UNDERSTANDING AND TROUBLESHOOTING ELECTRICAL SYSTEMS

Introduction

Most new vehicles are equipped with one or more on-board computers, like the unit(s) installed on vehicles covered by this manual. These electronic components (with no moving parts) should theoretically last the life of the vehicle, provided nothing external happens to damage the circuits or memory chips.

While it is true that electronic components should never wear out, in the real world malfunctions can, and often do, occur. It is also true that any computer-based system is extremely sensitive to electrical voltages and cannot tolerate careless or haphazard testing or service procedures. An inexperienced individual can easily cause major damage looking for a minor problem by using the wrong kind of test equipment or connecting test leads or connectors under improper conditions. Always pay close attention to the circumstances when a test should be performed. NEVER disconnect an ECM connector with the ignition switch **ON**. When selecting test equipment, make sure the manufacturer's instructions state that the tester is compatible with whatever type of electronic control system is being serviced. Read all instructions carefully and double check all test points before installing probes or making any test connections.

The following section outlines basic diagnosis techniques for dealing with computerized automotive control systems. Along with a general explanation of the various types of test equipment available to aid in servicing modern electronic automotive systems, basic repair techniques for wiring harnesses and connectors are given. Read the basic information before attempting any repairs or testing any computerized system, to provide the background of information necessary in order to avoid the most common and obvious mistakes that can cost both time and money. Although the replacement and testing procedures are simple in themselves, the systems are not, and unless one has a thorough understanding of all components and their function within a particular computerized control system, the logical test sequence these systems demand cannot be followed. Minor malfunctions can make a big difference, so it is important to know how each component affects the operation of the overall electronic system in order to find the ultimate cause of a problem without replacing good components unnecessarily. It is not enough to use the correct test equipment; the test equipment must be used correctly.

Safety Precautions

WARNING

Whenever working on or around any computer based microprocessor controlsystem, always observe these general precautions to prevent the possibility of personal injury or damage to electronic components.

. NEVER install or remove battery cables with the ignition switch ON or the engine

running. Jumper cables should be connected with the key OFF to avoid power surges that can damage electronic control units. Engines equipped with computer controlled systems should avoid both giving and getting jump starts due to the possibility of serious damage to components from arcing in the engine compartment when connections are made with the ignition ON.

- Always remove the battery cables before charging the battery. Never use a high output charger on an installed battery or attempt to use any type of "hot shot" (24 volt) starting aid.
- Exercise care when inserting test probes into connectors to insure good connections without damaging the connector or spreading the pins. Always probe connectors from the rear (wire) side, NOT the pin side, in order to avoid accidental shorting of terminals during test procedures.
- NEVER remove or attach wiring harness connectors with the ignition switch ON
 unless the instructions specifically direct you to do so. NEVER disengage/engage
 the computer control module wiring connectors with the ignition ON.
- Do NOT drop any components during service procedures and never apply 12 volts directly to any component (like a solenoid or relay) unless instructed specifically to do so. Some component electrical windings are designed to safely handle only 4 or 5 volts and can be destroyed in seconds if 12 volts are applied directly to the connector.
- Remove the electronic control unit if the vehicle is to be placed in an environment where temperatures exceed approximately 176°F (80°C), such as a paint spray booth or when arc or gas welding near the control unit location in the car.

ORGANIZED TROUBLESHOOTING

When diagnosing a specific problem, organized troubleshooting is a must. The complexity of a modern vehicle demands that you approach any problem in a logical, organized manner. There are certain troubleshooting techniques that are standard:

- 1. Establish when the problem occurs. Does the problem appear only under certain conditions? Were there any noises, odors, or other unusual symptoms?
- Isolate the problem area. To do this, make some simple tests and observations; then, eliminate the systems that are working properly. Check for obvious problems such as broken wires, dirty connections, and split or disconnected vacuum hoses. ALWAYS check the obvious before assuming something complicated is the cause.
- 3. Test for problems systematically to determine the cause once the problem area is isolated. Are all the components functioning properly? Is there power going to electrical switches and motors? Is there vacuum at vacuum switches and/or actuators? Is there a mechanical problem such as bent linkage or loose mounting screws? Performing careful, systematic checks will often turn up most causes on the first inspection without wasting time checking components that have little or no relationship to the problem.
- 4. Test all repairs after the work is done to make sure that the problem is fixed. Some causes can be traced to more than one component, so a careful verification of repair work is important to pick up additional malfunctions that may cause a problem to reappear or a different problem to arise. A blown fuse, for example, is a simple problem that may require more than another fuse to repair. If you don't look for a problem that caused a fuse to blow, for example, a shorted wire may go undetected.

Experience has shown that most problems tend to be the result of a fairly simple and obvious cause, such as loose or corroded connectors or air leaks in the intake

system; a careful inspection of components during testing is essential for quick and accurate troubleshooting. Special, hand held computerized testers designed specifically for diagnosing the system are available from a variety of aftermarket sources, as well as from the vehicle manufacturer, but care should be taken to assure that any test equipment being used is designed to diagnose that particular computer controlled system accurately without damaging the computer control module or other components being tested.

Pinpointing the exact cause of trouble in an electrical system cansometimes only be accomplished by the use of special test equipment. Thefollowing describes commonly used test equipment and explains how to put it tobest use in diagnosis. In addition to the information covered here, themanufacturer's instruction booklet provided with the tester should be read and clearly understood before attempting any test procedures.

TEST EQUIPMENT

Jumper Wires

Jumper wires are simple, yet extremely valuable, pieces of test equipment. Jumper wires are simply wires that are used to bypass sections of a circuit. The simplest type of jumper wire is merely a length of multi-strand wire with an alligator clip at each end. Jumper wires are usually fabricated from lengths of standard automotive wire and whatever type of connector (alligator clip, spade connector or pin connector) that is required for the particular vehicle being tested. The well equipped tool box will have several different styles of jumper wires in several different lengths. Some jumper wires are made with three or more terminals coming from a common splice for special purpose testing. In cramped, hard-to-reach areas it is advisable to have insulated boots over the jumper wire terminals in order to prevent accidental grounding, sparks, and possible fire, especially when testing fuel system components.

Jumper wires are used primarily to locate open electrical circuits, on either the ground (-) side of the circuit or on the hot (+) side. If an electrical component fails to operate, connect the jumper wire between the component and a good ground. If the component operates only with the jumper installed, the ground circuit is open. If the ground circuit is good, but the component does not operate, the circuit between the power feed and component is open. You can sometimes connect the jumper wire directly from the battery to the hot terminal of the component, but first make sure the component uses 12 volts in operation. Some electrical components, such as fuel injectors, are designed to operate on about 4 volts and running 12 volts directly to the injector terminals can burn out the wiring. By inserting an inline fuseholder between a set of test leads, a fused jumper wire can be used for bypassing open circuits. Use a 5 amp fuse to provide protection against voltage spikes. When in doubt, use a voltmeter to check the voltage input to the component and measure how much voltage is being applied normally. By moving the jumper wire successively back from the lamp toward the power source, you can isolate the area of the circuit where the open is located. When the component stops functioning, or the power is cut off, the open is in the segment of wire between the jumper and the point previously tested.

CAUTION

NEVER use jumpers made from wire that is of lighter gauge than used in the circuit under test. If the jumper wire is of too small a gauge, it

may overheatand possibly melt. Never use jumpers to bypass high resistance loads (such asmotors) in a circuit. Bypassing resistances, in effect, creates a short circuitwhich may, in turn, cause damage and fire. Never use a jumper for anythingother than temporary bypassing of components in a circuit.

12 Volt Test Light

The 12 volt test light is used to check circuits and components while electrical current is flowing through them. It is used for voltage and ground tests. Twelve volt test lights come in different styles but all have three main parts; a ground clip, a probe, and a light. The most commonly used 12 volt test lights have pick-type probes. To use a 12 volt test light, connect the ground clip to a good ground and probe wherever necessary with the pick. The pick should be sharp so that it can penetrate wire insulation to make contact with the wire, without making a large hole in the insulation. The wrap-around light is handy in hard to reach areas or where it is difficult to support a wire to push a probe pick into it. To use the wrap around light, hook the wire to be probed with the hook and pull the trigger. A small pick will be forced through the wire insulation into the wire core.

