

CAUTION: To prevent severe electrical shock extreme care must be taken when working on or near the electronic ignition system as dangerous high tension voltages are produced in both the primary and secondary circuits.

SPECIFICATIONS

BATTERY

Type 12 volt lead acid
Polarity to earth Negative (-)
*Specific gravity:
Fully charged Above 1.260
Fully discharged Below 1.130
*Electrolyte specific gravity varies 0.007 for every 10 deg C rise or fall in temperature above or below 20 deg C. For above temperature add, for below temperature subtract.

ALTERNATOR

Type 14 volt AC
Make Hitachi
Model LT 150-113
LT 150-120
LR 150-151 or 151B
LR 150-199 or 200
LR 160-137 or 138
Maximum output:
LT 150-113, LR 150-199,
LR 150-200 50 amps
LT 150-120, LR 150-151,
LR 150-151B 55 amps
LR 160-137, LR 160-138 60 amps
Polarity to earth Negative (-)
Stator windings Star wound
Regulator type:
LT External adjustable
LR Internal non adjustable
Regulated voltage 14.5 ± 0.3 volt at 20 deg C
Minimum brush length Limit line

EXTERNAL VOLTAGE REGULATOR

Voltage regulator core gap 0.6-1.0 mm
Voltage regulator point gap 0.35-0.45 mm
Voltage regulator yoke gap 0.9 mm
Charge relay core gap 0.6-1.0 mm
Charge relay point gap 0.4-0.6 mm

STARTER MOTOR

Type Reduction drive or direct drive
Make Nippon Denso
Minimum brush length:
Direct drive 11 mm
Reduction drive 9 mm
Minimum commutator diameter:
Direct drive 30.7
Reduction drive 29 mm

Minimum commutator undercut:

Direct drive 0.2 mm
Reduction drive 0.2 mm

DISTRIBUTOR

Make Hitachi
Type Breaker point or electronic
Control Vacuum and centrifugal advance
Rotation of rotor Anti-clockwise
*Firing order
(in direction of rotation) 1-3-2-4
Point gap (breaker type) 0.5 mm
Dwell angle (breaker type) 49-55 deg
Air gap:
Hitachi electronic type 0.3-0.5 mm
Nippon Denso electronic type 0.2-0.4 mm
*The cylinders are numbered as follows: No. 1 right hand front, No. 2 left hand front, No. 3 right hand rear, No. 4 left hand rear.

TORQUE SETTINGS

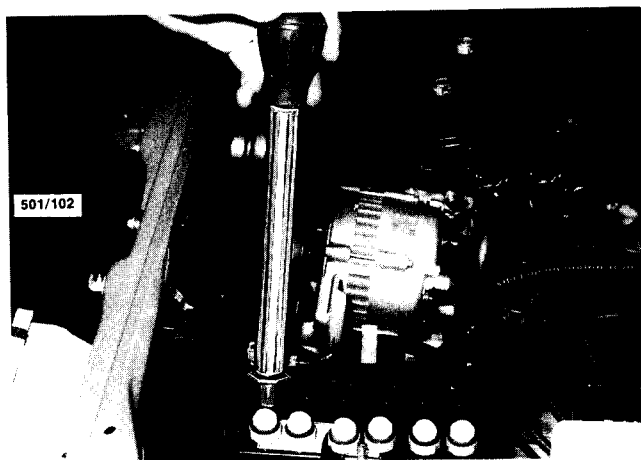
Alternator pulley nut 59 Nm

NOTE: For further specifications regarding the ignition system refer to the Engine Tune-up section.

1. BATTERY AND CHARGING SYSTEM TROUBLE SHOOTING

BATTERY UNDERCHARGED

- (1) Loose or broken drive belt: Adjust or renew drive belt.
- (2) Faulty battery: Instal a new battery of the recommended type and capacity.



Check the specific gravity of the battery electrolyte in each cell with a hydrometer.

(3) Faulty alternator: Overhaul or renew alternator.

(4) Fault in charging system wiring: Check and renew or repair wiring harness.

(5) Faulty connections in charging system: Check and renew or repair component(s).

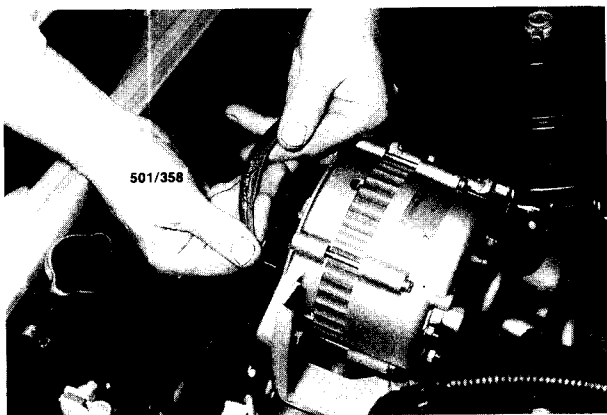
NOTE: The first thing to do is to test the state of charge of the battery with a hydrometer. As specific gravity varies with temperature it is advisable to use a hydrometer with an inbuilt thermometer so that the necessary variation can be calculated. Also an accurate hydrometer reading cannot be taken if distilled water has recently been added to the electrolyte. If the electrolyte level is below the battery plates it will be necessary to add water and charge the battery before testing with the hydrometer.

The specific gravity should not vary more than 0.030 between cells. If the variation is more than this then the serviceability of the battery is questionable and the battery should be recharged and retested before renewing it.

If all readings are above 1.220 and uniform the battery can be considered to be operational. However, it may require recharging depending on the reading. See attached chart showing charge condition for the various specific gravity readings.

1.110-1.130	Dead flat
1.140-1.160	Nearly flat
1.170-1.190	About one quarter charged
1.200-1.220	Half charged
1.230-1.250	About three quarters charged
1.260-1.280	Fully charged

If the battery is undercharged but serviceable seek out the cause by checking out the possible causes in the order given.



Checking the drive belt for wear and deterioration.

BATTERY OVERCHARGED

(1) Faulty alternator: Overhaul alternator and replace internal alternator regulator.

(2) Faulty battery: Install a new battery of the recommended type and capacity.

(3) Faulty charging circuit wiring or connections: Check and renew or repair faulty components.

NOTE: An overcharged battery is indicated by continual loss of water through boiling. This is usually accompanied by discolouration of the electrolyte.

CHARGE INDICATOR LAMP REMAINS ON

(1) Broken or defective alternator drive belt: Renew drive belt.

(2) Faulty alternator: Check and overhaul alternator.

(3) Short to earth in lamp circuit. Check and repair circuit.

CHARGE INDICATOR LAMP DOES NOT OPERATE

(1) Charge indicator lamp bulb blown: Check and renew faulty bulb.

(2) Faulty ignition switch: Check and renew faulty switch.

(3) Blown fusible link: Repair cause and renew fusible link.

NOISE IN DRIVE BELT OR ALTERNATOR

(1) Drive belt frayed: Renew drive belt.

(2) Loose alternator mounting bolts or worn bearings: Tighten mounting bolts or renew bearings.

(3) Loose alternator pulley: Tighten pulley retaining nut.

(4) Faulty alternator: Overhaul or renew alternator.

NOTE: To check if the noise is in the alternator or drive belt loosen the alternator retaining bolts, remove the drive belt and disconnect the wiring connector. If the noise has gone when the engine is run for a short time, check the serviceability of the drive belt and alternator components.



Spin the alternator pulley over by hand to check bearings for noise.

2. BATTERY AND STARTING SYSTEM TROUBLE SHOOTING

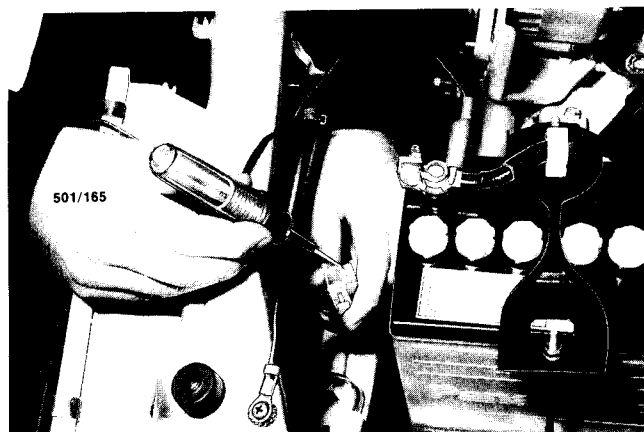
STARTER LACKS POWER TO CRANK ENGINE

- (1) Battery undercharged: Check the charging system and rectify as necessary.
- (2) Battery faulty, will not hold charge: Check and renew battery.
- (3) Battery terminals loose or corroded: Clean and tighten terminals.
- (4) Faulty starter solenoid switch or contacts: Check and renew solenoid as necessary.

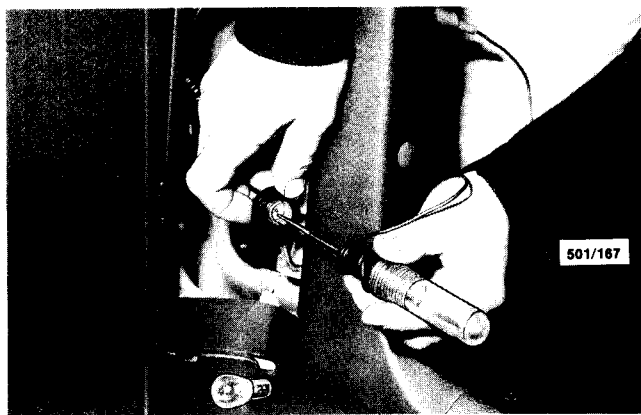
NOTE: Check the state of charge of the battery and check all terminals for cleanliness and security. If necessary test and overhaul the starter motor as described in this section.

STARTER WILL NOT ATTEMPT TO CRANK ENGINE

- (1) Open circuit in starting system: Check for dirty or loose terminals, dirty commutator, faulty solenoid or faulty switch.



Checking for power at the headlamp connectors using a test lamp.



Checking for power at the rear combination lamp sockets using a test lamp.

- (2) Discharged battery: Check for fault or short circuit in system.

- (3) Battery fully charged but will not crank engine: Check for locked drive and ring gear, internal starter fault or seized engine.

- (4) Faulty neutral safety switch: Check and renew faulty neutral safety switch. (Automatic transaxle only. Refer to that section for details.)

NOTE: Turn engine over by hand to ensure that the starter drive is not locked with the flywheel ring gear and that the engine is not seized. Ensure that the ignition is switched off before turning the engine.

3. LIGHTING SYSTEM TROUBLE SHOOTING

LAMP OR LAMPS FAIL TO LIGHT

- (1) Faulty bulbs(s): Check and renew faulty bulb(s).
- (2) Open circuit in wiring or connections: Check lamp circuits and rectify as necessary.
- (3) Faulty lamp switch: Check and if necessary renew lamp switch.
- (4) Faulty fuse: Repair cause and renew fuse.

NOTE: Switch on the lamps concerned and using a test lamp, check that the lamp circuits are operating. This is best done by starting at the lamp wiring connector or bulb holder and working back to the power source.

LAMP OR LAMPS INCORRECTLY ILLUMINATED

- (1) Lamp or lamps incorrectly earthed: Check lamp earth for looseness or clean contact, either at lamp body or wire and repair as necessary.
- (2) Incorrect bulbs fitted: Check bulbs wattage and voltage and renew with the correct type if necessary.
- (3) Dirty or damaged lamp reflector: Clean or renew lamp reflector.
- (4) Faulty bulbs: Check with a known serviceable unit and renew if necessary.
- (5) Dirty lamp lens: Clean or renew lamp lens.

NOTE: The most common cause for this condition is incorrect lamp earthing. Check the lamps at their earthing points.

LAMPS FLARE WITH ENGINE SPEED INCREASE

- (1) Faulty battery: Check and renew battery.
- (2) Battery in low state of charge: Recharge battery and check charging system.
- (3) High resistance or faulty connections between alternator and battery: Check circuit and rectify condition.

(4) Poor earth connection between battery and engine or alternator: Check battery earth lead and the strap between engine and body.

(5) Voltage regulator unit faulty: Check and renew voltage regulator.

NOTE: The most common cause for this condition is dirty terminals on the earth leads. Check all earth leads at their earthing points.

4. TURN SIGNAL LAMP TROUBLE SHOOTING

TURN SIGNAL WARNING LAMP DOES NOT BURN AND NO AUDIBLE CLICKING FROM FLASHER UNIT

- (1) Fuse blown: Rectify fault and renew fuse.
- (2) Faulty flasher unit: Renew flasher unit. Do not attempt repairs.
- (3) Faulty turn signal switch: Renew switch.
- (4) Fault in wiring circuit: Check and repair fault.

NOTE: If the fuse is functional check the flasher unit for serviceability by replacing with a known serviceable unit. The flasher unit on 1985 and 1986 Sedan and Station Wagon models is incorporated in the combination switch and is not available as a separate unit.



Remove the right hand trinket tray to gain access to the flasher unit on 1979-1984 models and all Utility models.

TURN SIGNAL WARNING LAMP DOES NOT FLASH BUT AUDIBLE CLICKING FROM FLASHER UNIT

- (1) Warning lamp bulb blown: Check and renew bulb.
- (2) Fault in warning lamp wiring: Check and repair fault.

NOTE: When renewing bulbs ensure that a new bulb of the correct wattage is used.

BOTH WARNING LAMPS FLASH WEAKLY AND AT GREATER THAN NORMAL SPEED

- (1) Faulty flasher unit: Check and renew flasher unit.
- (2) Front bulb blown on turn side: Check and renew bulb.
- (3) Rear bulb blown on turn side: Check and renew bulb.

NOTE: If one lamp unit is constantly blowing bulbs check for poor earth in circuit.

BOTH TURN SIGNAL WARNING LAMPS BURN CONSTANTLY

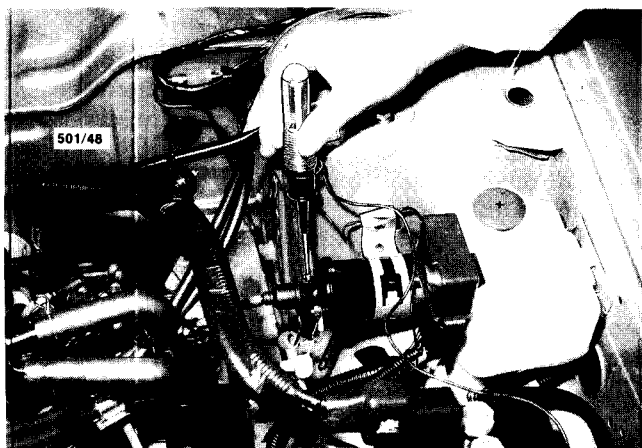
- (1) Faulty turn signal switch: Check and renew turn signal switch.
- (2) Fault in turn signal switch wiring: Check and repair fault.
- (3) Faulty flasher unit: Check and renew flasher unit.

NOTE: If the flasher unit is to be renewed always try to obtain a genuine replacement part. The flasher unit on 1985 and 1986 Sedan and Station Wagon models is incorporated in the combination switch and is not available as a separate unit.

5. IGNITION SYSTEM TROUBLE SHOOTING

ENGINE WILL NOT START

- (1) Fault in ignition primary circuit wiring: Check ignition primary circuit and repair as necessary.
- (2) Faulty ignition switch: Renew ignition switch.
- (3) Fault in coil primary winding: Renew ignition coil.
- (4) Burnt or dirty contact breaker points in contact breaker system: Clean or renew and adjust contact breaker points.
- (5) Faulty capacitor or capacitor lead in contact breaker ignition system: Check and renew capacitor.
- (6) Fused or broken low tension lead from breaker arm to low tension terminal in contact breaker ignition system: Check and renew lead.
- (7) Electronic control unit not securely earthed in electronic ignition system: Earth control unit.
- (8) Electronic control unit faulty in electronic ignition system: Renew control unit.
- (9) Faulty wiring or terminals to control unit in electronic ignition system: Check and renew wiring or terminals.
- (10) Fault in coil high tension circuit: Test and renew ignition coil as necessary.
- (11) Cracks in distributor cap: Renew distributor cap.



Checking for power at the coil positive terminal with a test lamp.

(12) Crack in distributor rotor: Renew distributor rotor.

(13) Faulty high tension leads: Check and renew high tension leads.

(14) Faulty or incorrectly adjusted spark plugs: Renew or clean and adjust spark plugs.

NOTE: Refer to the Roadside Trouble Shooting section and make the necessary tests to ensure that the trouble is in the ignition system.

ENGINE STARTS BUT MISFIRES UNDER LOAD

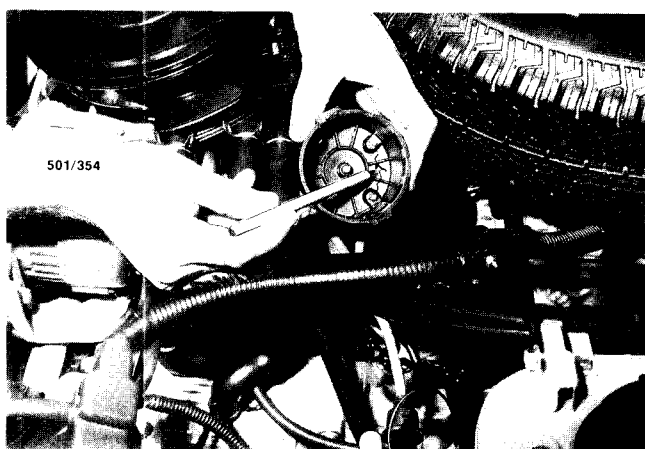
(1) Faulty, dirty or incorrectly adjusted spark plugs: Renew or clean and adjust spark plugs.

(2) Condensation moisture in distributor cap: Check and dry out and examine cap for cracks.

(3) Faulty high tension leads: Check and renew leads.

(4) Cracked spark plug insulator(s): Renew faulty spark plug(s).

(5) Faulty ignition coil: Check and renew ignition coil.



Check the distributor cap for cracks and tracking.

NOTE: Check possible causes in the order given.

ENGINE RUNS BUT LACKS POWER

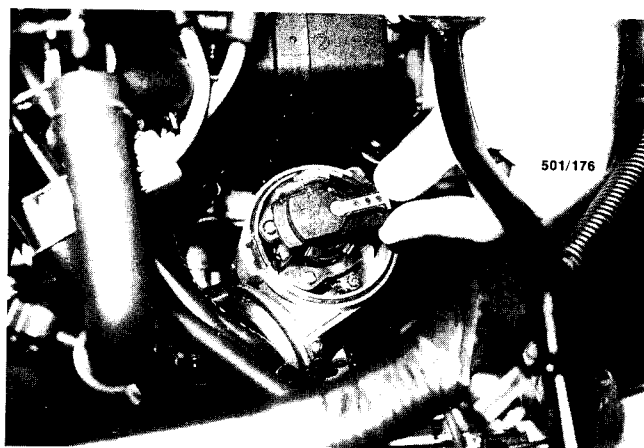
(1) Ignition timing incorrectly set: Check and readjust timing.

(2) Centrifugal advance mechanism seized or excessively worn: Overhaul distributor.

(3) Vacuum advance unit inoperative: Check for broken vacuum pipe or faulty unit.

(4) Vacuum advance unit operates but ineffective: Advance unit link disconnected or broken.

NOTE: To check if the centrifugal advance mechanism is operating correctly remove the distributor cap and twist the rotor in the direction of normal rotation. It should spring back to its original static position when released.



Turn the rotor in the direction of rotation then release it to check the operation of the centrifugal advance mechanism.

6. TEST EQUIPMENT AND SOME APPLICATIONS

TO MAKE A TEST LAMP

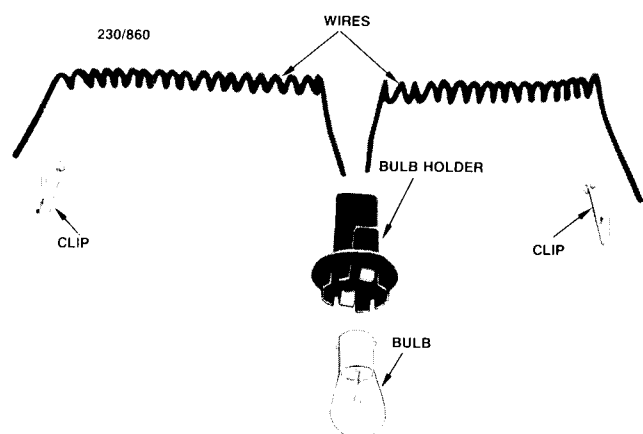
When working on the electrical system, a test lamp will be found to be most helpful for checking the continuity of live circuits. A simple test lamp can be made from two suitable lengths of 4 millimetre wire, two small alligator type clips, a double contact bulb holder and a 12 volt single filament double contact bulb.

(1) Bare both ends of the two lengths of 4 millimetre wire.

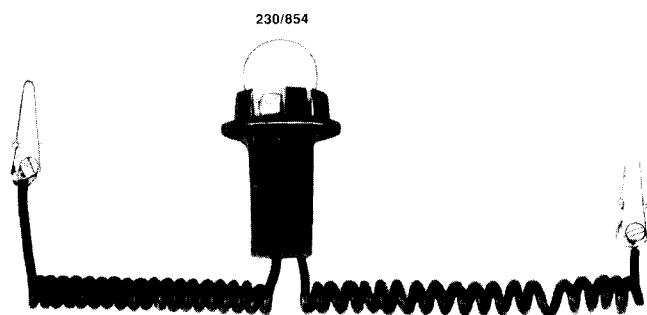
(2) Solder an alligator clip to one end of each wire lead.

