Lift tailgate or drop utility tailgate for easier access.
2. Remove the screws attaching the light assembly to the back panel, remove the light assembly.
2. As the globes and sockets are connected directly to the wiring loom, remove the globes and sockets from the rear of light assembly. Turn the globe and socket anti-clockwise to remove socket from back of light assembly.

Install**Station wagon / Utility**

Globe and socket

Globe and socket

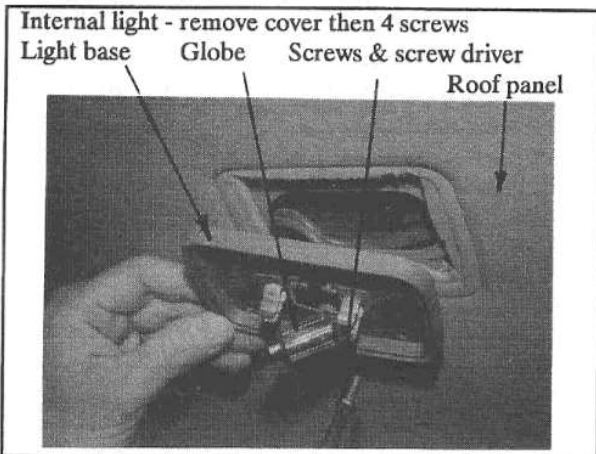


1. Replace any faulty globes with one of the same wattage.
2. Install the light assembly into the back panel.
3. Install the socket and new globe into the light assembly, turn clockwise to lock into place.
4. Check the function of the lights.
5. Close the tailgate.

INTERNAL LIGHT

Remove

1. Remove the light lens by pressing in on the rear of lens.
2. Remove globe by levering globe away from light socket.
3. Remove the 4 screws attaching the light assembly to the roof panel.



Install

1. Replace light assembly into roof panel, install 4 screws.
2. Insert new globe if necessary into sockets.
3. Replace light lens.

REAR INTERNAL LIGHT - Station Wagon

Remove

1. Remove the light lens by using a blade or small screw driver from the passenger side of the vehicle.
2. Remove globe by levering globe away from light socket.
3. Remove the electrical connections from the light.

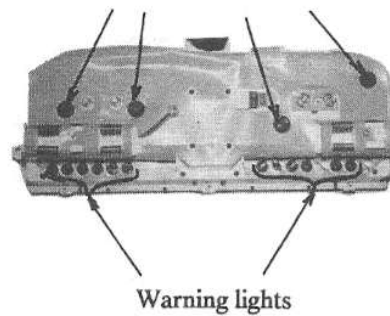
Install

1. Replace light assembly into roof panel, install the electrical connections.
2. Insert new globe if necessary into sockets.
3. Replace light and lens into roof by pushing the light into place.

INSTRUMENT CLUSTER AND WARNING LAMP CLUSTER ILLUMINATION

Instrument illumination and warning lamp bulbs are a push fit into sockets which twist.

Instrument cluster lights from rear view
Instrument lighting



Station Wagon High Mount Stop Light

Remove

1. Remove the rear cover of light - one screw.
2. Remove globe socket by turning socket globe also by turning.
3. Remove the light reflector by removing attaching screws if necessary.

Install

1. Replace the light reflector if removed tighten attaching screws.
2. Insert new globe if necessary into socket.
3. Replace light socket, turn to lock into place and replace rear cover and attaching screw.