WARNING

Do NOT use a test light to probe electronic ignition spark plug or coilwires. Never use a pick-type test light to probe wiring on computer controlledsystems unless specifically instructed to do so. Any wire insulation that ispierced by the test light probe should be taped and sealed with silicone aftertesting.

Like the jumper wire, the 12 volt test light is used to isolate opens in circuits. But, whereas the jumper wire is used to bypass the open to operate the load, the 12 volt test light is used to locate the presence of voltage in a circuit. If the test light glows, you know that there is power up to that point; if the 12 volt test light does not glow when its probe is inserted into the wire or connector, you know that there is an open circuit (no power). Move the test light in successive steps back toward the power source until the light in the handle does glow. When it does glow, the open is between the probe and point previously probed.

The test light does not detect that 12 volts (or any particular amount ofvoltage) is present; it only detects that some voltage is present. It isadvisable before using the test light to touch its terminals across the batteryposts to make sure the light is operating properly.

Self-Powered Test Light

The self-powered test light usually contains a 1.5 volt penlight battery. One type of self-powered test light is similar in design to the 12 volt test light. This type has both the battery and the light in the handle and pick-type probe tip. The second type has the light toward the open tip, so that the light illuminates the contact point. The self-powered test light is a dual purpose piece of test equipment. It can be used to test for either open or short circuits when power is isolated from the circuit (continuity test). A powered test light should NOT be used on any computer controlled system or component unless specifically instructed to do so. Many engine sensors can be destroyed by even this small amount of voltage applied directly to the terminals.

Open Circuit Testing

To use the self-powered test light to check for open circuits, first isolate the circuit from the vehicle's 12 volt power source by disconnecting the battery or wiring harness connector. Connect the test light ground clip to a good ground and probe sections of the circuit sequentially with the test light. Start testing from either end of the circuit. If the light is out, the open is between the probe and the circuit ground. If the light is on, the open is between the probe and end of the circuit toward the power source.

Short Circuit Testing

By isolating the circuit both from power and from ground, and using a self-powered test light, you can check for shorts to ground in the circuit. Isolate the circuit from power and ground. Connect the test light ground clip to a good ground and probe any easy-to-reach test point in the circuit. If the light comes on, there is a short somewhere in the circuit. To isolate the short, probe a test point at either end of the isolated circuit (the light should be on). Leave the test light probe connected and open connectors, switches, remove parts, etc., sequentially, until the light goes out. When the light goes out, the short is between the last circuit component opened and the previous circuit opened.

The 1.5 volt battery in the test light does not provide much current. Aweak battery may not provide enough power to illuminate the test light evenwhen a complete circuit is made (especially if there are high resistances inthe circuit). Always make sure that the test battery is strong. To check thebattery, briefly touch the ground clip to the probe; if the light glowsbrightly the battery is strong enough for testing. Never use a self-poweredtest light to perform checks for opens or shorts when power is applied to theelectrical system under test. The 12 volt vehicle power will quickly burn outthe 1.5 volt light bulb in the test light.

Voltmeter

A voltmeter is used to measure voltage at any point in a circuit, or to measure the voltage drop across any part of a circuit. It can also be used to check continuity in a wire or circuit by indicating current flow from one end to the other. Voltmeters usually have various scales on the meter dial and a selector switch to allow the detection of different voltages. The voltmeter has a positive and a negative lead. To avoid damage to the meter, always connect the negative lead to the negative (-) side of circuit (to ground or nearest the ground side of the circuit) and connect the positive lead to the positive (+) side of the circuit (to the power source or nearest the power source). Note that the negative voltmeter lead will always be black and that the positive voltmeter will always be some color other than black (usually red). Depending on how the voltmeter is connected into the circuit, it has several uses.

A voltmeter can be connected either in parallel or in series with a circuit, and has a very high resistance to current flow. When connected in parallel, only a small amount of current will flow through the voltmeter current path; the rest will flow through the normal circuit current path and the circuit will work normally. When the voltmeter is connected in series with a circuit, only a small amount of current can flow through the circuit. The circuit will not work properly, but the voltmeter reading will show if the circuit is complete or not.

WARNING

Do NOT use a multimeter to probe electronic ignition spark plug or coilwires. Small pin holes in secondary ignition wires will allow high voltage toarc from the wire to a metal part, external to the secondary ignition circuit. This arcing may cause misfiring, leading to a driveability complaint.

Available Voltage Measurement

Set the voltmeter selector switch to the 20V position and connect the meter negative lead to the negative post of the battery. Connect the positive meter lead to the positive post of the battery and turn the ignition switch **ON** to provide a load. Read the voltage on the meter or digital display. A well charged battery should register over 12 volts. If the meter reads below 11.5 volts, the battery power may be insufficient to operate the electrical system properly. This test determines voltage available from the battery and should be the first step in any electrical trouble diagnosis procedure. Many electrical problems, especially on computer controlled systems, can be caused by a low state of charge in the battery. Excessive corrosion at the battery cable terminals can cause a poor contact that will prevent proper charging and full battery current flow.

Normal battery voltage is 12 volts when fully charged. When the battery is supplying current to one or more circuits it is said to be "under load". When everything is off the electrical system is under a "no-load" condition. A fully charged battery may show about 12.5 volts at no load, will drop to 12 volts under medium load, and will drop even lower under heavy load. If the battery is partially discharged, the voltage decrease under heavy load may be excessive, even though the battery shows 12 volts or more at no load. When allowed to discharge further, the battery's available voltage under load will decrease more severely. For this reason, it is important that the battery be fully charged during all testing procedures to avoid errors in diagnosis and incorrect test results.

Voltage Drop

When current flows through a resistance, the voltage beyond the resistance is reduced (the larger the current, the greater the reduction in voltage). When no current is flowing, there is no voltage drop because there is no current flow. All points in the circuit which are connected to the power source are at the same voltage as the power source. The total voltage drop always equals the total source voltage. In a long circuit with many connectors, a series of small, unwanted voltage drops due to corrosion at the connectors can add up to a total loss of voltage which impairs the operation of the normal loads in the circuit.

INDIRECT COMPUTATION OF VOLTAGE DROPS

- 1. Set the voltmeter selector switch to the 20 volt position.
- 2. Connect the meter negative lead to a good ground.
- 3. Probe all resistances in the circuit with the positive meter lead.
- 4. Operate the circuit in all modes and observe the voltage readings.

DIRECT MEASUREMENT OF VOLTAGE DROPS

1. Set the voltmeter switch to the 20 volt position.

- 2. Connect the voltmeter negative lead to the ground side of the resistance load to be measured.
- 3. Connect the positive lead to the positive side of the resistance or load to be measured
- 4. Read the voltage drop directly on the 20 volt scale.

Too high a voltage indicates too high a resistance. If, for example, a blower motor runs too slowly, you can determine if there is too high a resistance in the resistor pack. By taking voltage drop readings in all parts of the circuit, you can isolate the problem. Too low a voltage drop indicates too low a resistance. If, for example, a blower motor runs too fast in the MED and/or LOW position, the problem can be isolated in the resistor pack by taking voltage drop readings in all parts of the circuit to locate a possibly shorted resistor. The maximum allowable voltage drop under load is critical, especially if there is more than one high resistance problem in a circuit because all voltage drops are cumulative. A small drop is normal due to the resistance of the conductors.

HIGH RESISTANCE TESTING

- 1. Set the voltmeter selector switch to the 4 volt position.
- 2. Connect the voltmeter positive lead to the positive post of the battery.
- 3. Turn on the headlights and heater blower to provide a load.
- 4. Probe various points in the circuit with the negative voltmeter lead.
- 5. Read the voltage drop on the 4 volt scale. Some average maximum allowable voltage drops are:
 - O FUSE PANEL 0.7 volts
 - O IGNITION SWITCH 0.5 volts
 - O HEADLIGHT SWITCH 0.7 volts
 - IGNITION COIL (+) 0.5 volts
 - O ANY OTHER LOAD 1.3 volts

Voltage drops are all measured while a load is operating; without currentflow, there will be no voltage drop.