(3) Connect the other end of each lead to the double contact bulb holder terminals and ensure that they are insulated from each other and from the bulb holder base.

(4) Instal the bulb in the bulb holder.



Components and materials for assembling a test lamp.



Assembled view of test lamp.

(5) To test the unit connect it across a 12 volt battery, the bulb should light up if the wiring is correct and the bulb serviceable.

TO MAKE A JUMPER LEAD

When testing components of the electrical system a jumper lead is very handy.

(1) Bare both ends of a suitable length of 4 millimetre wire.

(2) Connect a small alligator clip to each end of the wire. Solder and tape the connections.

(3) Test the jumper lead for continuity by removing one battery cable and connecting the lead between the cable and the battery terminal. Turn the ignition key to 'ON' and the dash warning lamps should operate indicating a completed circuit through the jumper lead.

(4) Remove the jumper lead from the circuit and reconnect the battery.

NOTE: Make a few test leads of various lengths using different sizes and types of alligator and battery clips.

TO TEST SWITCHES

If a switch is suspected of being faulty, remove the wires from the switch and using a test lamp, test each lead to find the power wire. It may be necessary to turn the ignition switch 'ON' as the switch may be wired through the ignition circuit.

After noting the color/position of the wire, disconnect the test lamp and using a suitable jumper lead, connect the jumper lead from the power wire of the switch to the other side of the switch. If the circuit functions, the switch is faulty and should be renewed. See Switches and Controls.

TO TEST BULBS

If a bulb is suspected of being faulty, remove the bulb from the bulb holder and using a small jumper lead connect one end of the jumper lead to the power terminal of a serviceable battery and the other end of the jumper lead to a lug on the side of the bulb.

Connect one end of a second jumper lead to the earth terminal of the battery and with the other end of the jumper lead touch the bulb contact. The bulb should light.

If the bulb has two filaments, touch the other bulb contact with the end of the jumper lead. The bulb should light. If the bulb should fail to light, the bulb should be replaced with a bulb of the correct voltage and wattage.

TO TEST CIRCUITS

If a circuit is suspected of being faulty, turn the switch on in the normal manner so as to supply power to the circuit.

Where connections are in the circuit, disconnect the connection and connect one lead of the test lamp to the power or switch side of the disconnected circuit and the other lead of the test lamp to a clean earth (e.g. bolt or screw). If the lamp does not light, check the circuit towards the power or switch end of the circuit.

If the lamp lights, continue checking towards the motor or bulb in the circuit.

NOTE: A fuse or its associated connections is always a good starting point, but reconnect each connector or fuse after testing that particular connector or fuse.

7. BATTERY

Special Equipment Required: To Test — Hydrometer

MAINTENANCE

Maintenance consists mainly of regular inspection and servicing.

(1) Keep the battery and its surroundings clean and dry. Give the top of the battery particular attention to prevent electrical leakage between the cell terminals.

(2) Remove the vent plugs and check that the vent holes are clear.

(3) Check the electrolyte level and top up as necessary. The correct level is just over the top of the separators. Do not overfill or acid will escape through the vent holes with detrimental effect to the connections and to adjacent parts of the vehicle.

(4) Use only distilled water for topping up.

NOTE: Never use a naked light when examining the battery, as the gases given off by the battery are dangerously explosive.

(5) If the battery required an excessive amount of topping up, the cause should be sought. If overcharging is suspected, then check the output of the alternator.

If one cell in particular is at fault, check the case for cracks. Never transfer electrolyte from one cell to another.

(6) Keep the terminals clean and apply a small amount of petroleum jelly to the terminals to prevent corrosion.

TO REMOVE AND INSTAL

(1) Remove the retaining nut and remove the negative lead from the battery post.

(2) Remove the positive lead in the same manner.

(3) Remove the battery holding clamp and lift the battery from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

Do not overtighten the clamp nuts and make sure of correct polarity.

After installation coat the terminals with petroleum jelly to prevent corrosion.

TO CLEAN BATTERY CASE

(1) Remove the battery from the vehicle as previously described.

(2) Pour hot water over the battery being careful not to pour water through the vent holes of the filler caps.

(3) Wipe the battery case clean.

(4) If there is a crack in the case or around the base of the terminal(s) the battery should be repaired or renewed. Take the battery to an automotive electrical shop or battery agent for the necessary servicing.

TO CLEAN BATTERY CARRIER

If the battery electrolyte has overflowed and contaminated the surrounding body panels, it will be necessary to remove this contamination and repaint the surfaces where necessary. The contamination can be neutralised by using an alkaline solution consisting of two tablespoons of washing soda to a quart of boiling water. Cloudy ammonia can also be used in concentrated form. Both these items are readily avail-

able at grocery stores.

After neutralising the contaminated body panels allow them to dry. Clean off the old paint and repaint the surfaces with an antirust based paint.

TO TEST

Use a hydrometer to check the specific gravity of the battery electrolyte. Refer to Specifications for a fully charged and fully discharged battery.

If the battery is in a low state of charge or completely flat take it to an automotive electrical shop to have it charged and load tested.

8. ALTERNATOR

Special Equipment Required:

To Test on Vehicle — 60-0-60 DC- Ammeter, 0-20 DC voltmeter

To Dismantle — Bearing puller, soldering iron

To Assemble — Press, soldering iron

DESCRIPTION

In the alternator the field and pole shoe assembly is the moving part and is shaped to form the rotor. Since only a low amperage current flows between the slips rings on the rotor shaft and the brushes, wear on brushes and slip rings is very slight and maintenance is reduced to a minimum.

The output current is generated in the fixed stator windings and is a three phase alternating current (AC). The stator windings, which are wound on a laminated soft iron former, are star connected and fitted between the end brackets.

As it is not possible to recharge a storage battery with alternating current, it is necessary to rectify the output of the stator windings to direct current (DC). This is performed by a bank of diodes mounted within the alternator slip ring end bracket.

The output of the alternator is governed by the regulator and built in characteristics of the alternator.

The external, adjustable regulator fitted to LT model alternators is mounted on the right hand inner fender panel to the rear of the battery. The regulator fitted to LR model alternators is an internal non-adjustable type, mounted on the alternator slip ring end bracket.

An electrical cut out unit is not necessary with the alternator charging system as the diodes prevent a reverse current flow through the alternator.

SERVICE PRECAUTIONS

(1) Ensure that the battery is connected with the correct polarity to earth. Refer to Specifications.

(2) Do not short out or ground any terminals common to the charging circuit.

(3) Always disconnect the battery before connecting a battery charger.

(4) If a booster battery is used always connect it

in a parallel circuit i.e. positive to positive (+ to +) and negative to negative (- to -) to maintain a 12 volt supply pressure.

(5) Never disconnect the battery or terminals in the charging circuit while the engine is running.

(6) Regularly check the drive belt tension.

(7) Keep the battery terminals clean and all electrical connections tight.

(8) Disconnect the battery and alternator when electric welding on the vehicle.

TO TEST ON VEHICLE

If the ignition warning lamp stays on after the engine has been started and run at approximately 1000 rpm, carry out the following tests and precautions.

(1) Stop the engine, do not open circuit any parts of the charging circuit while the engine is running.

(2) Check the condition and adjustment of the drive belt.

(3) Clean the battery terminals, tighten all electrical connections, check the wiring for shorts to earth and/or bridged circuits and make sure the battery is fully charged. If the battery is low either charge it or replace it with one fully charged.

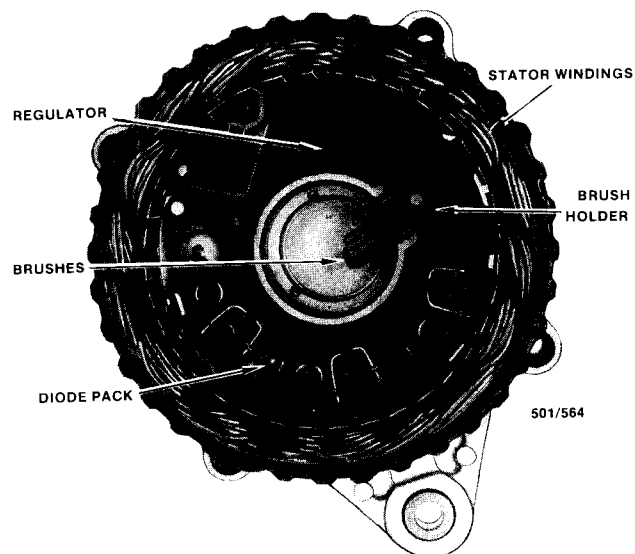
(4) Start the engine and allow it to run until normal operating temperature is reached.

(5) Stop the engine and disconnect the negative battery terminal.

(6) Remove the nut and washer from the alternator output terminal and disconnect the alternator output lead.

(7) Connect one lead of a 60-0-60 ammeter to the alternator output terminal and the other lead of the ammeter to the lead removed from the output terminal.

(8) Reconnect the battery negative terminal and connect a 0-20 voltmeter across the battery terminals.



View of the slip ring end bracket and stator assembly.

(9) Switch on all lamps and allow them to burn for approximately five minutes to reduce the charge of the battery and to apply a load to the circuit.

(10) Start the engine and gradually increase the engine speed to approximately 2500rpm. The reading on the ammeter should be approximately 75 per cent of the rated output of the alternator. (See Specifications).

(11) Switch off all the lamps and run the engine at 1500-2000 rpm until the indicated charge is below 10 amps. The voltmeter should now read between 12.5-14.7 volts.

NOTE: Should the alternator fail to reach the specified output the unit will have to be removed and overhauled or a replacement unit fitted. Should the voltage reading be above or below Specifications, the regulator will have to be renewed or adjusted.

TO REMOVE AND INSTALL

(1) Disconnect the negative battery terminal.

(2) Disconnect the terminal block at the alternator by pulling on the terminal block, not the wires.

(3) Remove the nut and washer from the output terminal on the alternator and disconnect the output lead.

(4) Remove the bolt securing the alternator to the drive belt adjusting bar.

(5) Remove the mounting bolt nut, push the alternator towards the engine and slip the drive belt from the pulley.

(6) Withdraw the mounting bolt whilst supporting the alternator with the other hand. Remove the alternator.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Do not over tension the drive belt and apply pressure to the mounting end bracket only when adjusting the drive belt.

(2) Check the wiring where soldered to the terminals.

TO DISMANTLE

(1) Remove the alternator from the vehicle as previously described.

(2) Mark the assembled position of the alternator components by scribing a line from the drive and bracket to the rear of the slip ring end bracket.

(3) Grip the alternator carefully in a vice with suitable protection between the vice jaws and the alternator body. Remove the pulley retaining nut whilst locking the shaft against rotation with a suitable Allen key inserted in the end of the shaft.

(4) Remove the nut, retaining washer, split pulley, cooling fan and inner spacer from the rotor shaft.

(5) Remove the alternator from the vice. Remove the diode pack retaining nuts and the nut and plastic insulating bush from the output stud. Remove

the through bolts and withdraw the slip ring end bracket from the alternator.

(6) Lift the brushes clear of the rear bearing on the rotor shaft and withdraw the rotor and drive end bracket from the stator and diode pack.

(7) Using a soft faced hammer, tap the rotor shaft from the drive end bracket.

(8) Remove the set screws from the drive end bracket bearing retainer and remove the bearing from the bracket.

NOTE: The diode pack is supplied as an integral unit and in the event of a component failure, the diode pack must be replaced as a complete unit.

(9) Tag and mark all wiring connections prior to removal to avoid incorrect connections during re-assembly.

(10) Using a very hot soldering iron and a pair of long nosed pliers unsolder the stator winding leads from the connector terminals on the diode pack.

NOTE: Do not apply undue heat to the connections as damage may result to the terminal insulator and/or the diodes.

(11) Using a suitable puller, remove the bearing from the slip ring end of the rotor shaft.

TO CLEAN PARTS

(1) Do not immerse units of the alternator in cleaning solvent as damage to the windings may result.

(2) The end bracket may be washed in kerosene or similar cleaning fluid after they have been completely dismantled from the unit. They should be thoroughly dried after cleaning.

(3) Compressed air can be used to carefully blow out the dust from the stator windings and the field windings on the rotor.

(4) Slip rings that are burned or scored should be polished using very fine glass paper.

(5) Clean the brushes and brush holders using a petrol damp rag and check and remove all burrs from the holders.

(6) Check the sealed type ball bearings for wear, roughness and lack of lubrication and renew as necessary.

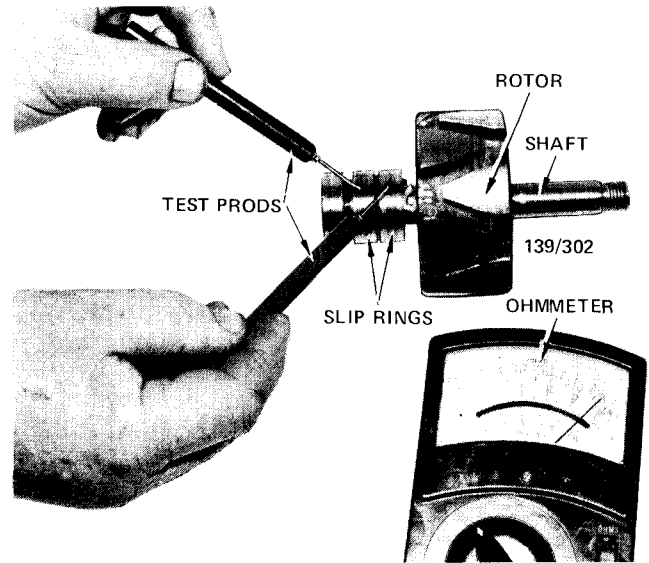
Unsealed type ball bearings, if still serviceable, may be sparingly lubricated with high melting point grease and installed for further service.

TO CHECK AND TEST COMPONENT PARTS

All parts being electrically tested should be resting on a non-conductive pad.

Slip Rings

(1) Visually check the slip ring assembly for damage.



Use an ohmmeter to test for bridging or internal shorting of rotor fields.

(2) Remove all burrs and burn marks with fine glass paper (not emery paper).

Field Windings and Rotor Assembly

(1) The insulation to earth test is made with an ohmmeter, connect one of the prods to one of the field wires or slip rings and the other test prod to one pole piece of the rotor.

(2) If the ohmmeter shows a reading and no visual earthing can be seen and rectified, a new rotor assembly will have to be installed.

(3) To check for bridged or internal shorting of the field coils use an ohmmeter to check the resistance of the rotor windings. Compare the ohmmeter reading with Specifications, a low reading indicates a bridged circuit internally, a high reading indicates an open circuit or high resistance in the windings. In both the above cases a new rotor assembly will have to be installed.

Diodes

The diode pack may be tested after disconnection. The testing can be made using a 12 volt battery and a 1.5 watt bulb in series with a jumper lead.

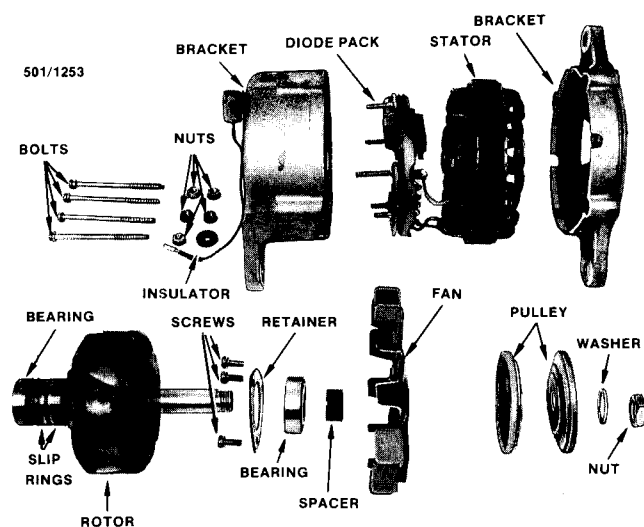
(1) Connect the jumper lead from the negative terminal of a charged battery to the diode pack body holding the diodes to be tested.

(2) Connect one lead of a test lamp to the battery positive terminal and with the other lead of the test lamp touch each diode lead in turn. Note whether the lamp is illuminated and then reverse the connections on the battery. Again test each diode with the test lamp lead.

(3) If the lamp was illuminated in both directions or was not illuminated at all, the diodes are faulty and the diode pack must be renewed.

Brush Springs and Brushes

(1) Unsolder and remove the brushes.



Dismantled view of the alternator.

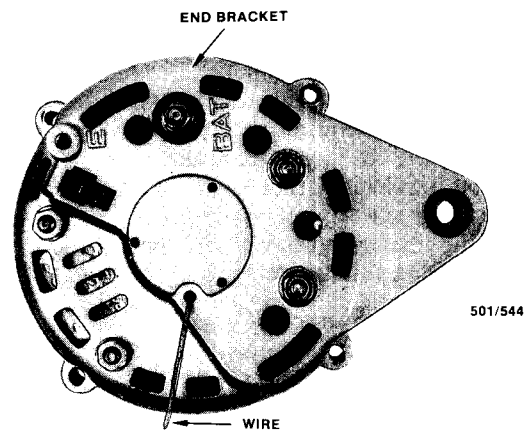
- (2) Check the brush springs for overheating and distortion, check for binding in the brush holder.
- (3) Check the brush length and renew as necessary. Refer to Specifications for minimum length.

TO ASSEMBLE

Assembly is a reversal of the dismantling procedure with attention to the following points:

- (1) Press the bearing onto the slip ring end of the rotor shaft.
- (2) Using a very hot soldering iron and a pair of long nosed pliers as a heat sink, solder the stator wires to the diode pack.
- (3) Instal the front bearing to the drive end bracket. Instal the bearing retainer with the retaining screws and tighten them securely.
- (4) Using a soft faced hammer tap the drive end bracket onto the rotor shaft as far as it will go.
- (5) Grip the rotor carefully in a vice with suitable protection between the vice jaws and the rotor. Instal the spacer, the fan, the split pulley, the washer and retaining nut. Tighten the pulley nut to Specifications.
- (6) Instal the diode pack and stator assembly into the slip ring end bracket. Instal the plastic insulating bush and retaining nut on the output stud and tighten it securely.
- (7) Instal the diode pack retaining nuts and tighten them securely.
- (8) Retract the slip ring brushes into the brush holder and insert a piece of stiff wire through the brush hold up hole in the slip ring end bracket. Ensure that the brush hold up wire does not become dislodged during the next stage of assembly.
- (9) Instal the rotor and drive end bracket assembly in the stator and slip ring end bracket assembly.

- (10) Align the scribed marks made before dis-



View of the slip ring end bracket showing the method of holding the brushes in a retracted position for assembly.

mantling, instal the through bolts and tighten them securely.

- (11) Remove the brush hold up wire from the slip ring end bracket and check the rotor for smooth rotation.

- (12) Instal the alternator to the vehicle and test its operation as previously described.

EXTERNAL VOLTAGE REGULATOR

To Remove and Instal

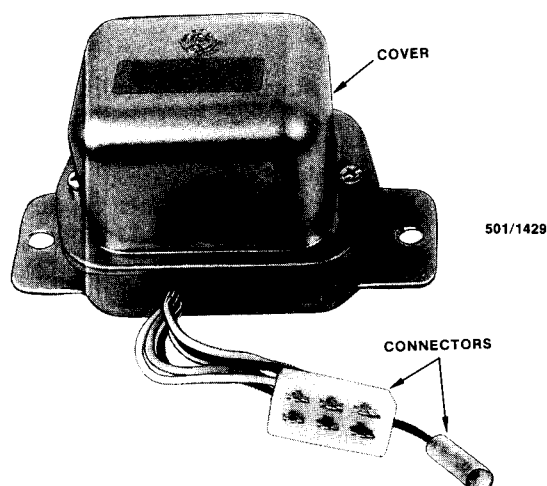
- (1) Disconnect the negative battery terminal.
- (2) Disconnect the wiring connector by pulling on the connector not the wires.
- (3) Remove the screws retaining the regulator to the inner fender panel and remove the regulator from the vehicle.

Installation is a reversal of the removal procedure.

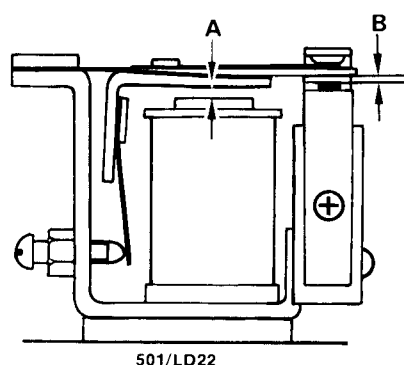
To Adjust

It is recommended that the vehicle be taken to an automotive electrician if the operation of the voltage regulator is in doubt. However the following air gap measurements and adjusting procedures may prove helpful in determining the condition of the regulator.