GLOBE SPECIFICATIONS

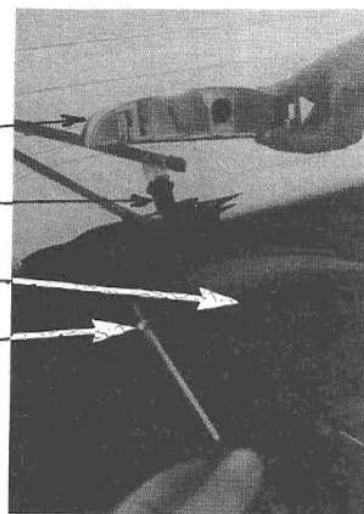
Watt

Headlamps

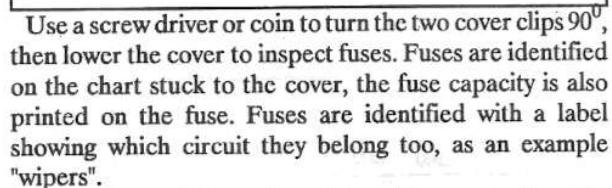
Hi/Lo beam	60/55
Parking (Front)	5
Turn Signal	21
Reverse Light	21
Stop and Tail Light	21/5
Number Plate Light	5
Instrument Cluster Exe/Ute - 3.67 Berl/Cal/Stat/Cap - 5	
Warning Lights	1.2

Station wagon
high mount stop
light

Light reflector
Globe & socket
Cover
Screw & screw
driver



The fuse panel is situated in front of the drivers seat, to the right of the steering column, behind the instrument panel lower right hand side, cover assembly.



* If it is necessary to replace a fuse, you must install an identical fuse, if another fuse failure occurs, the circuit must be checked to find the fault. Once the fault has been corrected replace the fuse, with the correct rating.

RELAYS

Ignition Relay

Heater and Air-Conditioner Fan Relay

Indicator Flasher Relay

Another relay panel is situated behind the battery.

E.F.I. Relay

Air Conditioner Relay

Harn Relay

Fuel Pump Relay

Engine Coolant Fan Relay

Starter Relay

Low Beam Relay

High Beam Relay

Warning Light Relay

Theft Alarm Relay

Fog Lights Relay



Heater Air Conditioner Fan 30amp

High Beam Light 30amp

Main wiring fuses 60amp

Fuel Injection 30amp

Engine Compartment Wiring Harness

One for V6 engines and one for V8 engines.

There are two different engine compartment wiring harnesses.

Vehicle Cabin Harness

Two harness for sedans, two harness for station wagons, luxury models have different harnesses to cater for the options.

Each door has a harness, the back door harnesses are the same.

Rear End Harness

Different harnesses are used for base models, luxury models, station wagons and utility models.

Additional Ancillary Harnesses

Ancillary harnesses are required when various equipment level options are fitted.

Wire Colour Codes

Code	Colour
B	Black
Blu	Blue
Br	Brown
G	Green
Gy	Grey
L Blu	Light blue
L G	Light Green
O	Orange
P	Pink
Pur	Purple
R	Red
T	Tan
V	Violet
Y	Yellow

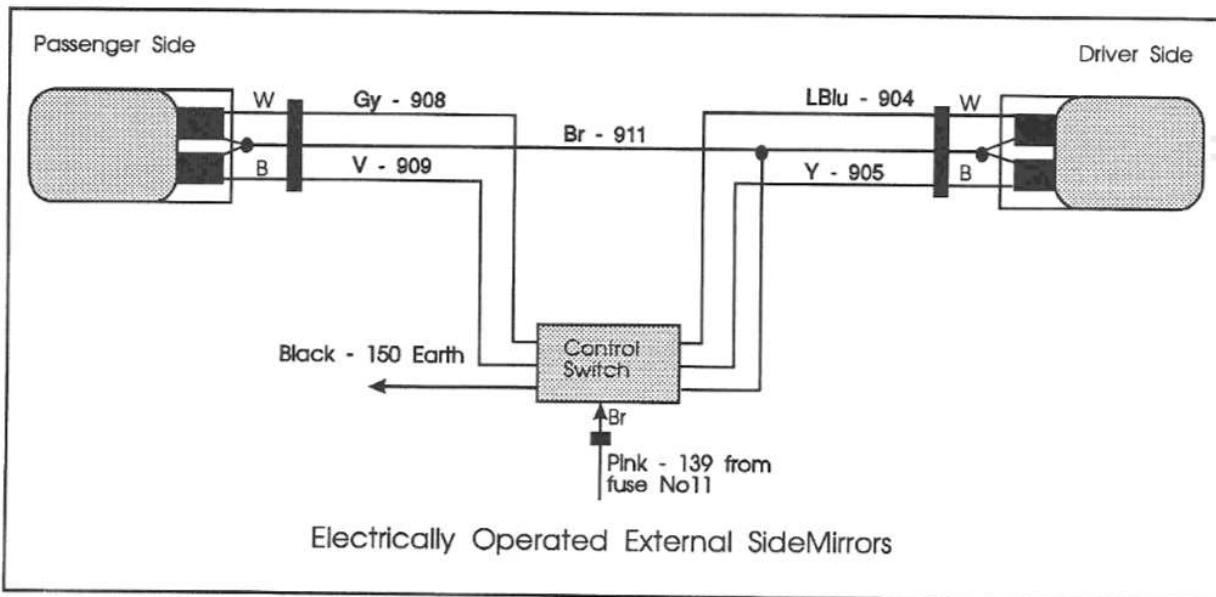
* In the following wiring diagrams each circuit has a colour code , followed by a circuit number.