Ohmmeter

The ohmmeter is designed to read resistance (ohms) in a circuit or component. Although there are several different styles of ohmmeters, all will usually have a selector switch which permits the measurement of different ranges of resistance (usually the selector switch allows the multiplication of the meter reading by 10, 100, 1000, and 10,000). A calibration knob allows the meter to be set at zero for accurate measurement. Since all ohmmeters are powered by an internal battery (usually 9 volts), the ohmmeter can be used as a self-powered test light. When the ohmmeter is connected, current from the ohmmeter flows through the circuit or component being tested. Since the ohmmeter's internal resistance and voltage are known values, the amount of current flow through the meter depends on the resistance of the circuit or component being tested.

The ohmmeter can be used to perform continuity tests for opens or shorts (either by observation of the meter needle or as a self-powered test light), and to read actual resistance in a circuit. It should be noted that the ohmmeter is used to check the resistance of a component or wire while there is no voltage applied to

the circuit. Current flow from an outside voltage source (such as the vehicle battery) can damage the ohmmeter, so the circuit or component should be isolated from the vehicle electrical system before any testing is done. Since the ohmmeter uses its own voltage source, either lead can be connected to any test point.

When checking diodes or other solid state components, the ohmmeter leadscan only be connected one way in order to measure current flow in a singledirection. Make sure the positive (+) and negative (-) terminal connections areas described in the test procedures to verify the one-way diode operation.

In using the meter for making continuity checks, do not be concerned with the actual resistance readings. Zero resistance, or any resistance readings, indicate continuity in the circuit. Infinite resistance indicates an open in the circuit. A high resistance reading where there should be none indicates a problem in the circuit. Checks for short circuits are made in the same manner as checks for open circuits except that the circuit must be isolated from both power and normal ground. Infinite resistance indicates no continuity to ground, while zero resistance indicates a dead short to ground.

RESISTANCE MEASUREMENT

The batteries in an ohmmeter will weaken with age and temperature, so the ohmmeter must be calibrated or "zeroed" before taking measurements. Many modern digital meters are self-zeroing and will require no adjustment. If your meter must be zeroed, be sure to check this each time it is used. To zero the meter, place the selector switch in its lowest range and touch the two ohmmeter leads together. Turn the calibration knob until the meter needle is exactly on zero.

All analog (needle) type ohmmeters must be zeroed before use, but mostdigital ohmmeter models are automatically calibrated when the switch is turnedon. Self-calibrating digital ohmmeters do not have an adjusting knob, but it's good idea to check for a zero readout before use by touching the leadstogether. All computer controlled systems require the use of a digital ohmmeterwith at least 10 megohms impedance for testing. Before any test procedures areattempted, make sure the ohmmeter used is compatible with the electrical system, or damage to the on-board computer could result.

To measure resistance, first isolate the circuit from the vehicle power source by disconnecting the battery cables or the harness connector. Make sure the ignition key is **OFF** when disconnecting any components or the battery. Where necessary, also isolate at least one side of the circuit to be checked to avoid reading parallel resistances. Parallel circuit resistances will always give a lower reading than the actual resistance of either of the branches. When measuring the resistance of parallel circuits, the total resistance will always be lower than the smallest resistance in the circuit. Connect the meter leads to both sides of the circuit (wire or component) and read the actual measured ohms on the meter scale. Make sure the selector switch is set to the proper ohm scale for the circuit being tested to avoid misreading the ohmmeter test value.

WARNING

NEVER use an ohmmeter with power applied to the circuit. Like

theself-powered test light, the ohmmeter is designed to operate on its own powersupply. The normal 12 volt automotive electrical system current could damagethe meter.

Ammeters

An ammeter measures the amount of current flowing through a circuit in units called amperes or amps. Amperes are units of electron flow which indicate the speed at which electrons are flowing through the circuit. Since Ohm's Law dictates that current flow in a circuit is equal to the circuit voltage divided by the total circuit resistance, increasing voltage also increases the current level (amps). Likewise, any decrease in resistance will increase the amount of amps in a circuit. At normal operating voltage, most circuits have a characteristic amount of amperes, called "current draw" which can be measured using an ammeter. By referring to a specified current draw rating, measuring the amperes, and comparing the two values, one can determine what is happening within the circuit to aid in diagnosis. An open circuit, for example, will not allow any current to flow so the ammeter reading will be zero. More current flows through a heavily loaded circuit or when the charging system is operating.

An ammeter is always connected in series with the circuit being tested. All of the current that normally flows through the circuit must also flow through the ammeter; if there is any other path for the current to follow, the ammeter reading will not be accurate. The ammeter itself has very little resistance to current flow and therefore will not affect the circuit, but it will measure current draw only when the circuit is closed and electricity is flowing. Excessive current draw can blow fuses and drain the battery, while a reduced current draw can cause motors to run slowly, lights to dim and other components to not operate properly. The ammeter can help diagnose these conditions by locating the cause of the high or low reading.

Multimeters

Different combinations of test meters can be built into a single unit designed for specific tests. Some of the more common combination test devices are known as Volt/Amp testers, Tach/Dwell meters, or Digital Multimeters. The Volt/Amp tester is used for charging system, starting system or battery tests and consists of a voltmeter, an ammeter and a variable resistance carbon pile. The voltmeter will usually have at least two ranges for use with 6, 12 and 24 volt systems. The ammeter also has more than one range for testing various levels of battery loads and starter current draw and the carbon pile can be adjusted to offer different amounts of resistance. The Volt/Amp tester has heavy leads to carry large amounts of current and many later models have an inductive ammeter pickup that clamps around the wire to simplify test connections. On some models, the ammeter also has a zero-center scale to allow testing of charging and starting systems without switching leads or polarity. A digital multimeter is a voltmeter, ammeter and ohmmeter combined in an instrument which gives a digital readout. These are often used when testing solid state circuits because of their high input impedance (usually 10 megohms or more).

The tach/dwell meter combines a tachometer and a dwell (cam angle) meter and is a specialized kind of voltmeter. The tachometer scale is marked to show engine speed in rpm and the dwell scale is marked to show degrees of distributor shaft rotation. In most electronic ignition systems, dwell is determined by the control unit, but the dwell meter can also be used to check the duty cycle (operation) of

some electronic engine control systems. Some tach/dwell meters are powered by an internal battery, while others take their power from the vehicle battery in use. The internal battery powered testers usually require calibration much like an ohmmeter before testing.

Special Test Equipment

A variety of diagnostic tools are available to help troubleshoot and repair computerized engine control systems. The most sophisticated of these devices are the console type engine analyzers that usually occupy a garage service bay, but there are several types of aftermarket electronic testers available that will allow quick circuit tests of the engine control system by plugging directly into a special connector located in the engine compartment or under the dashboard. Several tool and equipment manufacturers offer simple, hand held testers that measure various circuit voltage levels on command to check all system components for proper operation. Although these testers often cost about \$300-\$500, consider that the average computer control unit can cost just as much and the money saved by not replacing perfectly good sensors or components in an attempt to correct a problem could justify the purchase price of a special diagnostic tester the first time it's used.

These computerized testers can allow quick and easy test measurements while the engine is operating or while the vehicle is being driven. In addition, the onboard computer memory can be read to access any stored trouble codes, in effect allowing the computer to tell you "where it hurts" and aid trouble diagnosis by pinpointing exactly which circuit is malfunctioning. In the same manner, repairs can be tested to make sure the problem has been corrected. The biggest advantage these special testers have is their relatively easy hookups that minimize or eliminate the chances of making the wrong connections and getting false voltage readings or damaging the computer accidentally.

It should be remembered that these testers check voltage levels incircuits; they don't detect mechanical problems or failed components. Testerssimply can inform you if the circuit voltage falls within the preprogrammedlimits stored in the tester PROM unit. Also, most of the hand held testers are designed to work only on one or two systems made by a specific manufacturer.

A variety of aftermarket testers are available to help diagnose different computerized control systems. Owatonna Tool Company (OTC), for example, markets a device called the OTC Monitor which plugs directly into the Assembly Line Diagnostic Link (ALDL). The OTC tester makes diagnosis a simple matter of pressing the correct buttons and, by changing the internal PROM or inserting a different diagnosis cartridge, it will work on any model from full size to subcompact, over a wide range of years. An adapter is supplied with the tester to allow connection to all types of ALDL links, regardless of the number of pin terminals used. By inserting an updated PROM into the OTC tester, it can be easily updated to diagnose any new modifications of computerized control systems.