- (1) Disconnect the negative battery terminal.
- (2) Remove the regulator from the vehicle as previously described.
- (3) Remove the screws retaining the cover to the regulator and remove the cover from the regulator.
- (4) Inspect the points for pitting and burning. If the points are excessively burnt or pitted the regulator must be renewed. If the points are dirty they may be dressed using fine emery cloth.
- (5) Using feeler gauges of the correct thickness, measure the core gap and the point gap of the voltage regulator and the charge relay.
- (6) If the core or point gaps are not to Specification, adjust the core gap first followed by the point gap.
- (7) Adjust the core gap by loosening the screw



View of the external regulator removed from the vehicle.



Line drawing showing the measuring points for the core gap and point gap. A = core gap, B = point gap.

retaining the point set to the yoke and moving the point set up or down to achieve the correct gap.

(8) Adjust the point gap by loosening the screw retaining the upper point to the regulator body and moving the upper point up or down to achieve the correct gap.

(9) Adjustment of the yoke gap is not necessary.

(10) Instal the cover and tighten the retaining screws securely.

(11) Instal the regulator to the vehicle and check the operation of the charging system as previously described.

9. STARTER MOTOR

Two types of Nippon Denso starter motor are fitted to the Subaru range of vehicles, being of the direct drive, or indirect reduction drive type.

DESCRIPTION

Direct Drive Type

The direct drive type starter motor is of the induced pole type with four brushes and four pole shoes with field coils.

A solenoid switch is attached to the starter drive end bracket. The solenoid plunger is connected to the over-running clutch and drive pinion through a lever and spring arrangement.

When the solenoid windings are energised, the plunger acting on the lever and pivot engages the drive pinion with the flywheel ring gear and at the same time closes the switch supplying power from the positive side of the battery to the starter motor field coils and armature to operate the motor.

As the engine fires, the over-running clutch of the drive pinion assembly prevents high speed rotation of, and possible damage to, the starter armature if the solenoid winding are not immediately de-energised by releasing the switch key.

The starter solenoid switch windings are energised by the key operated combination ignition and starter switch.

Reduction Drive Type

The reduction drive type starter motor is of the induced pole type with four brushes and four pole shoes with field coils.

A solenoid switch is incorporated in the main housing, the solenoid plunger contacts the drive pinion through a spring loaded ball which acts as a bearing.

When the solenoid switch is activated, the plunger contacts the ball to move the drive pinion into mesh with the engine flywheel.

At the same time the switch contacts in the solenoid switch, supply power from the battery positive terminal to the starter motor field coils and armature to operate the starter motor.

The starter motor operates through a reduction gear set which is housed in the end bracket. The use of a reduction gear set increases the torque of the starter motor.

As the engine fires, the over-running clutch of the drive pinion assembly prevents high speed rotation of and possible damage to, the starter armature if the solenoid winding are not immediately de-energised by releasing the switch key.

The starter solenoid switch windings are energised by the key operated combination ignition and starter switch.

TO TEST ON VEHICLE

Should the starter fail to operate when the switch is moved to the start position check the following points:

(1) Check the battery condition and state of charge, refer to Battery heading in this section.

(2) Clean the battery terminals, taking particular care to remove the scale from the positive (+) terminal post and terminal.

(3) Check the earth connections for tightness and cleanliness.

(4) Switch on the headlamps and operate the

starter control switch. If the lamps go dim but the starter is not heard to operate, it could indicate that a short circuit or low resistance has developed in the starting system which could be either external or internal.

Also check that the engine is not "seized" or "locked up" as this condition would give the same indication as above.

(5) If the lamps do not go dim and the starter does not operate this would indicate an open circuit such as a broken or disconnected wire or a switch not operating. If the vehicle is fitted with automatic transmission operate the starter control switch and move the selector lever through all the gear selection range. If the starter operates in any position other than N or P, the neutral safety switch is faulty.

(6) Check all the external wiring to make sure the fault is not external, if the external circuit proves satisfactory, indicating that the problem is in the starter assembly, the unit will have to be removed for inspection.

TO REMOVE AND INSTAL

- (1) Disconnect the negative battery terminal.
- (2) Remove the spare tyre from the carrier.
- (3) Disconnect the wires from the starter motor solenoid.
- (4) Remove the bolts and nuts retaining the starter motor to the transaxle housing and withdraw the starter motor from the vehicle.

Installation is a reversal of the removal procedure.

TO DISMANTLE

Direct Drive Type

(1) Remove the starter motor from the vehicle as previously described.

(2) Disconnect the field connector strap from the terminal on the solenoid.

(3) Remove the screws or nuts retaining the solenoid to the drive end bracket and manoeuvre the solenoid from the bracket.

(4) Remove the screws retaining the armature end cap to the commutator end bracket and remove the armature end cap, clip, spring and seal from the commutator end bracket.

(5) Remove the through bolts retaining the commutator end bracket to the drive end bracket and remove the commutator end bracket from the starter motor.

(6) Remove the field coil brushes from the brush holder and remove the brush holder.

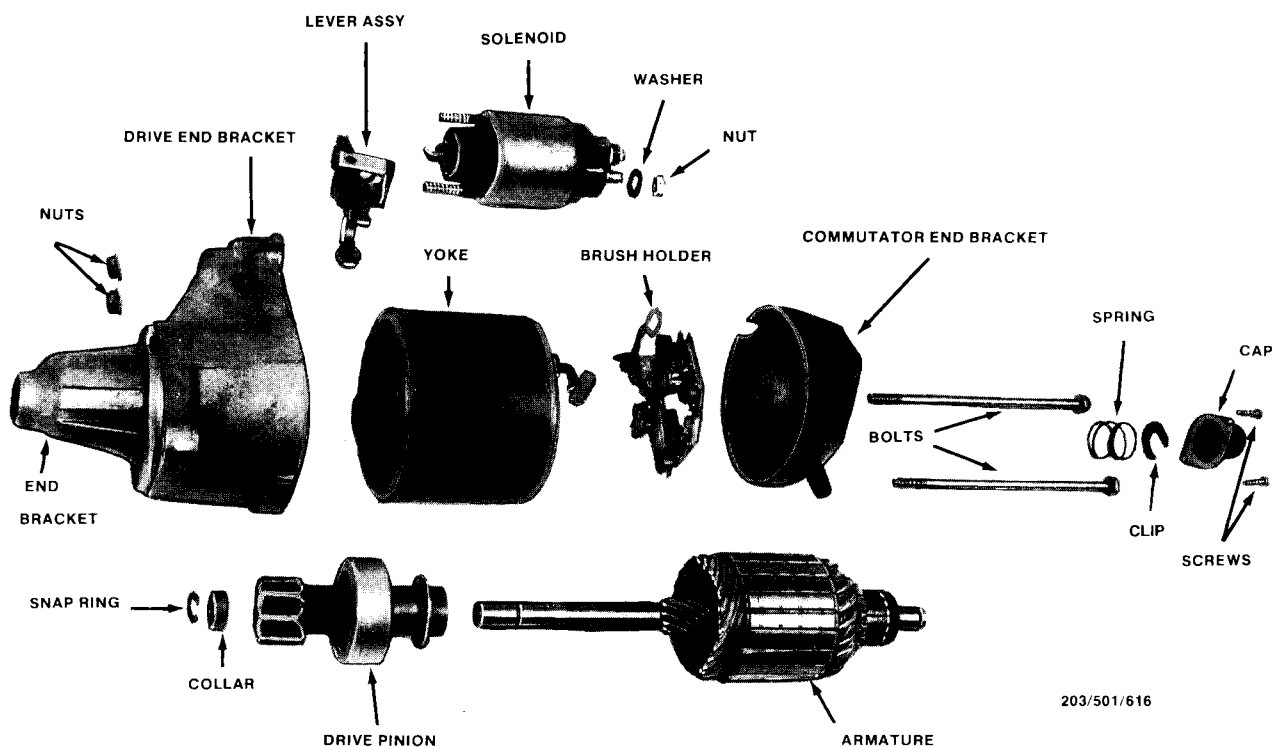
(7) Withdraw the yoke and solenoid seal from the drive end bracket.

(8) Withdraw the armature and lever from the drive end bracket.

(9) Support the armature in a vertical position with the drive pinion assembly uppermost.

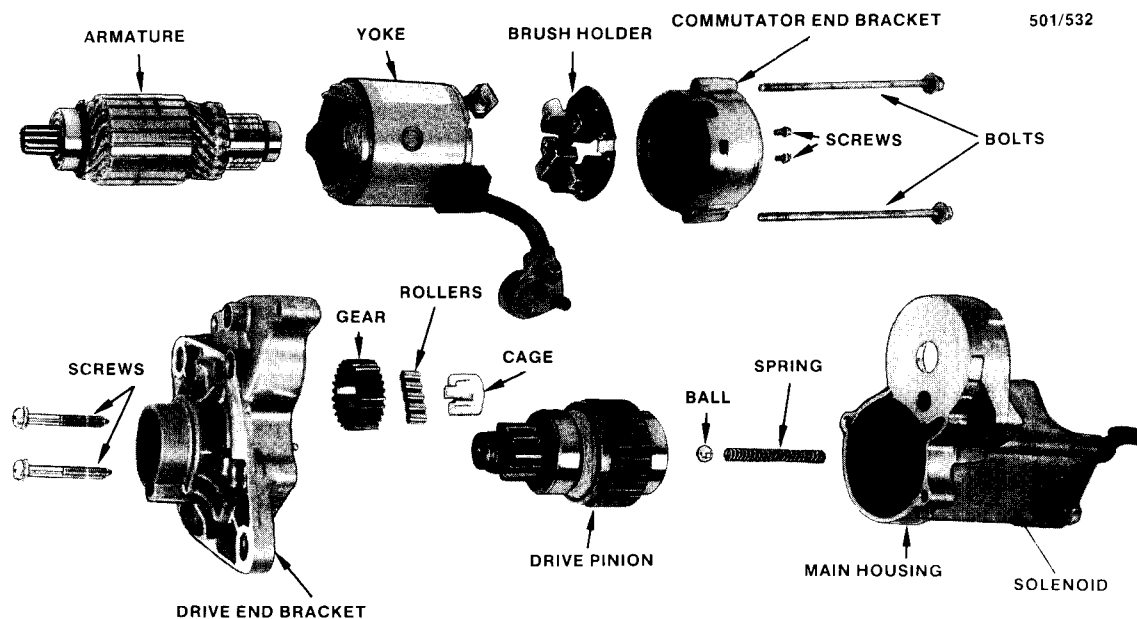
(10) Using a suitable tubular drift or socket, tap the stop collar towards the drive pinion and clutch assembly and remove the snap ring from the armature shaft.

(11) Remove any burrs from the shaft and withdraw the stop collar and the drive pinion and clutch



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Dismantled view of the direct drive starter motor.



Dismantled view of the reduction drive starter motor.

assembly from the armature shaft.

(12) Clean all parts thoroughly but do not immerse the yoke, armature, solenoid or drive clutch in cleaning fluid.

(13) Visually check all parts for wear and burned insulation.

Reduction Drive Type

(1) Remove the starter motor from the vehicle as previously described.

(2) Disconnect the field connector strap from the solenoid.

(3) Remove the through bolts retaining the yoke and commutator end bracket to the main housing and withdraw the yoke complete with the armature and commutator end bracket from the main housing.

(4) Remove the screws retaining the brush holder to the commutator end bracket and remove the commutator end bracket from the yoke.

(5) Withdraw the armature from the yoke.

(6) Disconnect the field brushes from the brush holder and withdraw the brush holder from the yoke.

(7) Remove the screws retaining the drive end bracket to the main housing and withdraw the drive end bracket from the main housing taking care not to misplace the spring, ball, rollers and cage.

(8) Remove the drive pinion, intermediate gear, rollers and cage from the drive end bracket.

TO CHECK AND INSPECT

(1) With the starter motor dismantled check the brush holder insulation using an ohmmeter.

Connect one test lead on the brush holder positive side and the other lead on the negative side. If there is any indication of leakage the ohmmeter will show a

reading other than infinite. Repair or renew the brush holder if a short circuit is evident.

(2) Check the brushes for adequate length. Brushes should be renewed when their length is below Specifications. They should be a free sliding fit in the brush holders.

(3) Check the brush springs, and compare them with new springs.

(4) Check that the commutator is free from pitting and burning, clean with a petrol moistened cloth and polish with a strip of fine glass paper.

A badly worn commutator may be cleaned up by mounting the armature in a lathe, spinning at high speed, and a light cut taken along the commutator with a very sharp tool. After turning, undercut the insulation between the segments.

(5) Check the armature for short circuit, using an ohmmeter.

(6) Place one of the test leads on the armature shaft or core and move the other lead around the circumference of the commutator. If the ohmmeter shows a reading at any point the armature is faulty and should be renewed.

(7) Test the field coils for continuity by connecting the test leads in series with the field windings.

Failure of the ohmmeter to show a reading indicates an open circuit in the wiring of the field coils.

(8) Check the field coil for ground by placing one test lead on the field coil lead and the other lead on the yoke. If the ohmmeter shows a reading the field coils and yoke assembly are faulty and will have to be renewed.

(9) Check the drive assembly clutch pinion teeth for wear, scoring or chipping. A clutch in good condition should take up the drive in one direction

only. It should rotate easily and smoothly in the non-drive direction and the assembly should move smoothly along the armature helical splines.

NOTE: Do not wash the drive assembly or clutch in solvent as this will destroy the clutch lubricant and cause early failure of the unit.

(10) Check the armature shaft bushes or bearings for wear and renew as necessary. The old bushes must be removed and the new ones pressed into the end brackets using a polished mandrel of the exact diameter of the armature shaft.

NOTE: The new bushes must not be reamed to size, as reaming will impair the porosity of the bushes and cause early failure. New bushes should be allowed to stand immersed in clean light engine oil for one hour before fitting.

On reduction drive starter motors, the bearings may be removed from the armature shaft using a suitable puller.

Install the bearing using a suitable tube no larger than the diameter of the inner race and a press with suitable attachments.

TO ASSEMBLE

Direct Drive Type

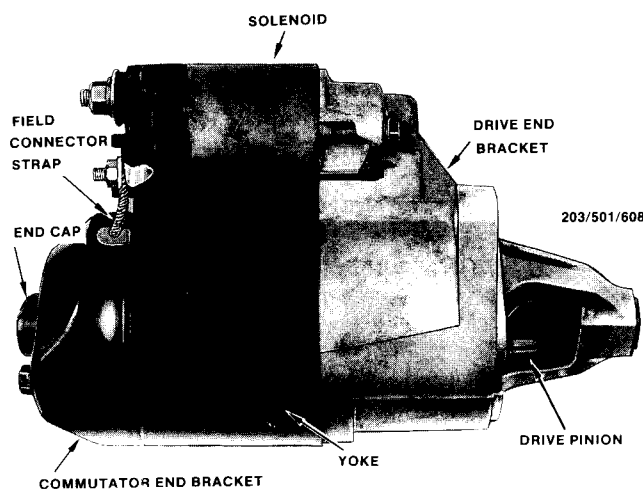
Assembly is a reversal of the dismantling procedure with attention to the following points:

(1) Lubricate the helix on the armature shaft lightly with graphite grease and install the drive pinion and clutch assembly to the armature shaft.

(2) Fit the stop collar and snap ring, slide the stop collar over the snap ring to lock the snap ring in position.

(3) Lubricate the bushes in both end brackets sparingly with engine oil.

(4) To install the brush holder with the brushes



Assembled view of the direct drive starter motor.

fitted it will be necessary to push the brushes against the brush spring tension into their holders and then slide the assembly onto the commutator.

(5) When installing the end cover, ensure that the field connector strap and insulator are seated correctly in the end cover.

(6) Install the solenoid plunger to the pinion lever.

(7) Install the solenoid and retaining screws, tighten the retaining screws securely.

(8) Connect the field connector strap to the solenoid terminal.

Reduction Drive Type

Assembly is a reversal of the dismantling procedure with attention to the following points:

(1) Apply suitable grease to the drive pinion and armature bearings prior to assembly.

(2) Install the rollers and cage to the drive end bracket and apply suitable grease.

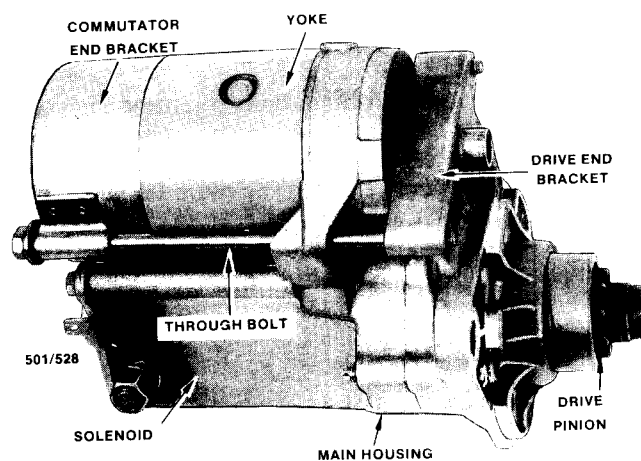
(3) Engage the teeth of the intermediate gear and drive pinion and install them to the drive end bracket.

(4) Ensure that the ball and spring are correctly installed and install the drive end bracket to the main housing. Install and tighten the retaining screws securely.

(5) Install the armature, brush holder and commutator end bracket to the yoke.

(6) Install the motor to the main housing, install and tighten the through bolts securely.

(7) Connect the field connector strap to the solenoid terminal, install and tighten the retaining nut securely.



Assembled view of the reduction drive starter motor.

10. BREAKER POINT DISTRIBUTOR

DESCRIPTION

The breaker point distributor is installed to the OHV engines on 1979-1984 and all Utility models.

The distributor is driven by a helical gear from the front of the crankshaft.

The distributor houses the contact breaker points which interrupt the ignition primary circuit and cause a high tension current to flow from the ignition coil. This current is distributed to the spark plugs by means of a rotor arm, a distributor cap and high tension leads which are mounted on the distributor.

The distributor also provides the means of ignition spark advance required by varying engine operating conditions. Two types of advance systems are incorporated, mechanical advance which advances the spark as engine speed rises and vacuum advance which caters for engine requirements at low engine rpm.

Mechanical advance is supplied by centrifugal weights mounted on the distributor drive shaft and is governed by springs.

Vacuum advance is supplied by manifold vacuum through a diaphragm mounted externally on the distributor body. Linkage between the breaker plate and the vacuum diaphragm enables spark advance, which is controlled by throttle position and engine loading.

TO REMOVE AND INSTALL

(1) Remove the air cleaner as described in the Fuel System section.

(2) Remove the distributor cap and secure it to one side.

(3) Rotate the crankshaft in the direction of normal rotation until the rotor arm is positioned adjacent to the distributor cap terminal for number one cylinder and the timing mark on the flywheel is aligned to the pointer on the transaxle flywheel housing.

(4) Disconnect the wiring connector from the distributor by pulling on the connector not the wires.

(5) Remove the bolt located at the rear of the distributor, retaining the distributor adaptor plate to the crankcase.

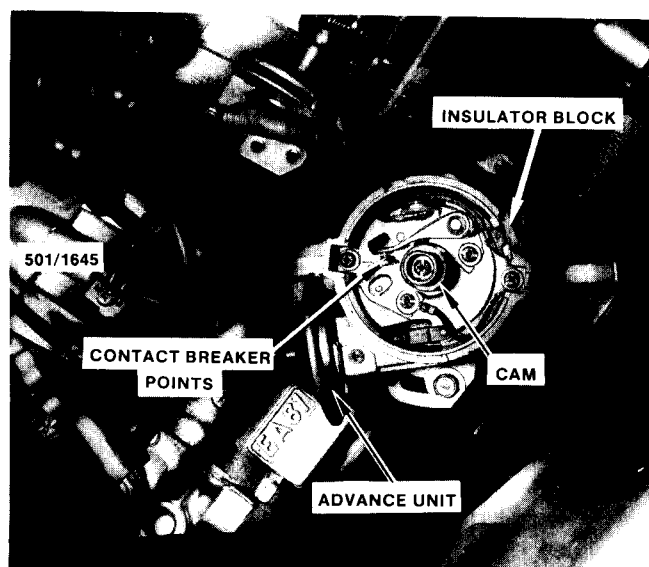
(6) Suitably mark the relationship of the distributor to the crankcase and lift the distributor and adaptor plate from the crankcase.

(7) Suitably mark the relationship of the distributor shaft to the distributor body after the distributor is removed as an aid to installation.

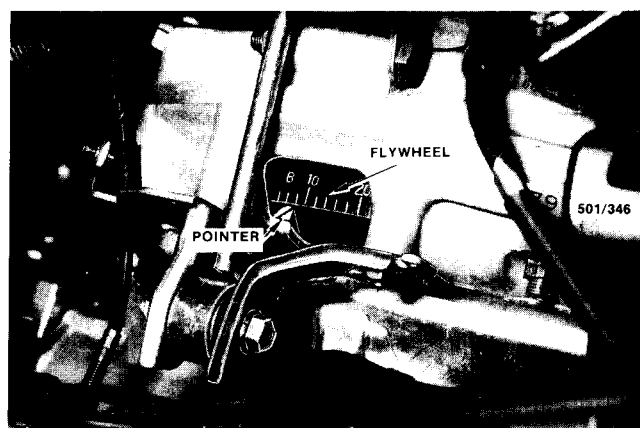
Installation is a reversal of the removal procedure with attention to the following points:

(1) Ensure that the engine has not been rotated. If the engine has been rotated with the distributor removed, remove the number one spark plug and place a finger or compression gauge in the spark plug hole. Rotate the crankshaft in the normal direction of rotation until compression pressure is indicated. Continue to rotate the crankshaft until the timing mark on the flywheel is aligned to the pointer on the transaxle flywheel housing.