* Always disconnect the earth terminal from the battery if it is necessary to disconnect the ECM or PCM or any of its compopents.

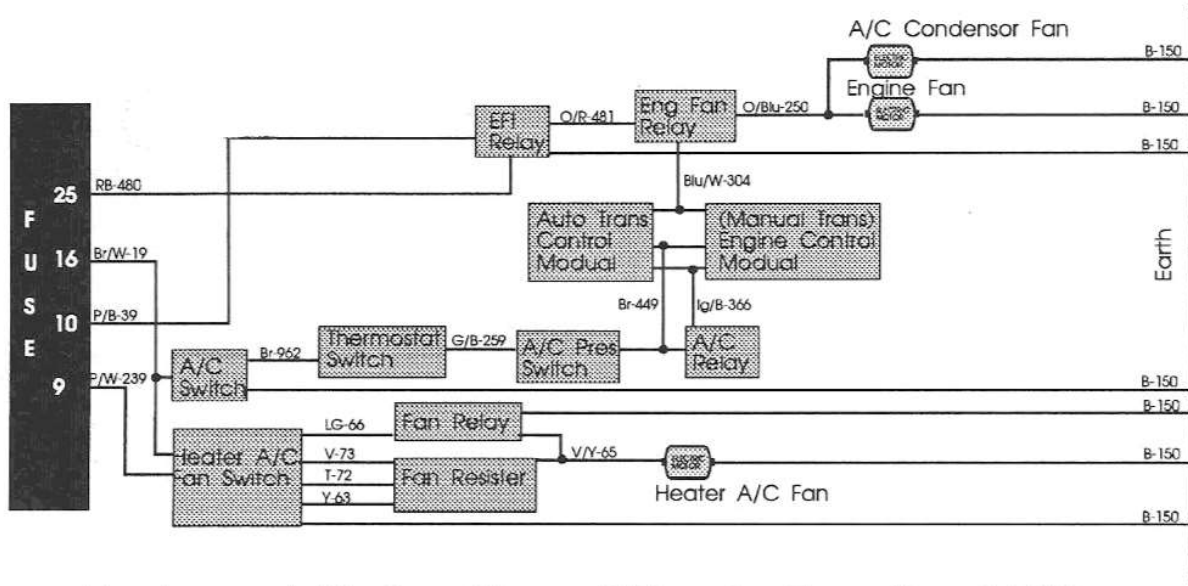
* To help trace a wiring problem, it helps to record the wirng colour code and circuit code number, as you follow the circuit from one component to the next.

* Never cause a dead short to earth, as this could cause a component failure, making it necessary to replace what was a perfectly good electrical component.

* When working on wiring looms and circuits it is important to label each wiring loom connection as it is disconnected. This will help when installing a new wiring loom replacing the old loom.







Heater and Air Conditioner Wiring for Executive / Utility

Heater and Air Conditioner Wiring for Berlina / Calais / Statesman / Caprice