Wiring Harnesses

The average vehicle contains about $^{1}/_{2}$ mile (0.805 km) of wiring, with hundreds of individual connections. To protect the many wires from damage and to keep them from becoming a confusing tangle, they are organized into bundles, enclosed in plastic or taped together and called wiring harnesses. Different wiring

harnesses serve different parts of the vehicle. Individual wires are color coded to help trace them through a harness where sections are hidden from view.

A loose or corroded connection or a replacement wire that is too small for the circuit will add extra resistance and an additional voltage drop to the circuit. A ten percent voltage drop can result in slow or erratic motor operation, for example, even though the circuit is complete. Automotive wiring or circuit conductors can be in any one of three forms:

- 1. Single-strand wire
- 2. Multi-strand wire
- 3. Printed circuitry

Single-strand wire has a solid metal core and is usually used inside such components as alternators, motors, relays and other devices. Multi-strand wire has a core made of many small strands of wire twisted together into a single conductor. Most of the wiring in an automotive electrical system is made up of multi-strand wire, either as a single conductor or grouped together in a harness. All wiring is color coded on the insulator, either as a solid color or as a colored wire with an identification stripe. A printed circuit is a thin film of copper or other conductor that is printed on an insulator backing. Occasionally, a printed circuit is sandwiched between two sheets of plastic for more protection and flexibility. A complete printed circuit, consisting of conductors, insulating material and connectors for lamps or other components is called a printed circuit board. Printed circuitry is used in place of individual wires or harnesses in places where space is limited, such as behind instrument panels.

WIRE GAUGE

Since computer controlled automotive electrical systems are very sensitive to changes in resistance, the selection of properly sized wires is critical when systems are repaired. The wire gauge number is an expression of the cross-section area of the conductor. The most common system for expressing wire size is the American Wire Gauge (AWG) system.

Wire cross-section area is measured in circular mils. A mil is $^{1}/_{1000}$ in. (0.001 in. or 0.0254mm); a circular mil is the area of a circle one mil in diameter. For example, a conductor with $^{1}/_{4}$ in. (6.35mm) diameter is 0.250 in. or 250 mils. The circular mil cross-section area of the wire is 250 squared (250 2) or 62,500 circular mils. Imported vehicles usually use metric wire gauge designations, which is simply the cross-section area of the conductor in square millimeters (mm 2).

Gauge numbers are assigned to conductors of various cross-section areas. As gauge number increases, area decreases and the conductor becomes smaller. A 5 gauge conductor is smaller than a 1 gauge conductor and a 10 gauge is smaller than a 5 gauge. As the cross-section area of a conductor decreases, resistance increases and so does the gauge number. A conductor with a higher gauge number will carry less current than a conductor with a lower gauge number.

Gauge wire size refers to the size of the conductor, not the size of the complete wire. It is possible to have two wires of the same gauge with different diameters because one may have thicker insulation than the other.

12 volt automotive electrical systems generally use 10, 12, 14, 16 and 18 gauge

wire. Main power distribution circuits and larger accessories usually use 10 and 12 gauge wire. Battery cables are usually 4 or 6 gauge, although 1 and 2 gauge wires are occasionally used. Wire length must also be considered when making repairs to a circuit. As conductor length increases, so does resistance. An 18 gauge wire, for example, can carry a 10 amp load for 10 feet without excessive voltage drop; however if a 15 foot wire is required for the same 10 amp load, it must be a 16 gauge wire.

WIRING DIAGRAMS

An electrical schematic shows the electrical current paths when a circuit is operating properly. It is essential to understand how a circuit works before trying to figure out why it doesn't. Schematics break the entire electrical system down into individual circuits and show only one particular circuit. In a schematic, no attempt is made to represent wiring and components as they physically appear on the vehicle; switches and other components are shown as simply as possible. Face views of harness connectors show the cavity or terminal locations in all multi-pin connectors to help locate test points.

If you need to backprobe a connector while it is on the component, the order of the terminals must be mentally reversed. The wire color code can help in this situation, as well as a keyway, lock tab or other reference mark.

WIRING REPAIR

Soldering is a quick, efficient method of joining metals permanently. Everyone who has the occasion to make wiring repairs should know how to solder. Electrical connections that are soldered are far less likely to come apart and will conduct electricity much better than connections that are only "pigtailed" together. The most popular (and preferred) method of soldering is with an electric soldering gun or iron. Soldering irons are available in many sizes and wattage ratings. Irons with higher wattage ratings deliver higher temperatures and recover lost heat faster. A small soldering iron rated for no more than 50 watts is recommended, especially on electrical systems where excess heat can damage the components being soldered.

There are three ingredients necessary for successful soldering; proper flux, good solder and sufficient heat. A soldering flux is necessary to clean the metal of tarnish, prepare it for soldering and to enable the solder to spread into tiny crevices. When soldering, always use a rosin flux or rosin core solder which is non-corrosive and will not attract moisture once the job is finished. Other types of flux (acid core) will leave a residue that will attract moisture and cause the wires to corrode. Tin is a unique metal with a low melting point. In a molten state, it dissolves and alloys easily with many metals. Solder is often made by mixing tin with lead. The most common proportions are 40/60, 50/50 and 60/40, with the percentage of tin listed first. Low priced solders usually contain less tin, making them very difficult for a beginner to use because more heat is required to melt the solder. A common solder is 40/60 which is well suited for all-around general use, but 60/40 melts easier, has more tin for a better joint and is preferred for electrical work.

Soldering Techniques

Successful soldering requires that the metals to be joined are heated to a temperature that will melt the solder-usually 360-460°F (182-238°C). Contrary to popular belief, the purpose of the soldering iron is not to melt the solder itself,

but to heat the parts being soldered to a temperature high enough to melt the solder when it is touched to the work. Melting flux-cored solder on the soldering iron will usually destroy the effectiveness of the flux.

Soldering tips are made of copper for good heat conductivity, but must be "tinned" regularly for quick transference of heat to the project and to prevent the solder from sticking to the iron. To "tin" the iron, simply heat it and touch the flux-cored solder to the tip; the solder will flow over the hot tip. Wipe the excess off with a clean rag, but be careful as the iron will be hot.

After some use, the tip may become pitted. If so, simply dress the tip with a smooth file and "tin" the tip again. An old saying holds that "metals well cleaned are half soldered." Flux-cored solder will remove oxides but rust, bits of insulation and oil or grease must be removed with a wire brush or emery cloth. For maximum strength in soldered parts, the joint must start off clean and tight. Weak joints will result in gaps too wide for the solder to bridge.

If a separate soldering flux is used, it should be brushed or swabbed on only those areas that are to be soldered. Most solders contain a core of flux and separate fluxing is unnecessary. Hold the work to be soldered firmly. It is best to solder on a wooden board, because a metal vise will only rob the piece to be soldered of heat and make it difficult to melt the solder. Hold the soldering tip with the broadest face against the work to be soldered. Apply solder under the tip close to the work, using enough solder to give a heavy film between the iron and the piece being soldered, while moving slowly and making sure the solder melts properly. Keep the work level or the solder will run to the lowest part and favor the thicker parts, because these require more heat to melt the solder. If the soldering tip overheats (the solder coating on the face of the tip burns up), it should be retinned. Once the soldering is completed, let the soldered joint stand until cool. Tape and seal all soldered wire splices after the repair has cooled.

Wire Harness and Connectors

The on-board computer wire harness electrically connects the control unit to the various solenoids, switches and sensors used by the control system. Most connectors located in the engine compartment or which are otherwise exposed to the elements are protected against moisture and dirt which could create oxidation and deposits on the terminals. This protection is important because of the very low voltage and current levels used by the computer and sensors. All connectors have a lock which secures the male and female terminals together, with a secondary lock holding the seal and terminal into the connector. Both terminal locks must be released when disconnecting module connectors.