(2) Align the marks on the distributor shaft and body made after removal or align the mating mark on the distributor drive gear with the right hand edge of



Installed view of the distributor with cap and rotor arm removed.



The timing marks are located on the flywheel and flywheel housing, 1986 model shown.

the notch in the distributor body as viewed with the distributor in an upright position.

(3) Install the distributor to the crankcase and align the distributor body to the crankcase using the marks made before removal. When the distributor is installed in the correct position, the points should be just about to open with the rotor pointing to the number one spark plug lead terminal in the distributor cap. If necessary, remove the distributor and reset the shaft position making allowances for the rotation of the shaft as the distributor is installed.

(4) Check and adjust the ignition dwell and timing as described in the Engine Tune-up section.

TO DISMANTLE

(1) Remove the distributor as previously described and remove the rotor from the distributor shaft.

(2) Remove the screws retaining the vacuum

advance unit to the distributor body, manoeuvre the advance unit link from the breaker plate and remove the advance unit from the distributor.

(3) Remove the screws retaining the earth lead at the contact breaker fixed point and breaker plate and remove the earth lead from the distributor.

(4) Remove the remaining contact breaker mounting screw.

(5) Remove the screw retaining the capacitor to the distributor body.

(6) Lift the wiring insulator from the slot in the side of the distributor body and withdraw the contact breaker points, capacitor and wiring harness from the distributor body as an assembly. If necessary, loosen the screw and separate the contact breaker points, capacitor and wiring harness.

(7) Remove the remaining breaker plate retaining screws and withdraw the breaker plate from the distributor.

(8) Prise the seal from the top of the upper shaft assembly and remove the screw retaining the upper shaft to the lower shaft.

(9) Suitably mark the relationship of the upper shaft to the lower shaft and withdraw the upper shaft from the distributor.

NOTE: It should not be necessary to remove the centrifugal weights and springs from the lower shaft, nor to dismantle the distributor further. If the lower shaft requires renewal, the distributor shaft and body should be renewed as a unit.

TO CLEAN AND INSPECT

(1) Thoroughly clean all parts with cleaning solvent, taking care not to immerse the distributor body, capacitor or vacuum advance unit in solvent.

(2) Check the contact breaker points for pitting and burning, if necessary, renew as a set.

(3) If the contacts are excessively burnt or pitted, renew the capacitor.

NOTE: Points should be cleaned with a contact file or oil stone, never use emery cloth or sand paper.

(4) Check all low tension leads for possible fractures.

(5) Check the distributor shaft and body for wear and renew as necessary. If the clearance between the shaft and body is excessive the shaft and body will have to be renewed.

(6) Check the cams for wear and roughness. Variation in lift between any two cams in excess of 0.05 mm will necessitate renewing the cam assembly.

(7) Check the clearance between the shaft and the cam assembly. Excessive clearance will necessitate the renewal of the shaft and cam assembly.

(8) Inspect the centrifugal advance weights for binding with the pivot pins.

(9) Check the distributor cap for cracks, carbon tracks, burned and corroded terminals.

(10) Check the centre carbon for wear and protrusion.

(11) Check the rotor arm for damage and cracks.

(12) Check the vacuum advance unit for a leaking diaphragm. To do this suck on the inlet pipe and observe the connecting link. The connecting link should move into the diaphragm housing.

TO ASSEMBLE

Assembly is a reversal of the dismantling procedure with attention to the following points:

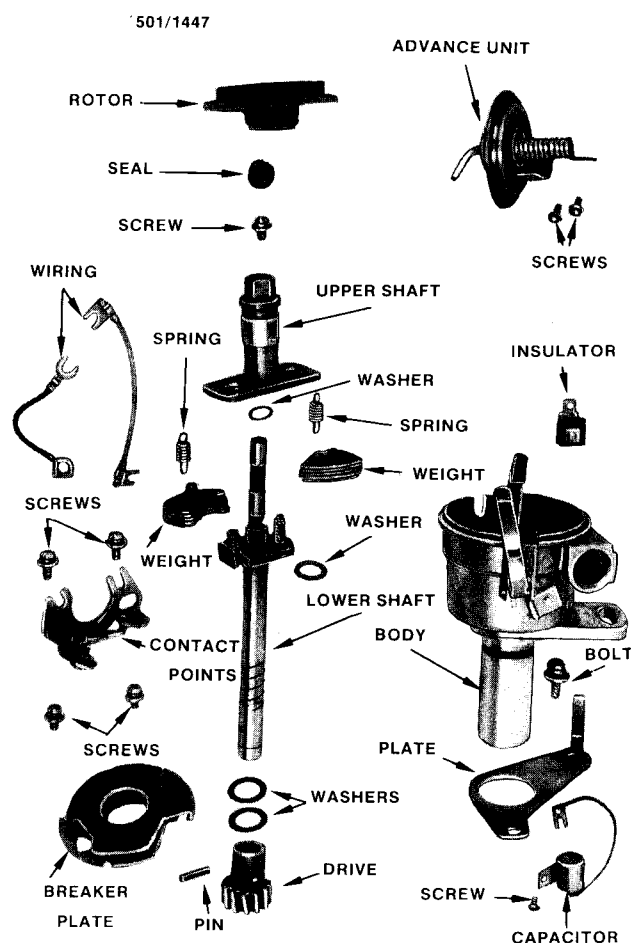
(1) Apply a small amount of high melting point grease to the centrifugal weight pivot points.

(2) Instal the upper shaft to the lower shaft as marked during dismantling, ensuring that the slots in the upper shaft are correctly engaged with the centrifugal weights.

(3) Instal the upper shaft retaining screw and tighten it securely. Instal the seal to the upper shaft.

(4) Instal the breaker plate and instal the retaining screws, ensuring that the earth lead is positioned correctly.

(5) Instal the vacuum advance unit link to the



Dismantled view of the breaker point distributor.

breaker plate and lightly lubricate it with high melting point grease. Instal the screws retaining the advance unit to the distributor body and tighten them securely.

(6) Instal the contact breaker points to the breaker plate ensuring that the earth lead is positioned correctly. Lightly lubricate the cam and the rubbing block of the moveable point with high melting point grease.

(7) Adjust the point gap using a feeler gauge of the correct thickness. With the rubbing block of the moveable point on the highest point of one of the cam lobes, insert the feeler gauge between the fixed and moveable point. Insert a screwdriver into the hole in the fixed point and using the pin in the breaker plate as a pivot, move the fixed point to obtain the correct gap.

The feeler gauge should be a light sliding fit between the fixed and moveable points. Tighten the retaining screws securely when the point gap is satisfactory and check the point gap, adjust them again if necessary.

(8) Instal the wiring insulator and the wiring harness to the distributor body ensuring that the leads for the breaker points and the capacitor are correctly positioned.

(9) Instal the capacitor to the distributor body and tighten the retaining screw securely.

(10) Instal the rotor arm and check that the centrifugal weights are free to operate by turning the rotor arm against the centrifugal weight springs while holding the drive pinion. When the rotor arm is released it should return freely to the fully retarded position.

If the rotor arm is inclined to stick or does not return to the retarded position the cause should be located and rectified.

11. ELECTRONIC DISTRIBUTOR

DESCRIPTION

The Hitachi or Nippon Denso distributor on 1985-1987 Sedan and Station Wagon models is driven from the rear of the left hand camshaft by helical gears.

The electronic ignition system is incorporated in the distributor and comprises a control unit, a reluctor and, on Hitachi models, a stator and magnet.

The reluctor rotates with the distributor upper shaft generating magnetic pulses which are detected by the control unit. The control unit uses these signals to switch the ignition coil on and off at the appropriate time during the operating cycle of the engine, providing the high tension current necessary to produce the spark at the spark plugs. The system is maintenance free requiring no routine servicing beyond inspecting the wiring, distributor cap and rotor for physical damage and deterioration.

Mechanical and vacuum advance systems are incorporated in the distributor. Mechanical advance

is provided by centrifugal weights, mounted on the distributor shaft and governed by springs. Mechanical advance is controlled by engine speed.

Vacuum advance consists of a diaphragm unit mounted externally on the distributor body with a linkage to the base plate from the diaphragm. Vacuum advance is controlled by throttle position and engine loading.

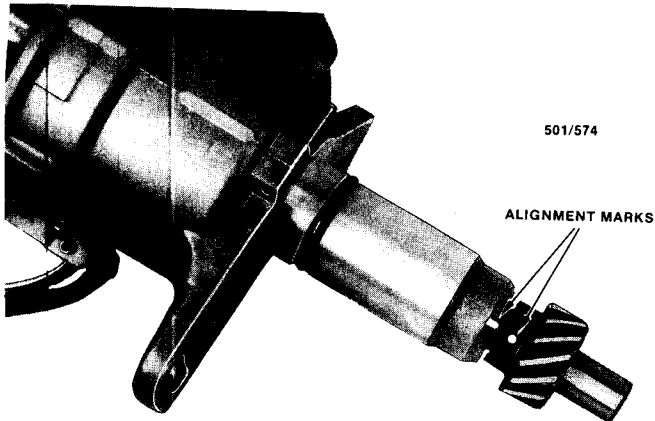
Dwell angle is not adjustable on electronic ignition systems and can only be measured using an oscilloscope. Some types of tachometers and timing lights are unsuitable for electronic ignition systems. Always ensure that suitable test equipment is used and correctly connected to the vehicles wiring circuits.

TO REMOVE AND INSTAL

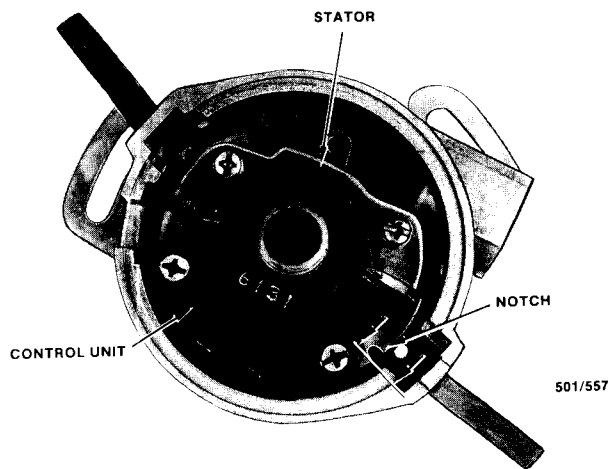
- (1) Remove the spare tyre from the carrier.
- (2) Disconnect the negative battery terminal.
- (3) Remove the distributor cap and secure it to one side.
- (4) Mark the relationship of the distributor to the crankcase.
- (5) Rotate the crankshaft in the normal direction of rotation until the rotor is positioned adjacent to the position in the distributor cap for No. 1 spark plug lead terminal and the timing mark on the flywheel is aligned to the pointer on the transaxle flywheel housing.
- (6) Remove the nuts retaining the wiring to the ignition coil and disconnect the wiring.
- (7) Remove the bolts retaining the distributor to the crankcase and lift the distributor from the crankcase.
- (8) Mark the relationship of the distributor shaft to the distributor body after the distributor is removed as an aid to installation.

Installation is a reversal of the removal procedure with attention to the following points:

- (1) Ensure that the engine has not been rotated. If the engine has been rotated with the distributor removed, remove the No. 1 spark plug and place a finger or compression gauge into the spark plug hole. Rotate the crankshaft in the normal direction of rotation until compression pressure is indicated. Continue to rotate the crankshaft until the timing marks on the flywheel and the flywheel housing are aligned.
- (2) Align the marks made on the distributor shaft and body after removal or, if necessary, align the mating marks on the drive gear and the distributor body and turn the shaft against the normal direction of rotation sufficiently to allow for the turn of the shaft as the distributor is installed.
- (3) Instal the distributor to the crankcase and align the marks made during removal. The distributor is correctly installed when the rotor is pointing to the position in the distributor cap for No. 1. spark plug lead terminal and the reluctor and stator poles are aligned. If necessary, remove the distributor and reset



View showing the alignment marks on the Hitachi electronic distributor drive gear.



View showing the alignment marks for the Hitachi electronic distributor base plate. The base plate should be aligned as shown.

the shaft position making allowances for the rotation of the shaft as the distributor is installed.

(4) Connect the distributor wiring to the ignition coil and tighten the retaining nuts securely.

(5) Check and adjust the ignition timing as described in the Engine Tune-up section.

TO DISMANTLE

Hitachi

(1) With the distributor removed from the vehicle, remove the rotor arm from the shaft.

(2) Remove the screw retaining the vacuum advance unit link to the distributor base plate and the screw retaining the vacuum advance unit to the distributor body and remove the advance unit from the distributor.

(3) Remove the distributor cap seal from the distributor body, remove the screw retaining the wiring harness to the distributor body and remove the wiring harness from the distributor.

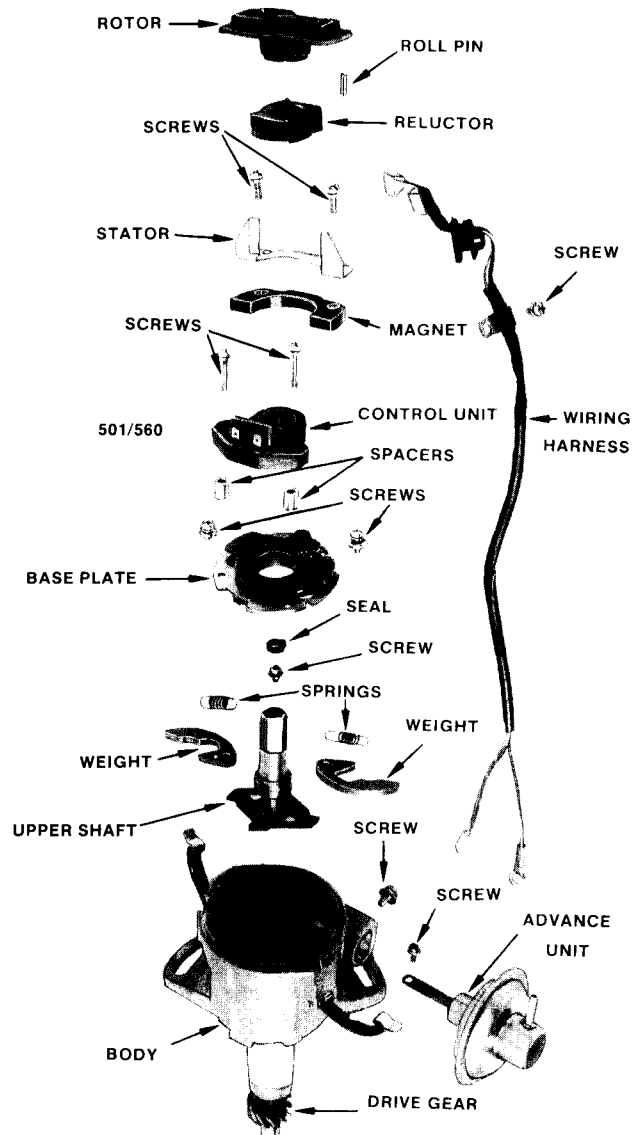
NOTE: Suitably mark the terminals as an aid to assembly and take care when removing the terminals from the control unit not to damage the wires or control unit.

(4) Carefully prise the reluctor from the shaft using two levers equally spaced and the body of the distributor as a pivot point. Take care not to misplace the roll pin.

(5) Suitably mark the relationship of the base plate to the distributor body.

NOTE: The base plate is not positively located in the distributor body, relying on the mounting screws and washers for retention. Therefore it is necessary to note the installed position before dismantling.

(6) Remove the screws retaining the base plate to the distributor body and remove the base plate.



Dismantled view of the Hitachi electronic distributor.

(7) Remove the screws retaining the control unit to the base plate and remove the control unit and spacers.

(8) Remove the screws retaining the stator and magnet to the base plate then remove the stator and magnet.

NOTE: The screws retaining the stator and magnet are non-magnetic stainless steel. Keep the screws to one side to avoid confusion during assembly. If the screws are to be renewed, use only screws of the same type.

(9) Suitably mark the centrifugal weights and springs to aid assembly and remove the seal from the top of the upper shaft.

(10) Remove the screw retaining the upper shaft to the lower shaft. Disconnect the centrifugal weight springs and remove the upper shaft from the distributor.

(11) Remove the centrifugal weights from the lower shaft.

NOTE: Further dismantling of the distributor should not be necessary.

Nippon Denso

(1) With the distributor removed from the vehicle, remove the rotor arm from the shaft.

(2) Remove the snap ring retaining the vacuum advance link to the distributor base plate and the screw retaining the advance unit to the distributor body and remove the advance unit from the distributor.

(3) Remove the screws retaining the control unit to the base plate and remove the control unit and wiring from the distributor.

(4) Remove the distributor cap seal from the distributor body. Remove the screws and square washers retaining the base plate to the distributor and remove the base plate noting the installed position of the base plate as an aid to assembly.

(5) Suitably mark the position of the centrifugal weight springs and disconnect the springs from the upper and lower shafts.

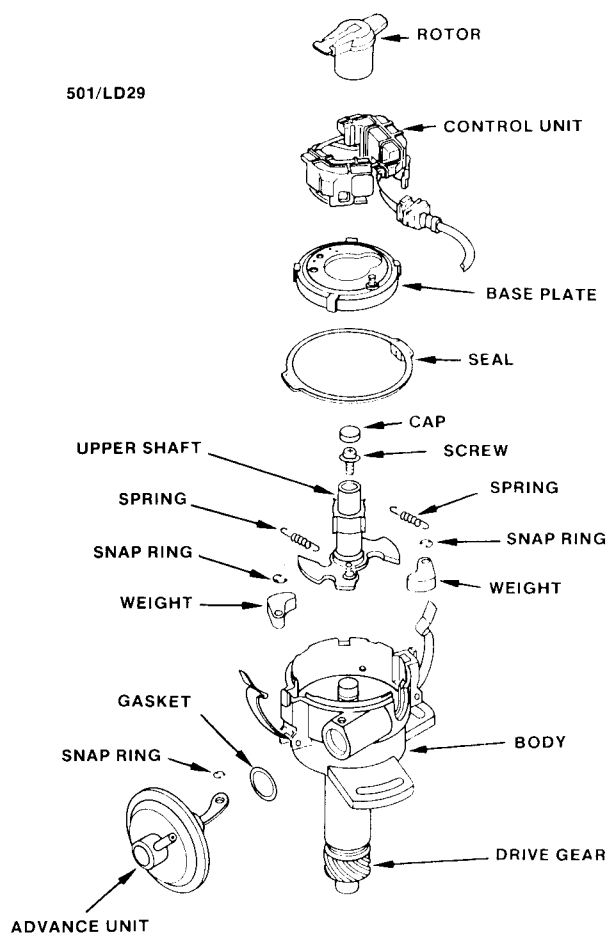
(6) Remove the cap from the centre of the upper shaft, remove the screw retaining the upper shaft to the lower shaft and remove the upper shaft from the distributor noting the position of the upper shaft in relation to the lower shaft as an aid to assembly.

(7) Remove the snap rings retaining the centrifugal weights to the lower shaft and remove the centrifugal weights from the distributor.

NOTE: Further dismantling of the distributor should not be necessary.

TO CHECK AND INSPECT

(1) Clean all parts thoroughly taking care not to immerse the control unit or vacuum advance unit in cleaning solvent.



Dismantled view of the Nippon Denso electronic distributor.

(2) Check the low tension wiring for possible fractures.

(3) Check the upper and lower shafts for distortion and wear. Renew the shafts and distributor body if there is excessive clearance between the shaft and distributor body.

(4) Check the reluctor for wear and damage. Do not dress the reluctor poles to rectify any faults, the reluctor must be renewed if wear or damage is evident.

(5) Where fitted, check the stator for wear and distortion. Renew the stator if wear or distortion is evident.

(6) Check that the base plate moves freely and is not distorted.

(7) Check that the centrifugal weights move freely on the pivots and that the springs are not distorted or stretched.

(8) Check the vacuum advance unit by pushing the link into the unit and placing a finger over the port. The link should not move out. If the operation of the unit is suspect it should be renewed.

(9) Check the high tension leads for damage and measure the resistance of each lead. Renew any lead if the reading is not within specification.

(10) Check the distributor cap for cracks, signs of arcing and corroded terminals.

(11) Check that the centre carbon brush is in a serviceable condition and protrudes at least 10 mm from the distributor cap.

(12) Check the rotor arm for cracks and signs of arcing.

TO ASSEMBLE

Hitachi

Assembly is a reversal of the removal procedure with attention to the following points:

(1) If the upper shaft has been removed from the distributor, align the mating mark on the drive gear with the projection on the distributor body and instal the upper shaft so that the rotor locating flat on the shaft is facing the position for number one cylinder.

NOTE: As the upper shaft may be installed in one of two positions, it is important that the alignment of the upper shaft is correct at this stage to allow the correct alignment of the distributor during installation.

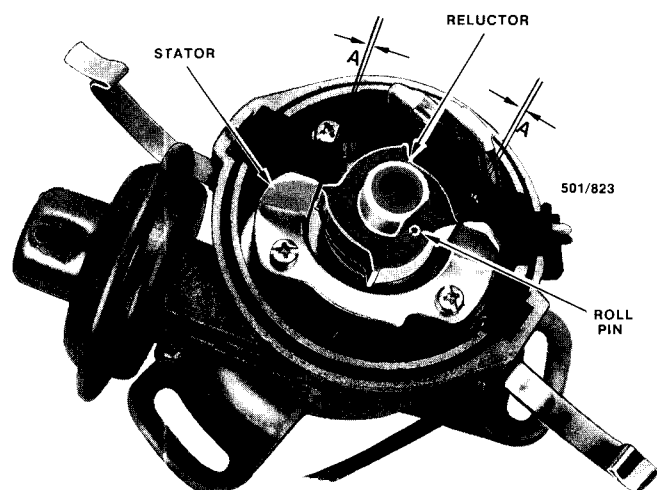
(2) Instal the centrifugal weights and springs to the positions noted during dismantling.

(3) Instal the stator and magnet to the base plate. Ensure that the non-magnetic screws are installed to the stator and magnet assembly.

(4) Instal the base plate to the marks made during dismantling.

(5) Instal the reluctor to the shaft and instal the roll pin so that the slot in the pin is parallel to the flat on the upper shaft. Refer to the illustration.

(6) Check that the air gap between the stator and magnet is between 0.3 and 0.5 mm. Adjust the air gap by loosening the screws and moving the stator and magnet on the base plate so that the air gap is to Specifications. Measure the air gap with non-magne-



View of the Hitachi electronic distributor showing the air gap and the installed position of the reluctor roll pin. Dimension A to be between 0.3 and 0.5 mm.

tic feeler gauges and ensure that the gap is equal on both sides of the stator.

(7) Instal the vacuum advance link to the base plate and the vacuum advance unit to the distributor body, instal and tighten the retaining screws securely.

(8) Instal the wiring harness to the distributor body, instal and tighten the retaining screw securely.

(9) Instal the rotor arm and check that the centrifugal weights are free to operate by turning the rotor arm against the centrifugal weight springs while holding the drive pinion. When the rotor arm is released it should return freely to the fully retarded position.

If the rotor arm is inclined to stick or does not return to the retarded position when released the cause should be located and rectified.

Nippon Denso

Assembly is a reversal of the dismantling procedure with attention to the following points:

(1) Instal the centrifugal weights to the lower shaft and instal the snap rings.

(2) Instal the upper shaft to the lower shaft in the position noted during dismantling. Instal the retaining screw and tighten securely. Instal the cap to the centre of the upper shaft.

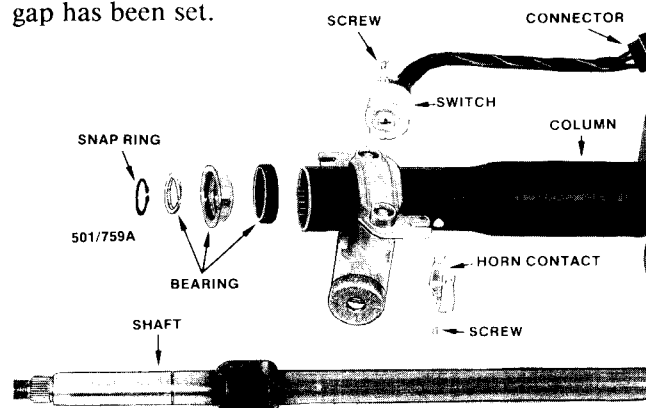
(3) Instal the centrifugal weight springs to the upper and lower shafts in the positions noted during dismantling.

(4) Instal the base plate to the distributor in the position noted during dismantling. Instal the retaining screws and square washers and tighten the retaining screws securely. Instal the distributor cap seal.

(5) Instal the control unit to the base plate and tighten the retaining screws temporarily.

(6) Align one of the reluctor projections with the projection on the control unit and measure the air gap with a non magnetic feeler gauge of the correct dimension. Refer to Specifications.

(7) If necessary, adjust the air gap by loosening the control unit mounting screws and moving the control unit on the base plate to obtain the correct gap. Tighten the retaining screws securely when the correct gap has been set.



Dismantled view of the steering column showing the location of the ignition switch, 1986 model shown.

(8) Install the vacuum advance unit to the distributor base plate, install the retaining screw and tighten securely. Install the snap ring retaining the advance unit link to the base plate.

(9) Install the rotor arm to the upper shaft and check that the centrifugal weights are free to operate by turning the rotor arm against the centrifugal weight springs while holding the drive pinion. When the rotor arm is released it should return freely to the fully retarded position.

If the rotor arm is inclined to stick or does not return to the retarded position when released, the cause should be located and rectified.

12. SWITCHES AND CONTROLS

IGNITION SWITCH

To Remove and Instal 1979–1984 and all Utility Models

- (1) Disconnect the negative battery terminal.
- (2) Remove the screws retaining the lower trim panel to the dashboard and remove the trim panel from the vehicle.
- (3) Remove the screws retaining the lower steering column cover to the steering column and remove the cover from the vehicle.
- (4) Disconnect the wiring connector by pulling on the connector not the wires.
- (5) Remove the screw(s) retaining the ignition switch to the steering column and withdraw the switch from the steering column.

Installation is a reversal of the removal procedure.

To Remove and Instal 1985–1987 Sedan and Station Wagon Models

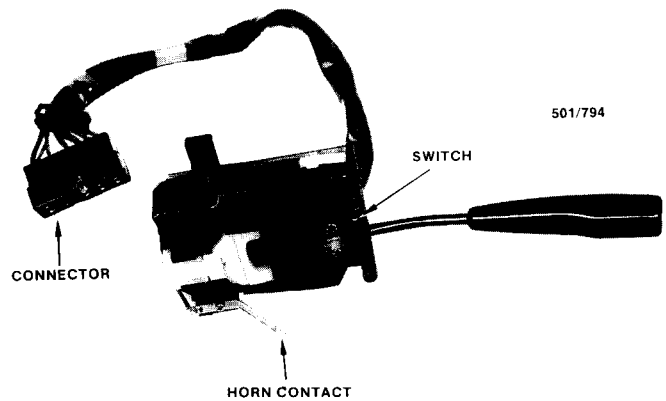
- (1) Disconnect the negative battery terminal.
- (2) Remove the self tapping screws and the screws in the plastic clips retaining the lower trim panel to the dashboard, disconnect the hose from the vent duct in the trim panel and withdraw the trim panel from the dashboard.
- (3) Remove the screws retaining the lower steering column cover to the steering column and remove the cover.
- (4) Disconnect the wiring connector by pulling on the connector not the wires.
- (5) Remove the screw retaining the ignition switch to the steering column and withdraw the ignition switch from the steering column.

Installation is a reversal of the removal procedure.

COMBINATION SWITCH

To Remove and Instal

- (1) Disconnect the negative battery terminal.
- (2) Remove the steering wheel as described later in this section under the Steering Wheel and Horn Control heading.
- (3) Remove the screws retaining the steering



View of the combination switch removed from the vehicle, 1986 model shown. The flasher unit is incorporated in the switch.

column covers to the steering column and remove the steering column lower cover.

(4) Disconnect the wiring connector by pulling on the connector not the wires.

(5) Withdraw the combination switch and upper steering column cover from the steering column.

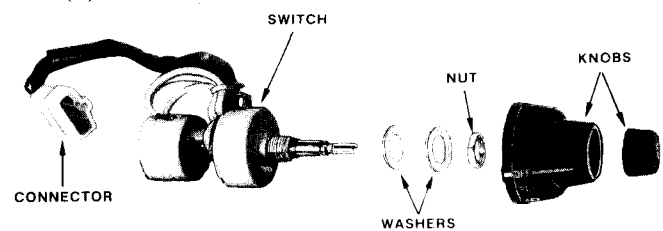
Installation is a reversal of the removal procedure with attention to the following points:

- (1) Install the upper steering column cover to the combination switch and install the combination switch and upper cover to the steering column.
- (2) Ensure that the wiring is routed correctly.

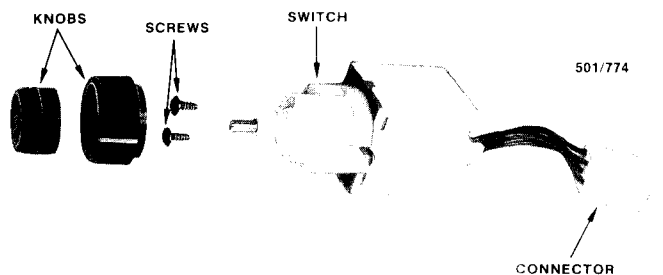
HEADLAMP SWITCH 1979–1986 MODELS

To Remove and Instal

- (1) Disconnect the negative battery terminal.
- (2) Remove the instrument cluster surround as



View of the headlamp switch removed from the vehicle, 1983 model shown.



View of the headlamp switch removed from the vehicle, 1986 model shown.

described under the Instrument Cluster heading later in this section.

(3) Remove the headlamp switch and instrument lamp control knobs from the switch shaft.

(4) Remove the nut or two screws retaining the switch to the instrument cluster surround and withdraw the switch from the rear of the surround.

Installation is a reversal of the removal procedure.

WIPER/WASHER SWITCH 1979-1986 MODELS

To Remove and Instal

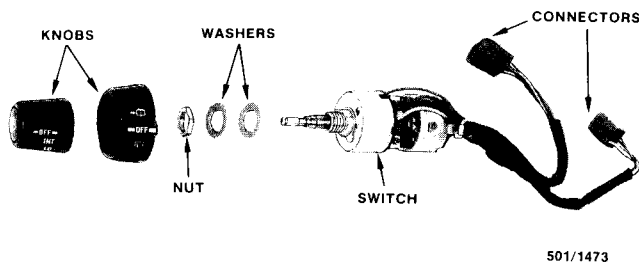
(1) Disconnect the negative battery terminal.

(2) Remove the Instrument cluster surround as described under the Instrument Cluster heading later in this section.

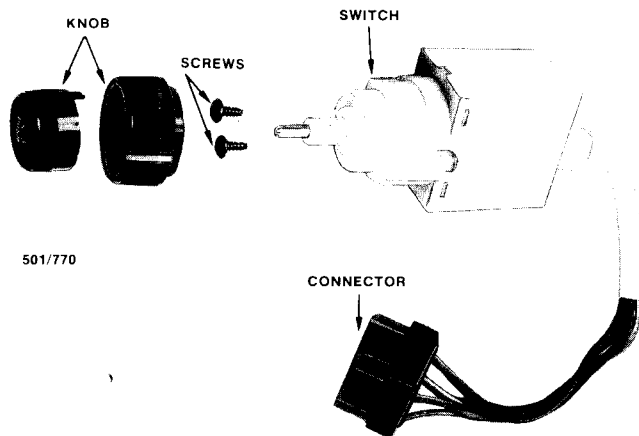
(3) Remove the wiper and washer switch knobs from the switch shaft.

(4) Remove the nut or two screws retaining the wiper/washer switch to the instrument cluster surround and withdraw the switch from the surround.

Installation is a reversal of the removal procedure.



View of the wiper/washer switch removed from the vehicle, 1983 Station Wagon model shown.



View of the wiper/washer switch removed from the vehicle, 1986 model shown.

REAR WIPER/WASHER SWITCH

To Remove and Instal 1979-1984 Models

The 1979-1984 Model rear wiper/washer switch is incorporated in the front wiper/washer switch.

Refer to the heading Wiper Washer Switch earlier in this section.

To Remove and Instal 1985-1987 Models

(1) Disconnect the negative battery terminal.

(2) Carefully prise the switch from the instrument cluster surround and withdraw it sufficiently to disconnect the wiring connector.

(3) Disconnect the wiring by pulling on the connector not the wires.

(4) Withdraw the switch from the instrument cluster surround.

Installation is a reversal of the removal procedure.

HEATER FAN SWITCH

To Remove and Instal 1979-1984 and all Utility Models

(1) Remove the heater control panel as described in the Cooling System section.

(2) Remove the nut retaining the heater fan switch to the heater control panel and withdraw the switch from the rear of the panel.

Installation is a reversal of the removal procedure.

To Remove and Instal 1985-1987 Sedan and Station Wagon Models

(1) Disconnect the negative battery terminal.

(2) Remove the instrument cluster surround as described under the heading Instrument Cluster later in this section.

(3) Remove the knob from the switch shaft.

(4) Remove the nut retaining the switch to the instrument cluster surround and withdraw the switch from the rear of the surround.

Installation is a reversal of the removal procedure.

REAR DEMISTER SWITCH

To Remove and Instal 1979-1984 and all Utility Models

(1) Disconnect the negative battery terminal.

(2) Remove the heater control panel as described in the Cooling System section.

(3) Disconnect the wiring connector by pulling on the connector not the wires.

(4) Remove the screws retaining the switch to the heater control panel and withdraw the switch from the panel.

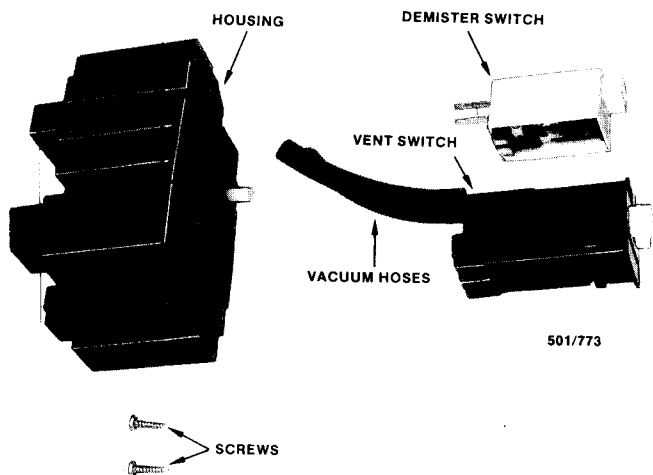
Installation is a reversal of the removal procedure.

To Remove and Instal 1985-1987 Sedan and Station Wagon Models

(1) Disconnect the negative battery terminal.

(2) Remove the instrument cluster surround as described under the heading Instrument cluster later in this section.

(3) Remove the screws retaining the rear demister switch and the heater fresh/recirculation mode switch housing to the surround and withdraw the assembly from the rear of the surround.



View of the rear demister switch and housing assembly removed from the instrument cluster surround, 1986 model shown.

(4) Withdraw the rear demister switch from the housing assembly.

Installation is a reversal of the removal procedure.

STOP LAMP SWITCH

To Remove and Instal

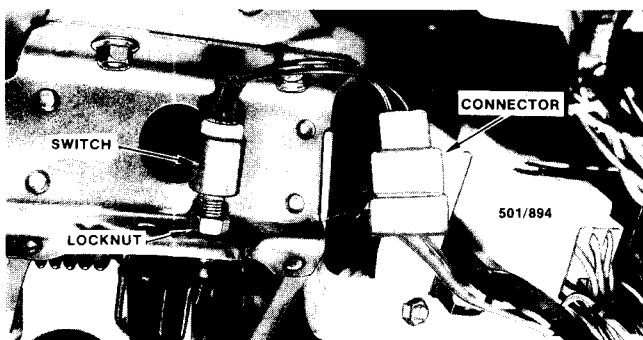
- (1) Disconnect the negative battery terminal.
- (2) Remove the screws retaining the lower trim panel to the dashboard and remove the trim panel.
- (3) Disconnect the wiring connector by pulling on the connector not the wires.
- (4) Remove the locknut from the stop lamp switch and unscrew the switch from the pedal support bracket.

Installation is a reversal of the removal procedure with attention to the following point:

Adjust the stop lamp switch as described in the Brakes section.

To Test

- (1) Remove the switch as previously described.
- (2) Connect a suitable ohmmeter between the terminals on the switch.
- (3) With the plunger of the switch depressed 1.8–3.3 mm, continuity should be present. With the



Installed view of the stop lamp switch, 1986 model shown.

plunger of the switch released, continuity should not be present.

REVERSE LAMP SWITCH — MANUAL TRANSAXLE MODELS

To Remove and Instal

- (1) Disconnect the negative battery terminal.
- (2) Disconnect the wiring connector by pulling on the connector not the wires. Refer to the Manual Transaxle section for the location of the reverse lamp switch.

- (3) Unscrew the switch from the side of the transaxle case.

Installation is a reversal of the removal procedure.

NEUTRAL SAFETY/REVERSE LAMP SWITCH — AUTOMATIC TRANSAXLE MODELS

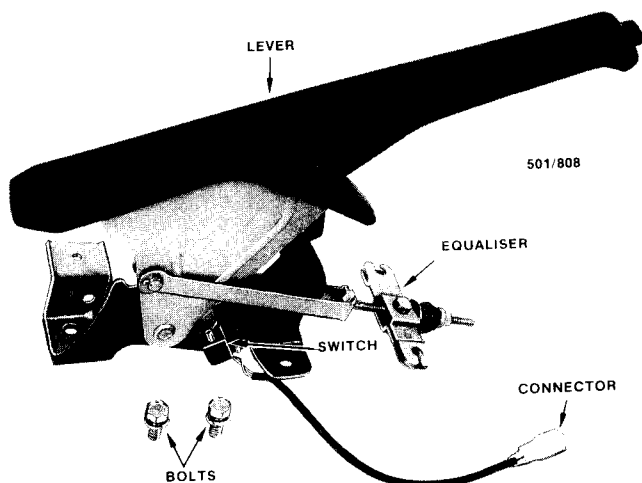
The removal and installation procedures for the neutral safety/reverse lamp switch are fully covered in the Automatic Transaxle section.

HANDBRAKE WARNING LAMP SWITCH

To Remove and Instal

- (1) Disconnect the negative battery terminal.
- (2) Remove the centre console from the vehicle as described in the Body section.
- (3) Disconnect the wiring by pulling on the connector not the wires.
- (4) Remove the screw retaining the switch to the handbrake assembly and remove the switch from the vehicle.

Installation is a reversal of the removal procedure.

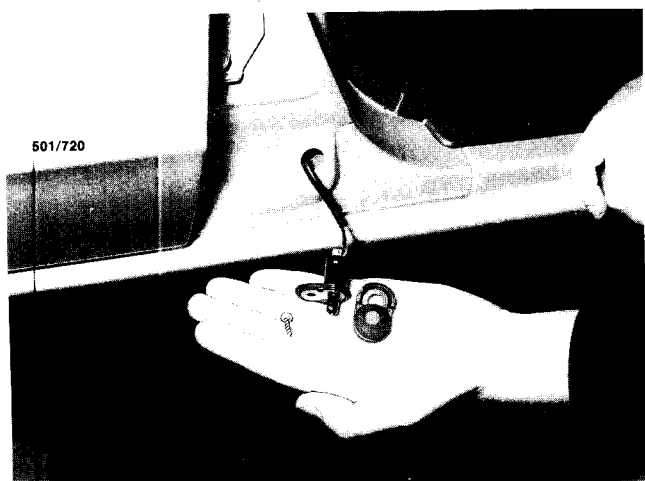


View of the handbrake assembly showing the location of the handbrake switch, 1986 model shown.

COURTESY LAMP DOOR SWITCH

To Remove and Instal

- (1) Disconnect the negative battery terminal.
- (2) Remove the screw retaining the switch to the



View of the courtesy lamp door switch removed from the vehicle, 1986 model shown.

door pillar and withdraw the switch sufficiently to disconnect the wiring connector.

(3) Disconnect the wiring by pulling on the connector not the wires and remove the switch from the vehicle.

Installation is a reversal of the removal procedure.

COURTESY LAMP TAILGATE SWITCH

To Remove and Instal

The luggage compartment lamp switch is incorporated in the tailgate lock assembly. Refer to the Body section for Removal and Installation procedures.

13. STEERING WHEEL AND HORN CONTROL

TO REMOVE AND INSTAL

(1) Disconnect the negative battery terminal.

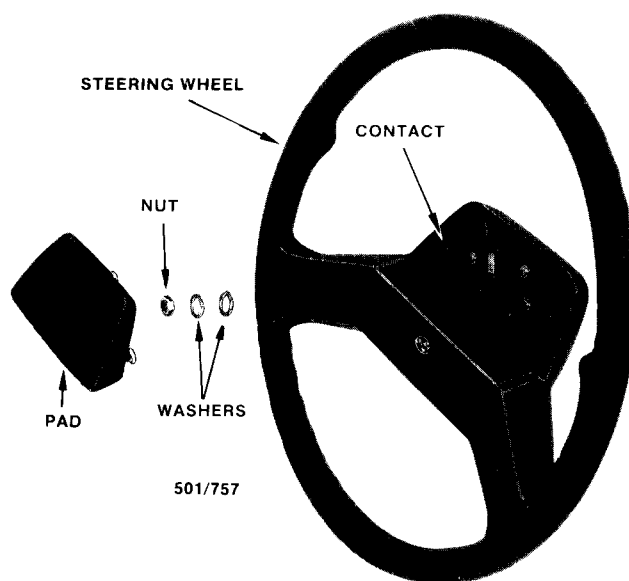
(2) Remove the horn pad by removing the screws from the rear of the steering wheel on two and four spoke steering wheels or carefully prising the horn pad from the centre of the steering wheel on soft grip steering wheels.