These special connectors are weather-proof and all repairs require the use of a special terminal and the tool required to service it. This tool is used to remove the pin and sleeve terminals. If removal is attempted with an ordinary pick, there is a good chance that the terminal will be bent or deformed. Unlike standard blade type terminals, these terminals cannot be straightened once they are bent. Make certain that the connectors are properly seated and all of the sealing rings in place when connecting leads. On some models, a hinge-type flap provides a backup or secondary locking feature for the terminals. Most secondary locks are used to improve the connector reliability by retaining the terminals if the small terminal lock tangs are not positioned properly.

Molded-on connectors require complete replacement of the connection. This

means splicing a new connector assembly into the harness. All splices in on-board computer systems should be soldered to insure proper contact. Use care when probing the connections or replacing terminals in them as it is possible to short between opposite terminals. If this happens to the wrong terminal pair, it is possible to damage certain components. Always use jumper wires between connectors for circuit checking and never probe through weatherproof seals.

Open circuits are often difficult to locate by sight because corrosion or terminal misalignment can be hidden by the connectors. Merely wiggling a connector on a sensor or in the wiring harness may correct the open circuit condition. This should always be considered when an open circuit or a failed sensor is indicated. Intermittent problems may also be caused by oxidized or loose connections. When using a circuit tester for diagnosis, always probe connections from the wire side. Be careful not to damage sealed connectors with test probes.

All wiring harnesses should be replaced with identical parts, using the same gauge wire and connectors. When signal wires are spliced into a harness, use wire with high temperature insulation only. With the low voltage and current levels found in the system, it is important that the best possible connection at all wire splices be made by soldering the splices together. It is seldom necessary to replace a complete harness. If replacement is necessary, pay close attention to insure proper harness routing. Secure the harness with suitable plastic wire clamps to prevent vibrations from causing the harness to wear in spots or contact any hot components.

Weatherproof connectors cannot be replaced with standard connectors. Instructions are provided with replacement connector and terminal packages. Some wire harnesses have mounting indicators (usually pieces of colored tape) to mark where the harness is to be secured.

In making wiring repairs, it's important that you always replace damaged wires with wires that are the same gauge as the wire being replaced. The heavier the wire, the smaller the gauge number. Wires are color-coded to aid in identification and whenever possible the same color coded wire should be used for replacement. A wire stripping and crimping tool is necessary to install solderless terminal connectors. Test all crimps by pulling on the wires; it should not be possible to pull the wires out of a good crimp.

Wires which are open, exposed or otherwise damaged are repaired by simple splicing. Where possible, if the wiring harness is accessible and the damaged place in the wire can be located, it is best to open the harness and check for all possible damage. In an inaccessible harness, the wire must be bypassed with a new insert, usually taped to the outside of the old harness.

When replacing fusible links, be sure to use fusible link wire, NOT ordinary automotive wire. Make sure the fusible segment is of the same gauge and construction as the one being replaced and double the stripped end when crimping the terminal connector for a good contact. The melted (open) fusible link segment of the wiring harness should be cut off as close to the harness as possible, then a new segment spliced in as described. In the case of a damaged fusible link that feeds two harness wires, the harness connections should be replaced with two fusible link wires so that each circuit will have its own separate protection.

Most of the problems caused in the wiring harness are due to bad ground connections. Always check all vehicle ground connections for corrosion or

looseness before performing any power feed checks to eliminate the chance of a bad ground affecting the circuit.

Repairing Hard Shell Connectors

Unlike molded connectors, the terminal contacts in hard shell connectors can be replaced. Replacement usually involves the use of a special terminal removal tool to depress the locking tangs (barbs) on the connector terminal and allow the connector to be removed from the rear of the shell. The connector shell should be replaced if it shows any evidence of burning, melting, cracks, or breaks. Replace individual terminals that are burnt, corroded, distorted or loose.

The insulation crimp must be tight to prevent the insulation from sliding back on the wire when the wire is pulled. The insulation must be visibly compressed under the crimp tabs, and the ends of the crimp should be turned in for a firm grip on the insulation.

The wire crimp must be made with all wire strands inside the crimp. The terminal must be fully compressed on the wire strands with the ends of the crimp tabs turned in to make a firm grip on the wire. Check all connections with an ohmmeter to insure a good contact. There should be no measurable resistance between the wire and the terminal when connected.

Mechanical Test Equipment

VACUUM GAUGE

Most gauges are graduated in inches of mercury (in. Hg), although a device called a manometer reads vacuum in inches of water (in. $\rm H_2O$). The normal vacuum reading usually varies between 18 and 22 in. Hg (60.78-74.29 kPa) at sea level. To test engine vacuum, the gauge must be connected to a source of manifold vacuum. Many engines have a plug in the intake manifold which can be removed and replaced with an adapter fitting. Connect the vacuum gauge to the fitting with a suitable rubber hose or, if no manifold plug is available, connect the vacuum gauge to any device using manifold vacuum, such as EGR valves, etc. The vacuum gauge can be used to determine if enough vacuum is reaching a component to allow its actuation.

HAND VACUUM PUMP

Small, hand-held vacuum pumps come in a variety of designs. Most have a built-in vacuum gauge and allow the component to be tested without removing it from the vehicle. Operate the pump lever or plunger to apply the correct amount of vacuum required for the test specified in the diagnosis routines. The level of vacuum in inches of Mercury (in. Hg) is indicated on the pump gauge. For some testing, an additional vacuum gauge may be necessary.

Intake manifold vacuum is used to operate various systems and devices on late model vehicles. To correctly diagnose and solve problems in vacuum control systems, a vacuum source is necessary for testing. In some cases, vacuum can be taken from the intake manifold when the engine is running, but vacuum is normally provided by a hand vacuum pump. These hand vacuum pumps have a built-in vacuum gauge that allows testing while the device is still attached to the component. For some tests, an additional vacuum gauge may be necessary.

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SUPPLEMENTAL RESTRAINT SYSTEM (AIR BAG)

Introduced in 1990, a driver's side air bag became standard on Taurus and Sables. In 1992 an optional passenger side air bag was first offered on these vehicles, then in 1994, driver and passenger side air bags became standard equipment on the Taurus and Sable. The supplemental restraint system was designed to provide increased protection in the event of an accident for those in the front seat of the car, when used along with the safety belt system. The system **MUST** be disarmed before any work is performed on or around the supplemental air bag system.

SERVICE PRECAUTIONS

- When performing service around the Supplemental Restraint System components or wiring, the system MUST be disabled. Failure to do so could result in possible air bag deployment, personal injury or unneeded system repairs.
- When carrying a live inflator module, make sure that the bag and trim cover are
 pointed away from you. Never carry the inflator module by the wires or connector
 on the underside of the module. In case of accidental deployment, the bag will
 then deploy with minimal chance of injury.
- When placing a live inflator on a bench or other surface, always face the bag and trim cover up, away from the surface.

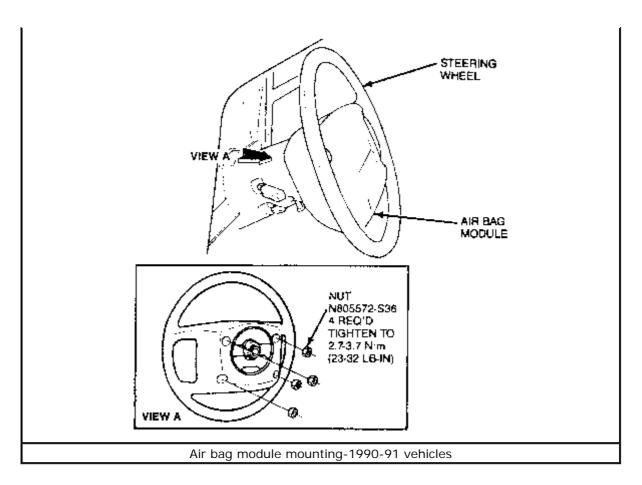
DISARMING THE SYSTEM

1990-91 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Open the glove compartment, then lower the door past its stops. Disconnect the backup power supply located to the right of the glove compartment opening.