(3) Where installed, remove the screw/s retaining the contact strip to the steering wheel and withdraw the strip from the steering wheel while disconnecting the terminal.

(4) Suitably mark the relationship of the steering wheel to the steering shaft, remove the nut retaining the steering wheel to the steering shaft and, using a suitable puller, remove the steering wheel from the shaft.

NOTE: Do not strike the end of the puller or the steering shaft to free the steering wheel from the shaft or damage to the energy absorbing components of the steering column may occur.

(5) Remove the screws retaining the steering



Dismantled view of the steering wheel, 1986 model shown.

column upper and lower covers to the steering column and withdraw the covers from the vehicle.

(6) Remove the screw retaining the lower horn control to the combination switch and unsolder the contact from the wire.

(7) Where applicable, remove the screw retaining the earth contact to the steering column and remove the earth contact from the steering column.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Ensure that the horn contacts are clean and free from corrosion.

(2) Ensure that the horn contacts are in the correct position to contact the steering shaft and the underside of the steering wheel and have sufficient tension to maintain electrical contact with the steering wheel and steering shaft.

(3) Instal the steering wheel to the marks made during removal.

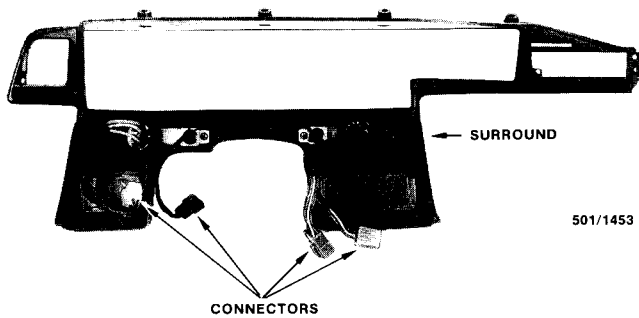
14. INSTRUMENT CLUSTER

TO REMOVE AND INSTAL 1979-1984 AND ALL UTILITY MODELS

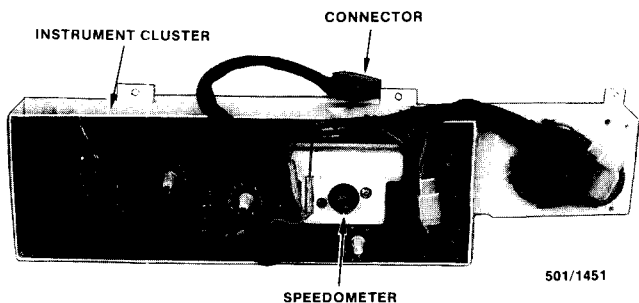
(1) Disconnect the negative battery terminal.

(2) Remove the screws retaining the instrument cluster surround to the dashboard and, on some models, remove the vent lever knob by carefully pulling it from the lever. The screws in the vent areas are covered by plastic covers, carefully prise the covers from the surround to gain access to the screws.

(3) Withdraw the instrument cluster surround from the dashboard, disconnect the wiring connectors by pulling on the connectors not the wires and remove the surround from the vehicle.



Rear view of the instrument cluster surround, 1983 model shown.



Rear view of the instrument cluster, 1983 electronic type shown.

NOTE: It may be necessary to lower the steering column slightly to remove the instrument cluster surround from the vehicle. Refer to the Steering section if necessary.

(4) Remove the screws retaining the instrument cluster to the dashboard and withdraw the instrument cluster sufficiently to disconnect the speedometer cable and the wiring connectors.

NOTE: It may be necessary to disconnect the speedometer cable from the transaxle to allow the instrument cluster to be withdrawn sufficiently to gain access to the speedometer and wiring connectors.

(5) Disconnect the speedometer cable from the speedometer head by easing the cable out from the speedometer head.

Disconnect the wiring connectors by pulling on the connectors not the wires and remove the instrument cluster from the dashboard.

Installation is a reversal of the removal procedure with attention to the following point:

Ensure that the speedometer cable is correctly located in the speedometer head.

TO REMOVE AND INSTALL 1985-1987 SEDAN AND STATION WAGON MODELS

- (1) Disconnect the negative battery terminal.
- (2) Remove the self tapping screws and the screws from the plastic plugs retaining the lower trim

panel to the dashboard, disconnect the hose from the vent duct in the trim panel and withdraw the trim panel from the vehicle.

(3) Remove the screws retaining the upper and lower steering column covers to the steering column and remove the lower steering column cover.

(4) Disconnect the combination switch wiring connector and withdraw the combination switch and upper steering column cover from the steering column.

(5) Disconnect the heater temperature control cable from the heater unit.

(6) Remove the screws retaining the instrument cluster surround to the dashboard and carefully prise the surround from the dashboard. The surround is retained to the dashboard by lugs moulded into the surround as well as the retaining screws, therefore use care not to damage the surround when removing it from the dashboard.

(7) Withdraw the instrument cluster surround sufficiently to disconnect the wiring connectors and the heater control vacuum hoses.

(8) Disconnect the wiring connectors by pulling on the connectors not the wires and remove the instrument cluster surround from the vehicle.

(9) Note the installed positions of the vacuum hoses on the heater controls and disconnect the hoses from the controls.

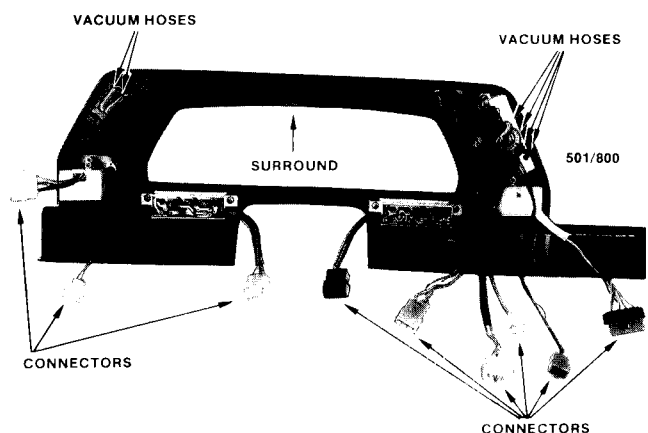
(10) Withdraw the instrument cluster surround from the vehicle.

(11) Reach up behind the instrument cluster to the left of the steering column and disconnect the speedometer cable from the speedometer head by pulling the cable from the speedometer head.

(12) Remove the screws retaining the instrument cluster to the dashboard and withdraw the instrument cluster sufficiently to disconnect the wiring.

(13) Disconnect the wiring by pulling on the connectors not the wires and withdraw the instrument cluster from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:



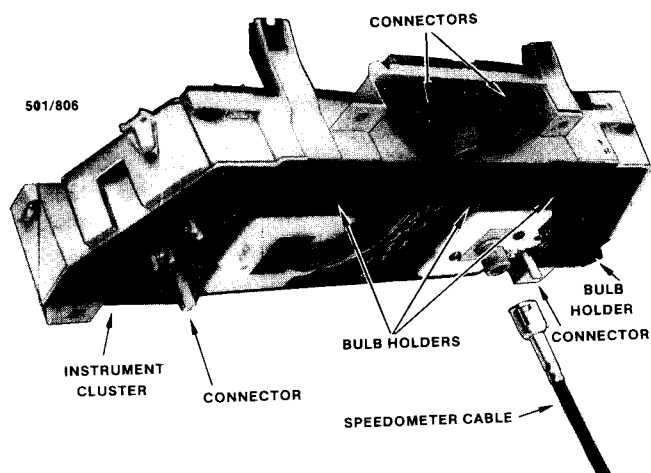
Rear view of the instrument cluster surround, 1986 model shown.

(1) Ensure that the speedometer cable is correctly located in the speedometer head.

(2) Adjust the heater temperature cable as described in the Cooling System section.

(3) Ensure that the wiring and vacuum hoses are correctly routed.

(4) Install the combination switch to the upper steering column cover and install the combination switch and upper cover to the steering column.



View of the instrument cluster removed from the vehicle, 1986 model shown.

15. SPEEDOMETER CABLE

TO REMOVE AND INSTALL

(1) Disconnect the negative battery terminal.

(2) Working in the engine compartment, unscrew the speedometer cable assembly from the trans-axle.

(3) Disconnect all cable clips from the speedometer cable.

(4) Working inside the vehicle under the dash, reach up under the instrument cluster at the left hand side of the steering column and disconnect the speedometer cable by pulling the cable from the speedometer head.

(5) Prise the grommet from the bulkhead and withdraw the speedometer cable from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Ensure that the speedometer cable is not kinked and that there are no sharp bends.

(2) Ensure that the cable is correctly installed to the speedometer head and that the inner cable is fully engaged with the speedometer head.

16. HEATER BLOWER MOTOR

TO REMOVE AND INSTALL 1979-1984 AND ALL UTILITY MODELS

(1) Disconnect the negative battery terminal.

(2) Remove the screws retaining the parcel shelf and lower trim panel to the dashboard. Remove the parcel shelf and trim panel from the vehicle.

(3) Remove the screws retaining the glove compartment lid to the dashboard and manoeuvre the lid from the dashboard.

(4) Rotate the glove compartment lamp and withdraw the lamp into the glove compartment.

(5) Remove the screws retaining the glove compartment to the dashboard.

(6) Disconnect the vacuum hose clamp from the lower edge of the glove compartment and withdraw the glove compartment sufficiently to disconnect the wiring connector.

(7) Disconnect the wiring connector by pulling on the connector not the wires and remove the glove compartment from the vehicle.

(8) Disconnect the heater duct from the fresh air duct and remove the heater duct from the vehicle.

(9) Disconnect the wiring connector from the blower motor by pulling on the connector not the wires.

(10) Remove the hose from the vacuum servo. Remove the screws retaining the vacuum servo to the fresh air duct and remove the servo from the duct.

(11) Remove the nuts and bolt retaining the fresh air duct to the vehicle body and remove the duct from the vehicle.

(12) Remove the screws retaining the heater blower motor to the fresh air duct and remove the blower motor from the duct.

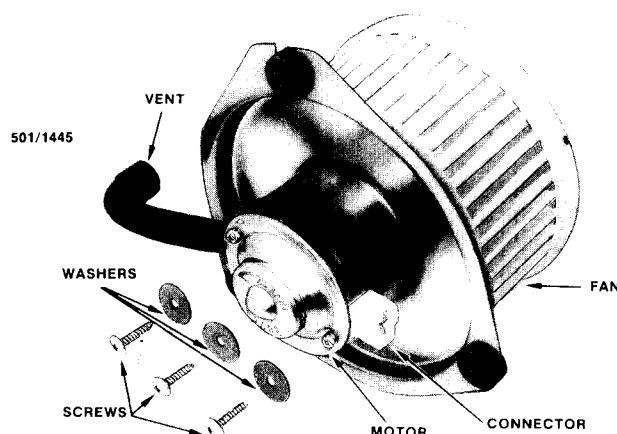
Installation is a reversal of the removal procedure.

TO REMOVE AND INSTALL 1985-1987 SEDAN AND STATION WAGON MODELS

(1) Disconnect the negative battery terminal.

(2) Remove the screws retaining the left hand lower trim panel to the dashboard and withdraw the panel from the dashboard.

(3) Disconnect the wiring from the blower motor assembly by pulling on the connectors not the wires.



View of heater blower motor removed from the vehicle, 1986 model shown.

(4) Remove the screws retaining the resistor block to the footwell fresh air duct and remove the resistor block from the duct.

(5) Remove the screws retaining the blower motor assembly to the footwell fresh air duct and withdraw the blower motor assembly from the duct.

(6) Disconnect the wiring connector by pulling on the connector not the wires.

Installation is a reversal of the removal procedure.

17. LAMP UNITS

PARK LAMP — TWIN HEADLAMP MODELS

To Remove and Instal

(1) Remove the screws retaining the park lamp to the headlamp surround.

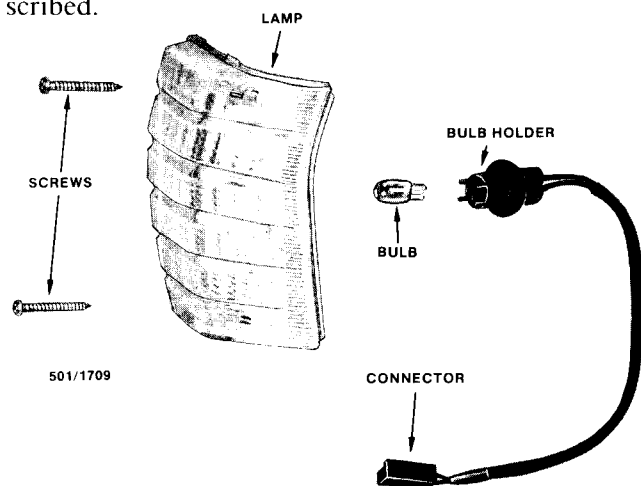
(2) Withdraw the park lamp from the headlamp surround sufficiently to remove the bulb holder.

(3) Remove the bulb holder by turning anti-clockwise and remove the park lamp from the vehicle.

Installation is a reversal of the removal procedure.

To Renew Bulb

(1) Remove the park lamp as previously described.



Dismantled view of the park lamp. Twin headlamp model shown.

(2) Remove the baseless bulb by pulling it from the bulb holder.

(3) Ensure that the bulb holder is free from corrosion and instal the new bulb to the bulb holder.

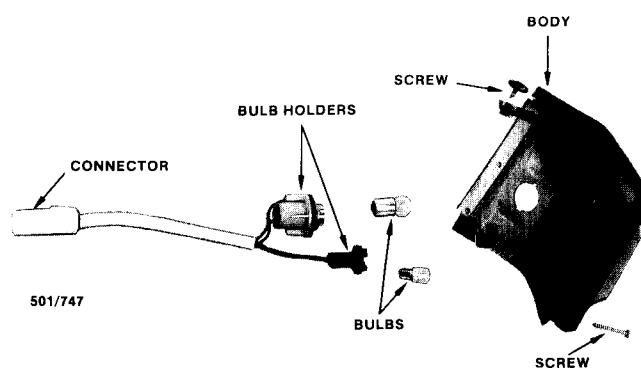
(4) Instal the bulb holder to the lamp. Instal the lamp to the headlamp surround and instal and tighten the retaining screws securely.

COMBINATION LAMP — SINGLE HEADLAMP MODELS

To Remove and Instal

(1) Remove the screws retaining the combination lamp to the headlamp surround.

(2) Withdraw the combination lamp sufficiently to remove the bulb holders.



Dismantled view of the front combination lamp, 1986 model shown.

(3) Remove the bulb holders by turning anti-clockwise and remove the lamp from the vehicle.

Installation is a reversal of the removal procedure.

To Renew Bulb

(1) Remove the combination lamp as previously described.

(2) Remove the bulb holder by turning anti-clockwise.

(3) Remove the bayonet pin bulb by pressing in slightly and turning it anti-clockwise. Remove the baseless bulb by pulling it from the bulb holder.

(4) Ensure that the bulb holder is free from corrosion and instal the new bulb.

(5) Instal the bulb holder to the combination lamp. Instal the lamp to the vehicle and instal and tighten the retaining screws securely.

HEADLAMP

To Renew Bulb 1979-1984 and all Utility Models

The headlamps on 1979-1984 models are sealed beam units. Refer to the heading To Remove and Instal.

To Renew Bulb 1985-1987 Sedan and Station Wagon Models

(1) Working in the engine compartment, disconnect the wiring connector by pulling on the connector not the wires.

(2) Remove the dust cover from the rear of the lamp assembly.

(3) Disconnect the retaining clip from the bulb holder and remove the bulb from the bulb holder.

NOTE: Extreme care should be taken not to touch the glass section of the halogen bulb, otherwise the life of the bulb will be shortened. If the glass is inadvertently touched or becomes contaminated with grease etc. it should be cleaned with methylated spirits.

(4) Instal the new bulb to the bulb holder ensuring that the locating tab on the bulb is correctly aligned to the cutout in the bulb holder.

(5) Retain the bulb in the bulb holder with the clip and instal the dust cover and wiring connector.

To Remove and Instal 1979–1984 and all Utility Models

(1) Working in the engine compartment, disconnect the headlamp wiring connector by pulling on the connector not the wires.

(2) Remove the screws retaining the radiator grille to the vehicle body and remove the grille from the vehicle.

(3) Remove the park lamp from the vehicle as previously described.

(4) Remove the screws retaining the headlamp surround assembly to the vehicle body and remove the surround assembly from the vehicle.

(5) Remove the screws retaining the headlamp retaining ring to the headlamp mounting bracket. Support the headlamp and remove the retaining ring. Remove the headlamp from the vehicle.

Installation is a reversal of the removal procedure with attention to the following point:

Adjust the headlamps as described later in this section.

To Remove and Instal 1985–1987 Sedan and Station Wagon Models

(1) Working in the engine compartment, disconnect the headlamp wiring connector by pulling on the connector not the wires.

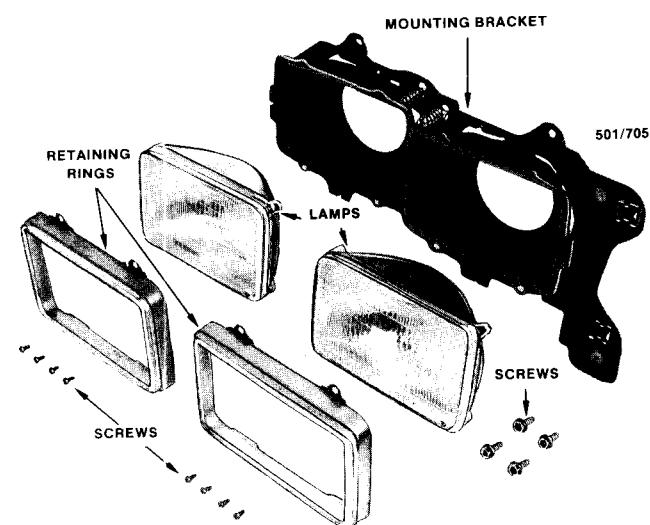
(2) Remove the front combination lamp from the vehicle as previously described.

(3) Remove the grille from the vehicle as described in the Body section.

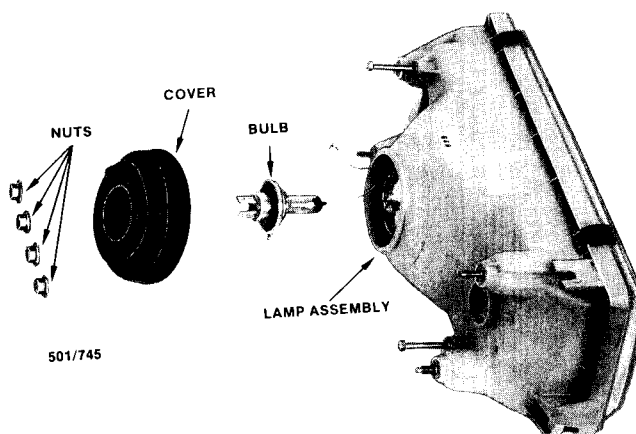
(4) Remove the screws retaining the headlamp surround to the vehicle and remove the surround.

(5) Remove the nuts retaining the headlamp assembly to the vehicle body and manoeuvre the headlamp from the vehicle by rotating it 90 deg clockwise as it is withdrawn from the vehicle.

Installation is a reversal of the removal procedure with attention to the following point:



Dismantled view of the headlamps. Twin headlamp model shown.



View of the headlamp removed from the vehicle, 1986 model shown.

Adjust the headlamps as described under the following heading.

To Adjust Headlamps

(1) Ensure that the tyres are inflated to the correct pressures and that the vehicle is in an unladen condition with the normal equipment installed and a full tank of fuel.

(2) Position the vehicle on level ground and square to the test equipment being used.

(3) Switch on the headlamps and select high beam.

(4) If a headlamp aiming machine is used, follow the manufacturer's instructions.

(5) If an aiming board is used, position the vehicle three metres from and square to the aiming board.

(6) For models with single headlamps, cover the headlamp not being adjusted.

The headlamp is correctly adjusted when the centre point of the projected 'hot spot' strikes the aiming board at a point 21 mm below the horizontal and coincident with the vertical centre line of the headlamp. Repeat the operation for the remaining headlamp. Refer to the diagram.

(7) For models with twin headlamps proceed as follows:

(a) Select main beam and cover both outer headlamps and the inner headlamp not being adjusted.

(b) The headlamp is correctly adjusted when the centre point of the projected 'hot spot' strikes the aiming board at a point 21 mm below the horizontal and coincident with the vertical centre lines of the headlamp. Repeat items (a) and (b) for the remaining inner headlamp.

(c) Select low beam and cover the outer headlamp not being adjusted.