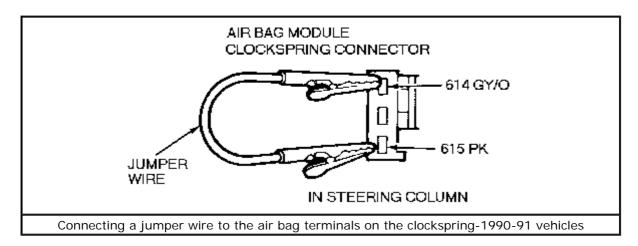
The backup power supply allows to air bag deployment if the battery or battery cables are damaged in an accident before the crash sensors close. The power supply is a capacitor that will leak down in approximately 15 minutes after the battery is disconnected or in 1 minute if the battery positive cable is grounded. The backup power supply must be disconnected before any air bag related service is performed.

3. Remove the four nut and washer assemblies retaining the driver air module to the steering wheel.



Click to enlarge

4. Disengage the driver air bag module and attach a jumper wire to the air bag terminals on the clockspring.

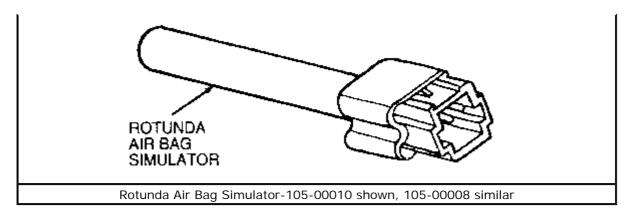


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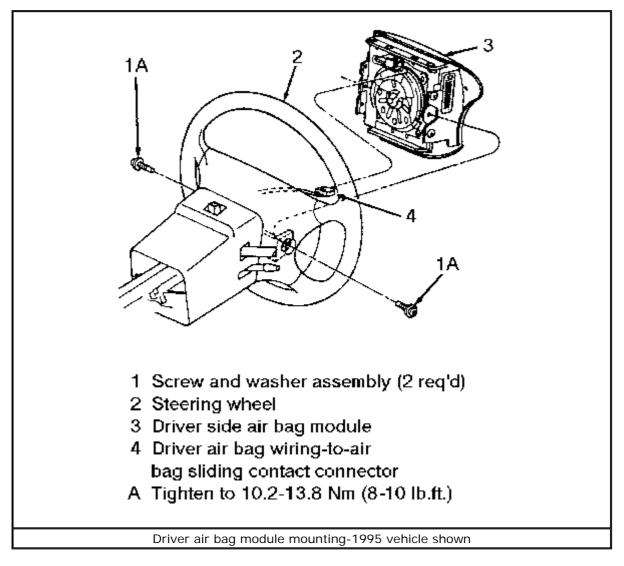
5. Connect the backup power supply and the negative battery cable.

1992-95 Vehicles

For this procedure, you will need Rotunda Air Bag Simulator 105-00008 or equivalent for 1992 vehicles; 105-00010 or equivalent for 1993-95 vehicles.

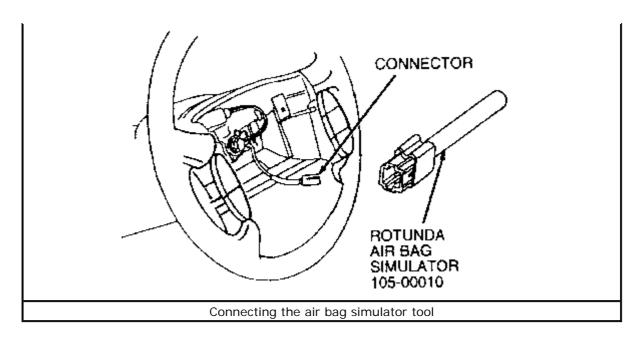


- 1. Disconnect the negative, then the positive battery cables.
- 2. Wait one minute for the backup power supply in the diagnostic monitor to deplete its stored energy.
- 3. Remove the fasteners attaching the air bag module to the steering wheel.



Click to enlarge

4. Disengage the driver air bag electrical connector, then attach Air Bag Simulator Tool 105-00008/105-00010 or equivalent to the vehicle harness connector.



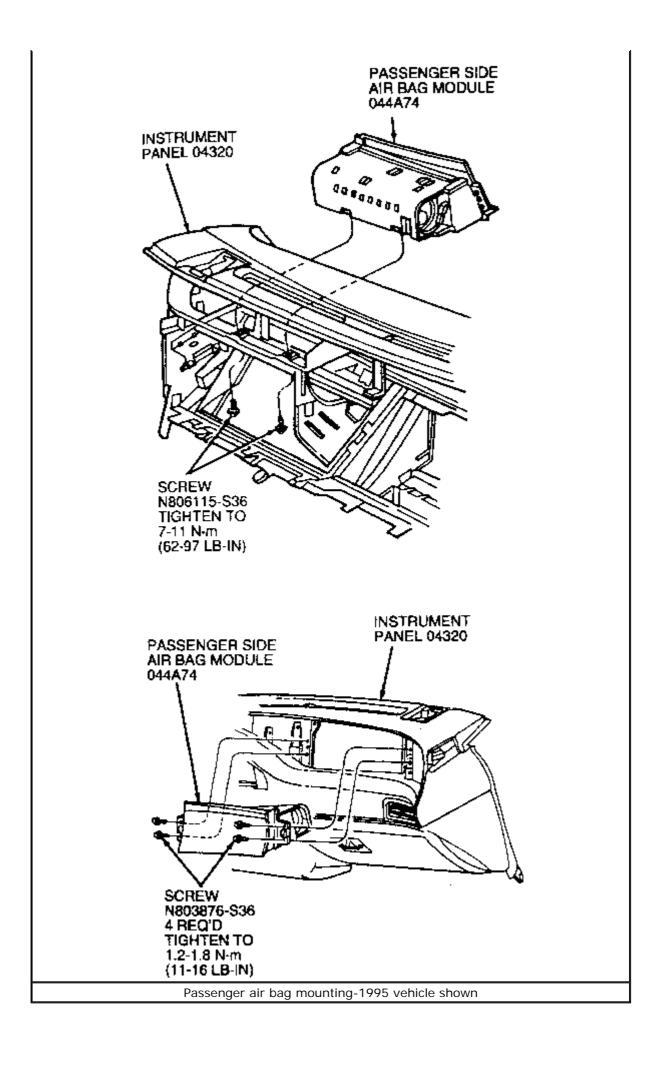
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If your vehicle is equipped with an optional passenger side air bag, both the driver and the passenger air bag modules must be disconnected.

- 5. If equipped with a passenger air bag, proceed as follows:
 - 1. Remove the right-hand and left-hand finish panels.
 - 2. Remove the instrument panel finish panel retaining spear clips.
 - 3. Open the glove compartment, press the side, then lower the glove compartment to the floor.
 - Working through the glove compartment opening, remove the two lower air bag module retaining bolts.
 - 5. Remove the four remaining air bag module retaining screws from the side of the air bag cover.
 - 6. Disengage the electrical connector from the left side of the air bag, then remove the air bag module.
 - 7. Attach Air Bag Simulator Tool 105-00008/105-00010 or equivalent to the vehicle harness connector.

CAUTION

When carrying a live air bag, make sure the bag and trim cover are pointed away from the body. In the unlikely event of an accidental deployment, the bag will then deploy with the minimal chance of injury. In addition, when placing a live air bag on a bench or other surface, always face the bag and trim cover up, away from the surface. This will reduce the motion of the unit if it is accidentally deployed.



Click to enlarge

6. Connect the positive battery cable, then the negative battery cable.

ENABLING THE SYSTEM

1990-91 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Open the glove compartment, then lower the door past its stops. Disconnect the backup power supply located to the right of the glove compartment opening.
- 3. if connected, remove the jumper wire from the air bag terminals on the clockspring assembly.
- 4. Engage the driver air bag module electrical connector.
- 5. Position the driver air bag module on the steering wheel, then secure with the four nut and washer assemblies. Tighten the retainers to 35-53 inch lbs. (4-6 Nm).
- 6. Connect the negative battery cable and the backup power supply.
- 7. Verify the air bag indicator.