(d) The headlamp is correctly adjusted when the upper edge of the 'hot spot' contacts the horizontal centre line and the right hand edge of the 'hot spot' contacts the vertical centre line of the headlamp on

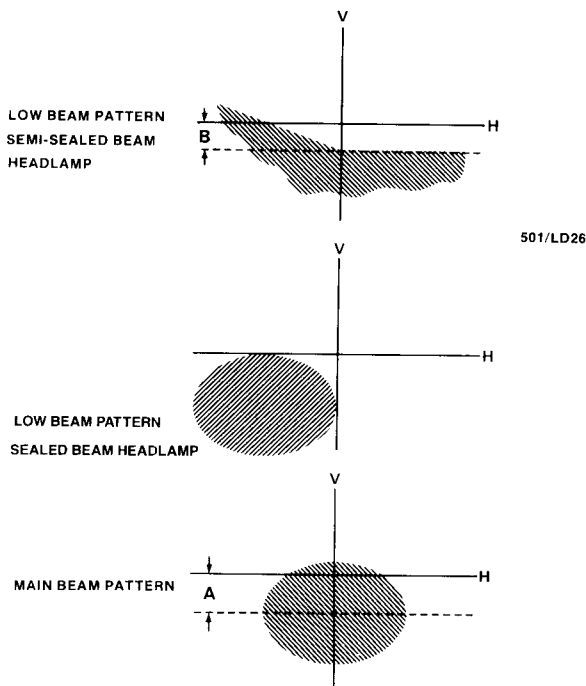
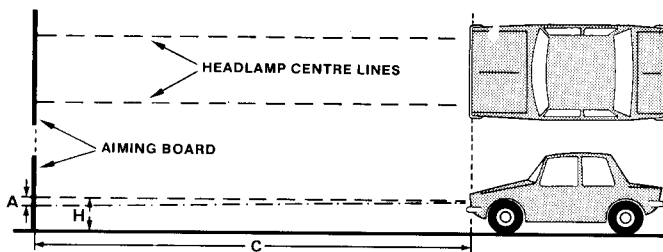
the aiming board. Repeat items (c) and (d) for the remaining outer headlamp. Refer to the diagram.

(e) Low beam adjustment on 1985–1987 Sedan and Station Wagon models having semi-sealed beam headlamp units should be made as follows. Select low beam and cover the lamp not being adjusted.

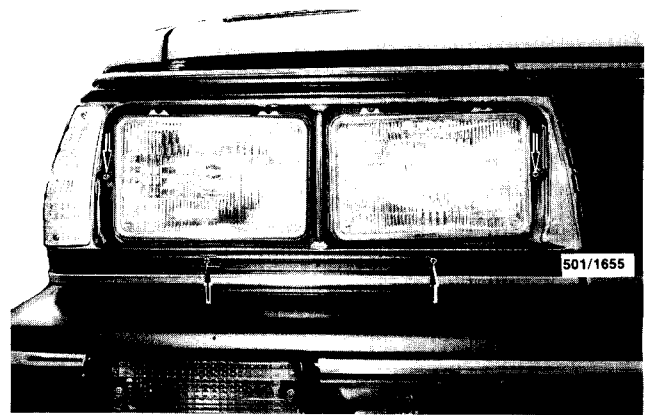
(f) The headlamp is correctly adjusted when the point of cut-off coincides with the vertical centre line and at a point 30 mm below the horizontal centre line of the headlamp. Repeat items (e) and (f) for the remaining headlamp. Refer to the diagram.

NOTE: It is not necessary to adjust the low beam on models having sealed beam headlamps. Adjustment is made on high beam only.

(8) To adjust the headlamp vertically, turn the lower adjusting screw accessible from the front of the headlamp on 1979–1984 and Utility models and from



Line drawing providing essential dimensions for the adjustment of headlamp aim. V and H are the vertical and horizontal centre lines of the headlamp respectively. On high beam, dimension A = 21 mm, for low beam with semi-sealed headlamps dimension B = 30 mm. Dimension C = 3 m. Refer to the text for method of adjustment.



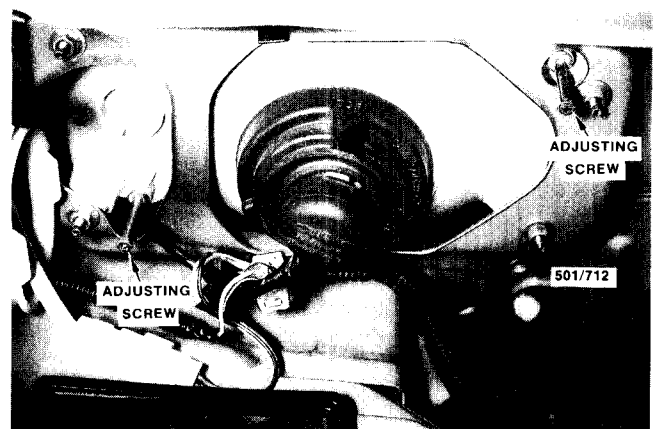
View showing the headlamp adjusting screws, 1983 twin headlamp model shown.



View showing the headlamp adjusting screws, 1981 model shown.

the rear of the headlamp on 1985–1987 Sedan and Station Wagon models.

(9) To adjust the headlamp horizontally, turn the upper adjusting screw accessible from the front of the headlamp on 1979–1984 and Utility models and from the rear of the headlamp on 1985–1987 Sedan and Station Wagon models.



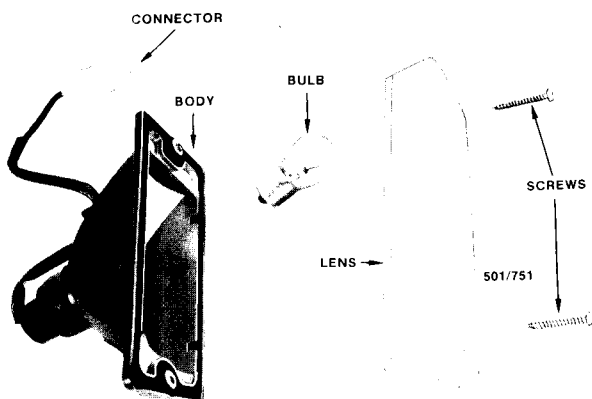
Rear view of the headlamp showing the adjusting screws, 1986 model shown.

NOTE: Reference should be made to local government regulations governing headlamp aim and the headlamps adjusted accordingly.

FRONT TURN SIGNAL LAMP — BUMPER MOUNTED

To Renew Bulb

- (1) Remove the screws retaining the lamp and lens assembly to the bumper and carefully prise the lens from the lamp body.
- (2) Remove the bulb from the bulb holder by pressing it in slightly, rotating it anti-clockwise and withdrawing the bulb from the holder.
- (3) Ensure that the bulb holder is free from corrosion and instal the new bulb. Instal the lens and tighten the retaining screws.



Dismantled view of the front bumper mounted turn signal lamp, 1986 model shown.

To Remove and Instal

- (1) Remove the screws retaining the lamp and lens assembly to the bumper and withdraw the lamp sufficiently to disconnect the wiring connector.
- (2) Disconnect the wiring connector by pulling on the connector not the wires and remove the lamp from the vehicle.

Installation is a reversal of the removal procedure.

FRONT TURN SIGNAL REPEATER LAMP — FENDER MOUNTED

To Renew Bulb

- (1) Remove the screws retaining the lamp and lens to the front fender and remove the lens.
- (2) Remove the bulb by pulling it from the bulb holder.
- (3) Ensure that the bulb holder is free from corrosion and instal the new bulb by pushing it into the bulb holder. Instal the lens and tighten the retaining screws.

To Remove and Instal

- (1) Remove the screws retaining the repeater lamp to the front fender and withdraw the lamp sufficiently to allow the wiring to be disconnected.

- (2) Disconnect the wiring by pulling on the connector not the wires and remove the lamp from the vehicle.

Installation is a reversal of the removal procedure.

REAR COMBINATION LAMP

To Renew Bulb 1979–1984 Sedan and Coupe

- (1) Where fitted, remove the luggage compartment trim panel.
- (2) Remove the relevant bulb holder from the lamp by it turning anti-clockwise.
- (3) Remove the bulb by pressing it in slightly and turning it anti-clockwise.
- (4) Ensure that the bulb holder is free from corrosion and instal the new bulb.
- (5) Instal the bulb holder to the lamp body and the trim panel to the vehicle body.



View showing the bulb holder and bulb removed from the rear combination lamp, 1983 Coupe shown.

To Renew Bulb 1985–1987 Sedan

- (1) Where fitted, remove the luggage compartment trim panel.
- (2) Remove the bulb holder from the rear of the lamp body.
- (3) Remove the relevant bulb from the bulb holder by pushing it in slightly and turning it anti-clockwise.
- (4) Ensure that the bulb holder is free from corrosion and instal the new bulb.
- (5) Instal the bulb holder to the lamp body and the trim panel to the vehicle.

To Renew Bulb 1979–1984 Station Wagon

- (1) Remove the screws retaining the combination lamp to the vehicle body and withdraw the lamp sufficiently to remove the bulb holders.
- (2) Remove the relevant bulb holder from the lamp by turning it anti-clockwise.
- (3) Remove the relevant bulb from the bulb holder by pressing it in slightly and turning it anti-clockwise.
- (4) Ensure that the bulb holder is free from

corrosion and instal the new bulb to the bulb holder. Instal the bulb holder to the lamp body.

(5) Instal the lamp to the vehicle and tighten the retaining screws securely.

To Renew Bulb 1985-1987 Station Wagon

(1) Depress the locktab on the rear interior trim panel and remove the trim panel.

(2) Remove the relevant bulb holder from the lamp by turning it anti-clockwise.

(3) Remove the bulb from the bulb holder by pressing it in slightly and turning it anti-clockwise.

(4) Ensure that the bulb holder is free from corrosion and instal the new bulb to the bulb holder. Instal the bulb holder to the lamp body and instal the trim panel to the vehicle.

To Renew Bulb-Utility

(1) Remove the screws retaining the combination lamp to the vehicle body and withdraw the lamp sufficiently to remove the bulb holders.

(2) Remove the bulb holders from the lamp assembly by turning them anti-clockwise and remove the lamp assembly from the vehicle.

(3) Remove the bulb from the bulb holder by pressing it in slightly and turning it anti-clockwise.

(4) Ensure that the bulb holder is free from corrosion and instal the new bulb to the bulb holder.

(5) Instal the bulb holders to the lamp body, instal the lamp assembly to the vehicle and tighten the retaining screws.

To Remove and Instal-Sedan and Coupe

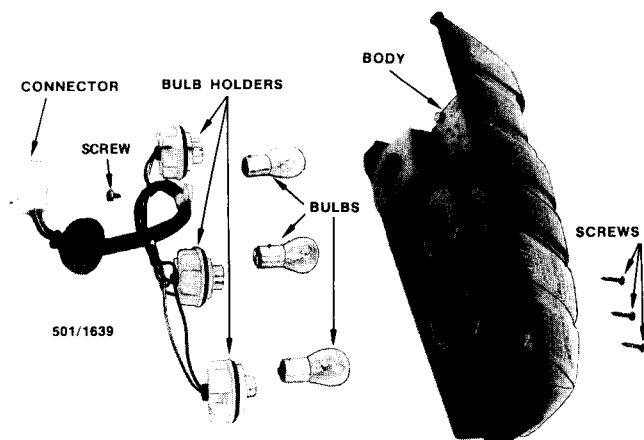
(1) Where fitted, remove the luggage compartment trim panel.

(2) Disconnect the wiring connector by pulling on the connector not the wires.

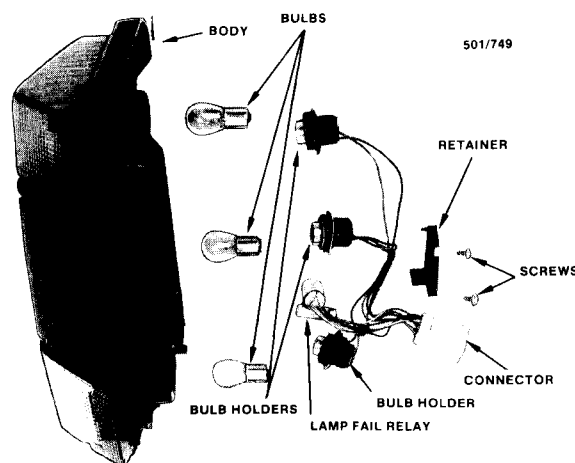
(3) Remove the nuts retaining the lamp to the rear panel and withdraw the lamp from the vehicle.

Installation is a reversal of the removal procedure with attention to the following point:

Apply a suitable sealant to the lamp body to



Dismantled view of the rear combination lamp, 1983 Station Wagon shown.



Dismantled view of the rear combination lamp, 1986 Station Wagon shown.

ensure a weatherproof seal between the lamp and the vehicle body.

To Remove the Instal 1979-1984 Station Wagon

(1) Remove the screws retaining the combination lamp to the vehicle and withdraw the lamp sufficiently to remove the bulb holders.

(2) Remove the bulb holders from the lamp by turning them anti-clockwise and withdraw the lamp assembly from the vehicle.

(3) If the bulb holders are to be removed from the vehicle, carefully prise the wiring grommet from the lamp mounting panel and withdraw the wiring sufficiently to disconnect the wiring connector.

Installation is a reversal of the removal procedure.

To Remove and Instal 1985-1987 Station Wagon

(1) Depress the locktab on the rear interior trim panel and remove the trim panel.

(2) Remove the bulb holders from the lamp by turning them anti-clockwise.

(3) Remove the nuts retaining the combination lamp to the vehicle body and carefully prise the lamp from the vehicle body.

Installation is a reversal of the removal procedure with attention to the following point:

Apply a suitable sealant to the lamp body to ensure a weather proof seal between the lamp and the vehicle body.

To Remove and Instal — Utility

(1) Remove the screws retaining the combination lamp to the vehicle body and withdraw the lamp sufficiently to remove the bulb holders.

(2) Remove the bulb holders from the lamp assembly by turning them anti-clockwise and remove the lamp assembly from the vehicle.

Installation is a reversal of the removal procedure.

NUMBER PLATE LAMP

To Remove and Instal 1979-1984 Sedan and Coupe

(1) Working in the luggage compartment, dis-

connect the wiring by pulling on the connectors not the wires.

(2) Remove the nuts retaining the lamp to the rear panel and withdraw the lamp and wiring from the vehicle.

Installation is a reversal of the removal procedure.

To Remove and Instal 1985–1986 Sedan

(1) Remove the screws retaining the lamp to the rear bumper.

(2) Remove the lens and cover from the upper side of the bumper and withdraw the lamp from the lower side of the bumper.

(3) Disconnect the wiring connector.

Installation is a reversal of the removal procedure.

To Remove and Instal 1979–1987 Station Wagon

(1) Remove the screws retaining the lamp to the vehicle tailgate.

(2) Withdraw the lamp sufficiently to disconnect the wiring.

(3) Disconnect the wiring by pulling on the connectors not the wires and withdraw the lamp from the tailgate.

Installation is a reversal of the removal procedure.

To Remove and Instal — Utility

(1) Disconnect the wiring connector by pulling on the connector not the wires.

(2) Remove the screws retaining the lamp to the vehicle body and withdraw the lamp from the vehicle.

Installation is a reversal of the removal procedure.

To Renew Bulb 1979–1984 Sedan and Coupe

(1) Remove the number plate lamp assembly as previously described.

(2) Remove the screws retaining the lens to the lamp body.

(3) Remove the bulb by pulling it from the bulb holder.

(4) Ensure that the bulb holder is free from corrosion and instal the new bulb to the bulb holder.

(5) Instal the lamp assembly to the vehicle rear panel.

To Renew Bulb 1985–1987 Sedan

(1) Remove the screws retaining the lens and lamp to the rear bumper and withdraw the lamp body from under the bumper.

(2) Remove the bulb by pulling it from the bulb holder.

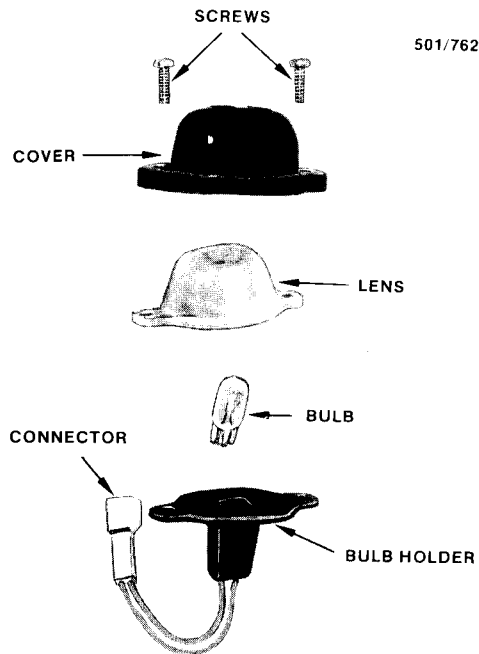
(3) Ensure that the bulb holder is free from corrosion and instal the new bulb.

(4) Instal the lamp body to the underside of the bumper, place the lens on the upper side of the bumper and tighten the retaining screws securely.

To Renew Bulb 1979–1987 Station Wagon

(1) Remove the screws retaining the lamp and lens to the tailgate and remove the lens from the lamp body.

(2) Remove the bulb by pulling it from the bulb holder.



Dismantled view of the number plate lamp, 1986 Station Wagon shown.

(3) Ensure that the bulb holder is free from corrosion and instal the new bulb.

(4) Instal the lens and screws to the tailgate and tighten the screws securely.

To Renew Bulb—Utility

(1) Remove the screws retaining the lamp and lens to the vehicle body and remove the lens from the lamp.

(2) Remove the bulb by pulling it from the bulb holder.

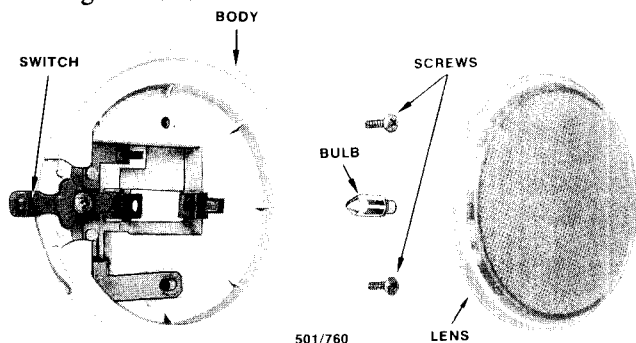
(3) Ensure that the bulb holder is free from corrosion and instal the new bulb.

(4) Instal the lens and screws to the lamp and tighten the screws securely.

COURTESY LAMP

To Renew Bulb

(1) Remove the lens from the courtesy lamp by turning it anti-clockwise.



Dismantled view of the interior lamp, 1986 model shown.

- (2) Remove the bulb by carefully moving it to one side and withdrawing it from the bulb holder.
- (3) Ensure that the bulb holder is free from corrosion and install the new bulb.
- (4) Install the lens by turning it clockwise.

To Remove and Instal

- (1) Disconnect the negative battery terminal. Remove the lens from the courtesy lamp by turning it anti-clockwise.
- (2) Remove the screws retaining the lamp to the roof brace and withdraw the lamp sufficiently to allow the wiring to be disconnected.
- (3) Disconnect the wiring by pulling on the connectors not the wires and withdraw the lamp from the vehicle.

Installation is a reversal of the removal procedure.

18. WINDSCREEN WIPERS

TO RENEW WIPER BLADES

1979-1984 and all Utility Models

- (1) Raise the wiper arm from the windscreen until it locks in the vertical position.
- (2) Lift the locking lever on the wiper arm and withdraw the wiper blade from the wiper arm.

Installation is a reversal of the removal procedure.

1985-1987 Sedan and Station Wagon Models

- (1) Raise the wiper arm from the windscreen until it locks in the vertical position.
- (2) Remove the screws retaining the wiper blade to the wiper arm and withdraw the blade from the arm.

Installation is a reversal of the removal procedure.

TO REMOVE AND INSTAL WIPER ARMS

1979-1984 and all Utility Models

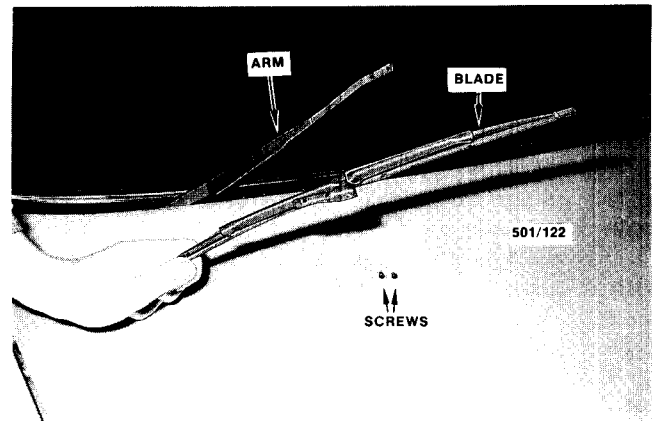
- (1) Lift the cover from the pivot end of the wiper arm and withdraw it from the arm.
- (2) Remove the nut retaining the arm to the pivot.
- (3) Lift the wiper arm to the locked position and carefully rock the lower section of the arm to free it from the splines of the pivot. Withdraw the arm from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

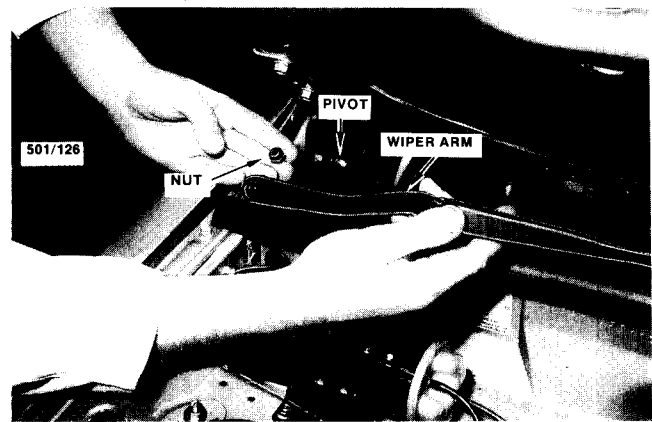
- (1) Ensure that the wiper motor is in the Park position before installing the wiper arm. If in doubt, turn the wiper switch to the Off position and turn the ignition switch to the On position until the wiper motor stops.
- (2) Install the wiper arm on the pivot so that it will not hit the lower or side windscreen mouldings during operation.