1992-95 Vehicles

- 1. Disconnect the negative then the positive battery cables.
- 2. Wait one minute for the backup power supply in the air bag diagnostic monitor to deplete its stored energy.
- 3. If connected, remove the Rotunda Air Bag Simulator 105-00008 or 105-00010 from the air bag sliding contact connector.
- 4. Position the driver side air bog module on the steering wheel, then secure with the fasteners. Tighten to 8-10 ft. lbs. (10.2-13.8 Nm).
- 5. If equipped with a passenger side air bag, remove the air bag simulator from the harness the proceed as follows:
 - Engage the electrical connector to the passenger side air bag module, then position the passenger side air bag module in the instrument panel.
 - 2. Install the four upper retaining screws, then tighten the screws to 11-16 inch lbs. (1.2-1.8 Nm).
 - 3. Install the lower passenger air bag retaining screws, then tighten the screws to 62-97 inch lbs. (7-11 Nm).
 - 4. Return the glove compartment to the correct position.
 - Install the instrument panel finish panel locator pin into the air bag bushing locator, align the spear clips, then press the finish panel into place.
- 6. Connect the positive, then the negative battery cables.
- 7. Turn the ignition switch from OFF to RUN, then visually check the air bag warning indicator light. The warning indicator should light continuously for about six seconds, then shut off. If an air bag system fault is detected, the air bag warning indicator will either fail to light, remain lighted continuously or flash. If this problem exists, take your vehicle to an authorized repair shop for service.

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HEATER

Blower Motor

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Open the glove compartment door, release the door retainers and lower the door.



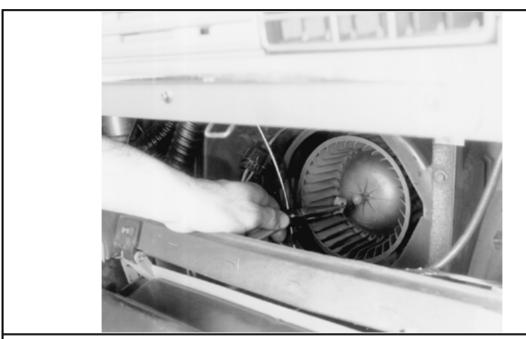
- 3. Remove the screw attaching the recirculation duct support bracket to the instrument panel cowl.
- 4. Remove the vacuum connection to the recirculation door vacuum motor. Remove the screws attaching the recirculation duct to the heater assembly.

HEATER Стр. 2 из 19



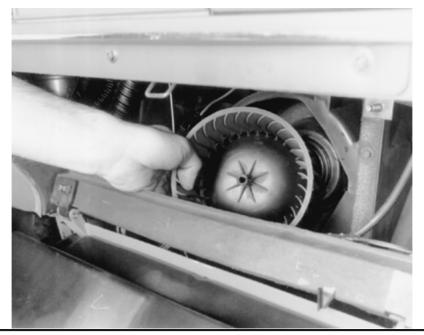
Remove the screws attaching the recirculation duct to the heater assembly, then remove the duct

- 5. Remove the recirculation duct from the heater assembly, lowering the duct from between the instrument panel and the heater case.
- 6. Disconnect the blower motor electrical lead. Remove the blower motor wheel clip and remove the blower motor wheel.

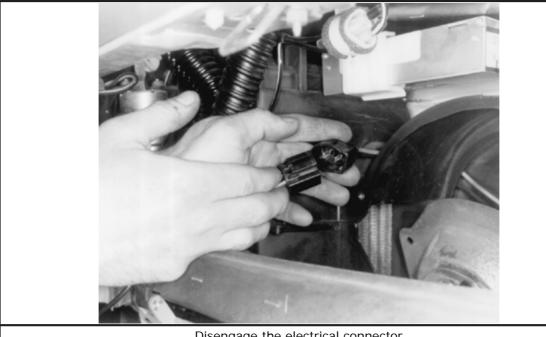


Remove the blower motor wheel clip

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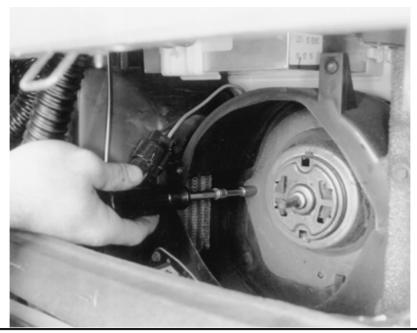
Remove the blower motor wheel



Disengage the electrical connector

7. Remove the blower motor mounting plate screws and remove the blower motor from the evaporator case.

HEATER Стр. 4 из 19

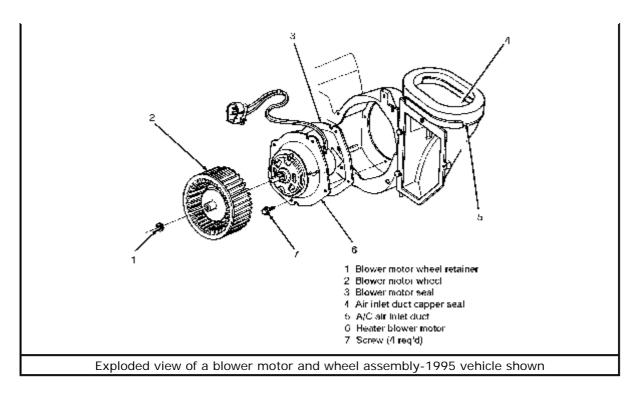


Remove the blower motor retaining screws



Remove the blower motor assembly from the vehicle

HEATER Стр. 5 из 19



Click to enlarge

To install:

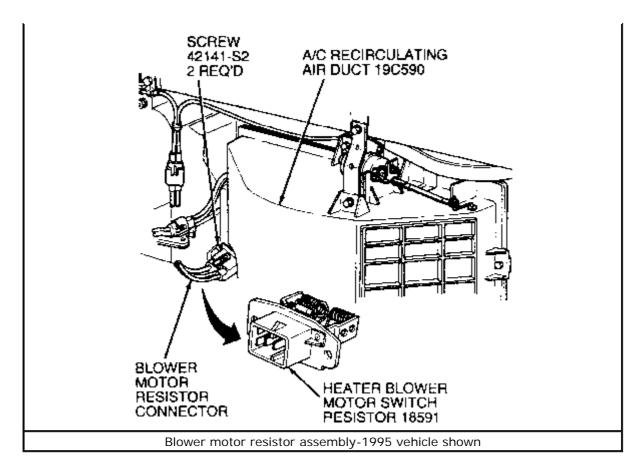
- 8. Feed the blower motor electrical connector through the evaporator housing.
- 9. Position the blower motor into the evaporator housing. Install the retaining screws, making sure the mounting seal is in place.
- 10. Assembly to blower motor to the shaft aligning the flat on the shaft with the flat on the inside diameter of the blower wheel hub. Slide the blower motor wheel onto the blower motor shaft until the wheel is fully seated.
- Install a new blower motor retainer on the blower shaft to retain the blower motor wheel.
- 12. Connect the blower motor electrical lead to the wiring harness.
- 13. Install the recirculation duct using the retaining screws.
- 14. Install the glove compartment door to its original closed position, then connect the negative battery cable.

Blower Motor Resistor

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Open the glove compartment door and release the glove compartment retainers so that the glove compartment hangs down.
- 3. Disengage the wire harness connector from the resistor assembly.
- 4. Remove the two resistor attaching screws and remove the resistor from the evaporator housing.

HEATER Стр. 6 из 19



Click to enlarge

To install:

- 5. Position the resistor assembly in the evaporator case opening and install the two attaching screws. Do not apply sealer to the resistor assembly mounting surface.
- 6. Engage the wire harness connector to the resistor.
- 7. Connect the negative battery cable, check the operation of the blower motor, then install the glove compartment to the retainers and close the door.

Heater Core

REMOVAL & INSTALLATION

Be sure to consult the laws in your area before beginning any procedure which requires servicing the air conditioning system. In some states, it is illegal to perform repairs involving refrigerant unless the work is done by a certified technician.

CAUTION

When draining the coolant, keep in mind that cats and dogs are attracted by the ethylene glycol antifreeze, and are quite likely to drink any that is left in an uncovered container or in puddles on the ground. This will prove fatal in sufficient quantity. Always drain the coolant into a sealable container. Coolant should be reused unless it is contaminated or several years old.