1985-1987 Sedan and Station Wagon Models

- (1) Working in the engine compartment, remove the nut retaining the wiper arm to the pivot.



Windscreen wiper blade removed from the arm, 1986 model shown.



Windscreen wiper arm removed from the vehicle, 1986 model shown.

- (2) Manoeuvre the wiper arm from the pivot and withdraw the arm from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

- (1) Ensure that the wiper motor is in the Park position before installing the wiper arm. If in doubt, turn the wiper switch to the Off position and turn the ignition switch to the On position until the wiper motor stops.

- (2) Install the wiper arm to the pivot so that it will not hit the lower or side windscreen mouldings during operation.

TO REMOVE AND INSTAL WIPER MOTOR

1979-1984 and all Utility Models

- (1) Remove the wiper arms from the vehicle as previously described.
- (2) Disconnect the negative battery terminal.
- (3) Working in the engine compartment, disconnect the wiper motor wiring connector by pulling on the connector not the wires.
- (4) Remove the screws retaining the plenum chamber grille to the vehicle body and withdraw the grille from the vehicle.

(5) Suitably mark the relationship of the wiper motor crank to the wiper motor shaft and remove the nut retaining the crank to the shaft.

(6) Remove the crank from the wiper motor shaft.

(7) Remove the bolts retaining the wiper motor to the vehicle body and withdraw the wiper motor from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Instal the crank to the wiper motor shaft, aligning the marks made during removal.

(2) Ensure that the wiper motor is in the Park position before installing the wiper arms. If in doubt, connect the battery, turn the wiper switch to the Off position and turn the ignition switch to the On position until the wiper motor stops.

(3) Instal the wiper arms to the pivots so that they will not hit the lower or side windscreen mouldings during operation.

1985-1987 Sedan and Station Wagon Models

(1) Remove the wiper arms from the vehicle as previously described.

(2) Disconnect the negative battery terminal.

(3) Working in the engine compartment, disconnect the wiring at the wiper motor by pulling on the connector not the wires.

(4) Remove the bolts retaining the wiper motor to the vehicle body and withdraw the wiper motor sufficiently to remove the nut retaining the crank to the wiper motor shaft.

(5) Suitably mark the relationship of the crank to the wiper motor shaft and remove the nut retaining the crank to the shaft.

(6) Remove the crank from the shaft and withdraw the wiper motor from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Instal the crank to the wiper motor shaft aligning the marks made during removal.

(2) Ensure that the wiper motor is in the Park position before installing the wiper arms. If in doubt,

connect the battery, turn the wiper switch to the Off position and turn the ignition switch to the On position until the wiper motor stops.

(3) Instal the wiper arms to the pivots so that they will not hit the lower or side windscreen mouldings during operation.

19. REAR WIPERS

TO RENEW WIPER BLADE

1979-1984 and all Utility Models

(1) Lift the wiper arm from the rear window until it locks in the vertical position.

(2) Depress the lever on the wiper blade and withdraw the blade from the arm.

Installation is a reversal of the removal procedure.

1985-1987 Station Wagon Models

(1) Lift the wiper arm from the rear window until it locks in the vertical position.

(2) Tilt the wiper blade pivot up to disengage the blade from the arm and withdraw the blade from the arm.

Installation is a reversal of the removal procedure.

TO REMOVE AND INSTAL WIPER ARM

(1) Lift the cover from the wiper arm at the pivot end and remove the cover from the arm.

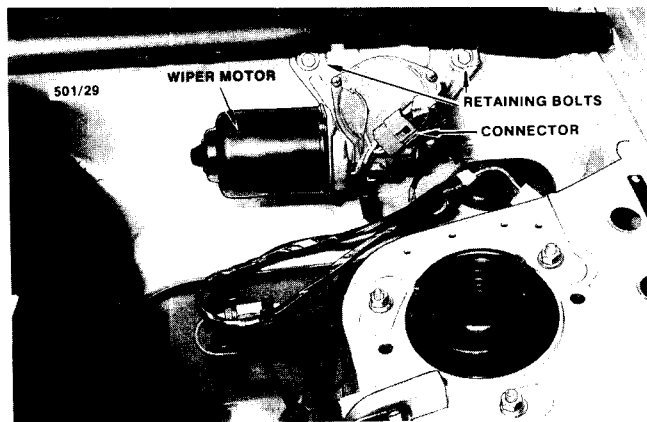
(2) Remove the nut retaining the wiper arm to the wiper motor pivot.

(3) Lift the wiper arm from the rear window until it locks in position and carefully rock the lower section of the arm to free it from the splines on the pivot. Withdraw the arm from the vehicle.

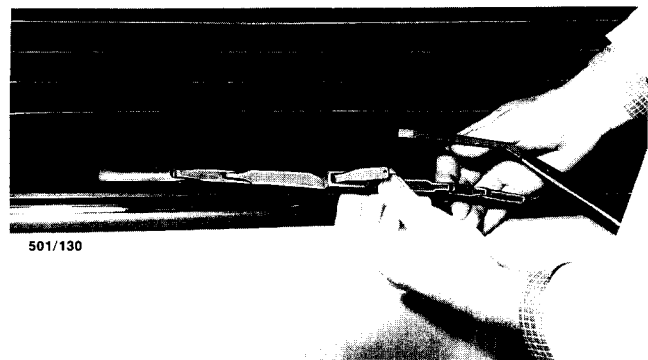
Installation is a reversal of the removal procedure with attention to the following points:

(1) Ensure that the wiper motor is in the Park position before installing the wiper arm. If in doubt, turn the wiper switch to the Off position and turn the ignition switch to the On position until the wiper motor stops.

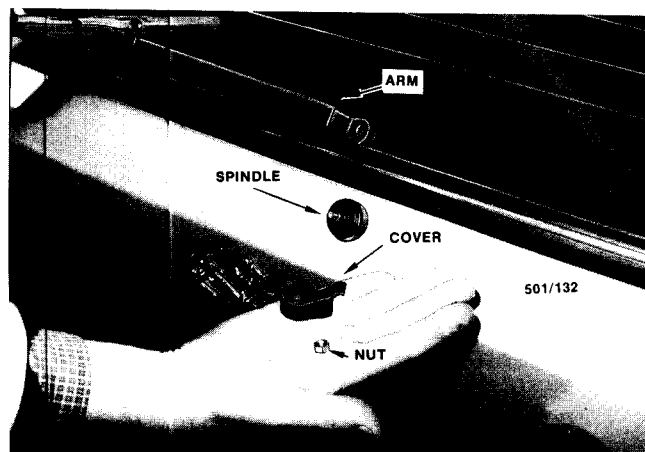
(2) Instal the wiper arm to the pivot so that the blade will not hit the lower window moulding during operation.



Installed view of the wiper motor, 1986 model shown.



Rear window wiper blade removed from the wiper arm, 1986 model shown.

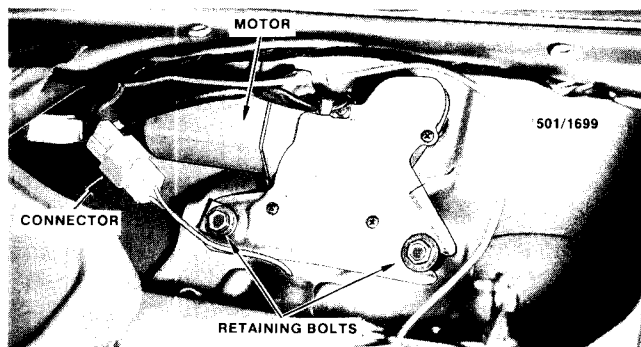


Rear window wiper arm removed from the pivot shaft, 1986 model shown.

TO REMOVE AND INSTALL WIPER MOTOR

- (1) Disconnect the negative battery terminal.
- (2) Remove the wiper arm from the vehicle as previously described.
- (3) Remove the nut retaining the wiper pivot to the tailgate.
- (4) Remove the tailgate interior trim by carefully prising the retaining clips from the tailgate.
- (5) Disconnect the wiring by pulling on the connectors not the wires.
- (6) Remove the bolts retaining the wiper motor to the tailgate and withdraw the wiper motor from the tailgate.

Installation is a reversal of the removal procedure with attention to the following point:



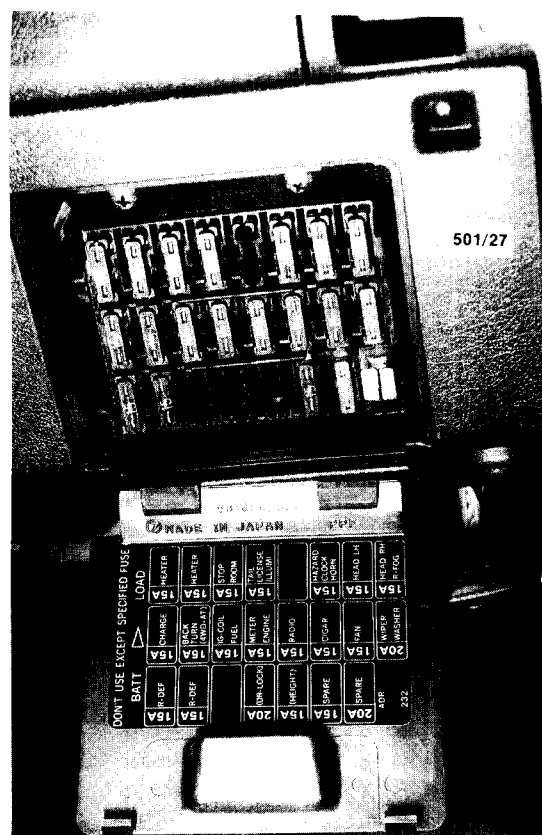
Installed view of the rear wiper motor, 1983 model shown.

Install the wiper arm as previously described.

20. FUSES AND FUSIBLE LINKS

TO CHECK AND RENEW FUSE

NOTE: If a fuse is found to be faulty or burnt out, use a new fuse of the specified amperage only. The use of a higher rated fuse than specified could cause damage to the vehicle wiring harness.



View showing location of fuses, 1986 model shown.

- (1) Remove the cover from the fuse box and locate the fuse protecting the circuit at fault.
- (2) Pull the fuse from the socket and visually inspect it for serviceability. If the fuse appears to be intact, connect a suitable ohmmeter to the terminals on the fuse and check that continuity exists. Renew the fuse if serviceability is in doubt.
- (3) If the circuit is still faulty, refer the problem to an automotive electrician.

TO CHECK AND RENEW FUSIBLE LINK

NOTE: If the fusible link is found to be faulty or burned out use a new fusible link of the specified amperage only. The use of a higher rated fusible link than specified could cause damage to the vehicle wiring harness.

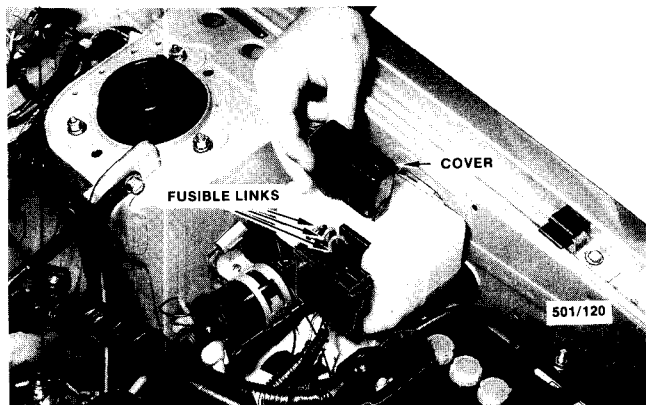
The fusible links are located in a holder adjacent to the battery.

- (1) Disconnect the negative battery terminal.
- (2) Remove the cover from the holder and disconnect the link by pulling on the connectors not the wires.
- (3) Inspect the fusible link visually for serviceability. If the link appears to be intact, connect a suitable ohmmeter to the terminals on the link and check that continuity exists. Renew the fusible link if serviceability is in doubt.

(4) If a new fusible link is installed, have an assistant temporarily connect the battery terminal while checking the operation of the circuit.

NOTE: While checking the operation using a new fusible link, loosely connect the battery terminal only, to safeguard against damage to the wiring harness.

(5) If the circuit is still faulty, refer the problem to an automotive electrician.



View showing location of fusible links, 1986 model shown.

21. HOW TO WIRE UP A TRAILER

There are many different brands of trailer electrical combination plugs and sockets on the market. Some makes can even be obtained with a varying number of circuit pin connections. Most manufacturers however, now choose to market the seven pin variety only. The seven pin plug and socket provides for two auxiliary circuits and in caravan use, these are usually used for the 12 volt interior lights and the electrical brakes.

If the trailer which is to be towed by the vehicle already has a connector plug then the matching type of socket will have to be fitted to the vehicle. If on the other hand, the trailer has no plug then it is advisable to fit a seven pin type unit to the vehicle and trailer so that if at a later time auxiliary circuits are needed, it is only a matter of using the vacant pins.

FITTING THE SOCKET AND PLUG

NOTE: The minimum amount of material needed will be:

Trailer socket and plug, socket mounting bracket, multi core flex, wiring connectors, grommet, heavy duty flasher unit with repeater lamp.

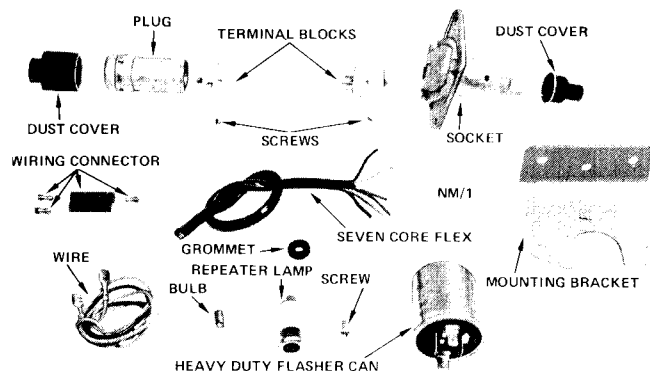
When wiring the stop lamp, the stop lamp warning system must be taken into consideration.

If the trailer stop lamp wiring is taken from a point before the warning relay,

located either in the right hand rear combination lamp or at a point close to the right hand rear combination lamp, the warning lamp will not indicate any fault in the trailer lamps.

If the trailer stop lamp wiring is taken from one of the wires from the relay to one of the vehicle stop lamps, the warning lamp will indicate a fault in the stop lamp circuit whenever the trailer wiring is connected and the stop lamps are operated, even though no fault exists.

If the trailer stop lamp wiring is connected so that a separate wire for each side trailer stop lamp is taken from each side vehicle stop lamp circuit at a point beyond the warning relay, the warning system will indicate if a fault exists in either the vehicle or trailer stop lamps.



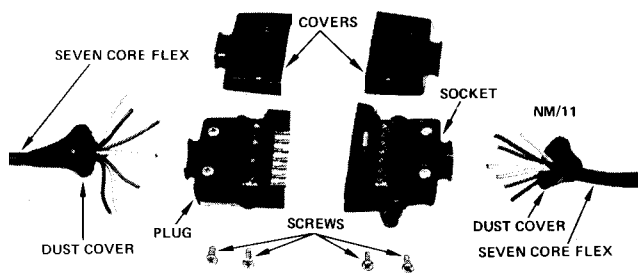
Minimum material needed for wiring up a trailer. Utilux trailer socket and plug shown.

- (1) Disconnect the negative battery terminal.
- (2) Locate the main wiring harness at the rear of the vehicle and using the length of multi core flex, cut if necessary and tap into the right hand flasher wire, left hand flasher wire, tail lamp wire, stop lamp wire and an earth wire. Use insulated connectors when tapping into the wires.

NOTE: To determine which colour wire on the vehicle is for each particular rear lamp refer to the wiring diagram in this section which shows the colours for the various wires. Ensure the right diagram for the applicable model is used. When tapping into the rear wires on the vehicle conform to the standard caravan colour coding by mating the correct colour wire of the multi core flex to its applicable lamp or earth wire on the vehicle.

The standard caravan coding is as follows:

Left flasher Yellow
 Right flasher Green
 Stop lamp Red



Brylite seven pin trailer plug and socket.

Tail lamp Brown
 Earth White
 Auxiliary spare Blue
 Auxiliary spare Black

This colour coding has nothing to do with the wiring on the vehicle. It is only for the caravan or trailer wiring.

(3) Drill a suitable sized hole through the vehicle floor, instal a rubber grommet and push through the multi core flex.

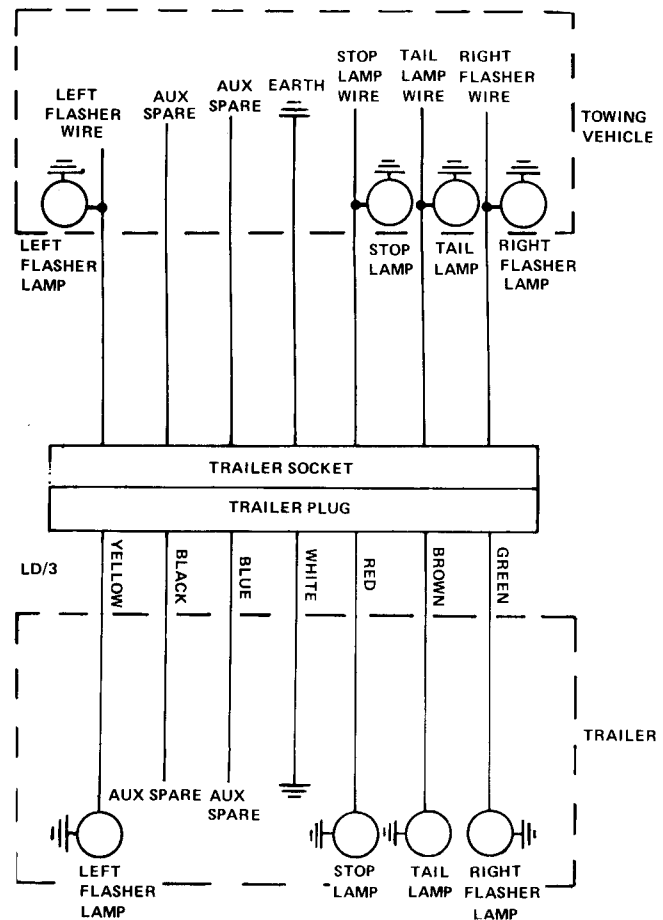
NOTE: Before drilling a hole through the floor, check to see if there is an existing hole which will take the multi core flex. It may be convenient to use the number plate lamp wire hole. Whichever hole is used ensure that a rubber grommet is installed to prevent the wires from chafing.

(4) Cut the multi core flex to the length required and slide the socket dust cover onto the flex. Strip about 15 mm of covering from each wire and connect the wires to the terminals of the socket. Ensure that each coloured wire is connected to its correct terminal. On the brands of sockets where the terminals are only numbered it will be necessary to refer to the instruction sheet which comes with the unit to find out the correct circuit connection for each pin number.

(5) After wiring up and reassembling the socket mount the socket to the rear of the vehicle. Try to mount the socket as near as possible to the tow bar ball and high enough to prevent damage to the socket if the rear of the vehicle happens to scrape on driveways, etc. On brands of sockets that do not have an inbuilt mounting bracket it will be necessary to make up a mounting bracket or use the optional mounting bracket for the particular socket.

(6) Using the same wiring up procedure, wire the plug to the trailer wiring. If the wiring on the trailer is not to the standard colour code and is an unknown quantity then it will be necessary to connect up the wiring as follows:

(a) Locate the earth wire for the trailer even if all wires have to be traced on the trailer. Connect the earth wire only to the wiring plug and connect the plug to the connector on the vehicle.



Typical diagram for wiring up a trailer.

(b) Connect up the vehicle's battery and switch on the tail lamps. Connect each trailer wire in turn to the live tail lamp terminal on the plug until the trailer tail lamp illuminates. When the trailer tail lamp wire is found connect this to the tail lamp terminal on the plug. Switch off the tail lamps and using the same procedure turn the other lamps on in turn and find the applicable trailer lamp by connecting to the live terminal on the plug.

NOTE: On some makes of plug it will be necessary to dismantle the terminal blocks from the plug and/or socket in order to expose the terminals.

(7) Instal the heavy duty flasher unit and repeater lamp to the vehicle following the wiring up instructions which are enclosed in the flasher unit and repeater lamp kit. Ensure the correct kit is purchased for the applicable model of vehicle.

The heavy duty flasher unit keeps the flash rate constant regardless of additional load. The repeater lamp, which should be mounted in some easy to see position on the dash panel, indicates if the trailer turn signal lamps are operating.