HEATER Cтр. 7 из 19

When removing the instrument panel, it may be beneficial to have a friend or assistant help you.

Without Air Conditioning

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument panel on 1986-89 vehicles as follows:
 - 1. Remove the four screws retaining the steering column opening cover, then remove the cover.
 - Remove the sound insulator under the glove compartment by removing the two push nuts securing the insulator to the studs on the climate control case.
 - Remove the steering column trim shrouds, then tag and disengage all electrical connections from the steering column switches.
 - 4. Remove the four screws at the steering column bracket to remove the steering column.
 - Remove the screws retaining the lower left and radio finish panels, then remove the panels by snapping them out.
 - Remove the cluster opening finish panel retaining screws. On Taurus remove the jam nut behind the headlight switch and the screw behind the clock or clock cover. Remove the finish panel by rocking the upper edge toward the driver.
 - Disconnect the speedometer cable by reaching up under the instrument panel and pressing on the flat surface of the plastic connector. The panel can be removed with the cluster installed.
 - 8. Release the glove compartment assembly by depressing the side of the glove compartment bin and swinging the door/bin down.
 - Using the steering column, cluster and glove compartment openings and by reaching under the instrument panel, tag and disengage all electrical connections, vacuum hoses, heater control cables and the radio antenna cable.
 - 10. Tag and disengage all underhood electrical connectors of the main wire loom. Disengage the rubber grommet from the dash panel and push the wire and connectors into the instrument panel area.
 - 11. Remove the right and left speaker opening covers by snapping them out.
 - 12. Remove the two lower instrument panel-to-cowl side retaining screws from the right and left side. Remove the instrument panel brace retaining screw from under the radio area. On Sable, remove the defroster grille by snapping it out.
 - 13. Remove the three instrument panel upper retaining screws, then remove the instrument panel.

- 3. Remove the instrument panel on 1990-95 vehicles as follows:
 - Position the front wheels in the straight-ahead position.
 - 2. Disconnect the positive battery cable.
 - Remove the ignition lock cylinder and, if equipped, remove the tilt lever.
 - Remove the steering column trim shrouds. Tag and disengage all electrical connections from the steering column switches.
 - Remove the four bolts and opening cover, and the two bolts and reinforcement from under the steering column.
 - Disengage the insulator retainer and remove the insulator. Remove the four nuts and reinforcement from under the steering column.

Do not rotate the steering column shaft.

- Remove the four nuts retaining the steering column to the instrument panel, disconnect the shift indicator cable and lower the column on the front seat. Install the lock cylinder to make sure the steering column shaft does not turn.
- Remove bolt at the steering column opening attaching the instrument panel to the brace.
 Remove instrument panel brace retaining bolt from under the radio area.
- Remove the sound insulator under the glove compartment by removing the two push nuts that secure the insulator to the studs on the climate control case.
- 10. Disconnect the wires of the main wire loom in the engine compartment. Disengage the rubber grommet from the dash panel, then feed the wiring through the hole in the dash panel into the passenger compartment.
- 11. Remove the right and left cowl side trim panels.

 Disconnect the wires from the instrument panel at the right and left cowl sides.
- Remove screw each from the left and right side retaining the instrument panel. Pull up to unsnap the right and left speaker opening covers and remove.
- 13. Release the glove compartment assembly by depressing the side of the glove compartment bin and swinging the door/bin down.
- 14. Using the steering column and glove compartment openings and by reaching under the instrument panel, tag and disengage all electrical connections, vacuum hoses, heater control cables, speedometer cable and radio antenna cable.
- 15. Close the glove compartment door, support the

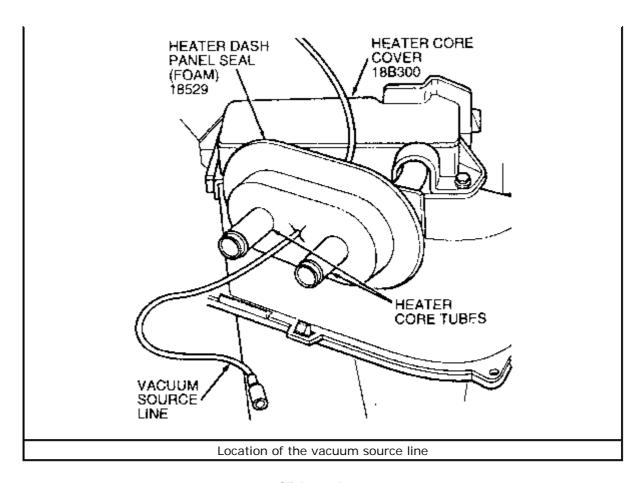
panel and remove the three screws attaching the top of the instrument panel to the cowl top and disconnect any remaining wires. Remove the panel from the vehicle.

- 4. Drain the coolant from the radiator.
- Disconnect and plug the heater hoses at the heater core. Plug the heater core tubes.
- 6. Disconnect the vacuum supply hose from the inline vacuum check valve in the engine compartment. Remove the screw holding the instrument panel shake brace to the heater case and remove the shake brace.
- Remove the floor register and rear floor ducts from the bottom of the heater case.
 Remove the three nuts attaching the heater case to the dash panel in the engine compartment.
- 8. Remove the two screws attaching the brackets to the cowl top panel. Pull the heater case assembly away from the dash panel and remove from the vehicle.
- Remove the vacuum source line from the heater core tube seal and remove the seal from the heater core tubes.
- Remove the four heater core access cover attaching screws and remove the
 access cover from the heater case. Lift the heater core and seals from the heater
 case.

To install:

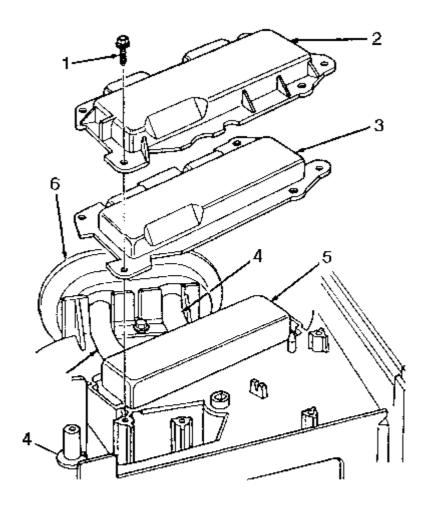
- 11. Transfer the three foam core seals to the new heater core. Install the heater core and seals into the heater case.
- Position the heater case access cover on the case, then install the four retaining screws.
- 13. Install the seal on the heater core tubes, then install the vacuum source line through the seal.
- 14. Position the heater case assembly to the dash panel and cowl top panel at the air inlet opening. Install the two screws to attach the support brackets to the cowl top panel.
- 15. Install the three nuts in the engine compartment to attach the heater case to the dash panel. Install the floor register and rear floor ducts on the bottom of the heater case.
- 16. Install the instrument panel shake brace and screw to the heater case.
- 17. Install the instrument panel by reversing the removal procedure.
- 18. Connect the heater hoses to the heater core. Connect the black vacuum supply hose to the vacuum check valve in the engine compartment.
- 19. Fill the radiator and bleed the cooling system.
- 20. Connect the negative battery cable and check the system for proper operation.

HEATER Стр. 10 из 19



Click to enlarge

HEATER Стр. 11 из 19



- 1 Screw (4 reg'd)
- 2 Heater core cover
- 3 Heater core cover seal
- 4 Heater core tubes
- 5 Heater core
- 6 Heater dash panel seal

Heater core cover location

Click to enlarge

With Air Conditioning

CAUTION

Some 1992-93 and all 1994-95 air conditioned vehicles covered by this manual are equipped with a new non-CFC (chlorofluorocarbon) refrigerant (R-134a). This new refrigerant is not available commercially in most areas, as it is usually illegal for do-it-yourselfers to service a vehicle with this refrigerant. If you have a Taurus or Sable that uses the new refrigerant, R-134a, the vehicle should be taken to a qualified technician for any repair requiring A/C system service.

It is necessary to remove the evaporator case in order to remove the

HEATER Стр. 12 из 19

heater core. Whenever an evaporator case is removed, it will be necessary to replace the suction accumulator/drier.

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument panel on 1986-89 vehicles as follows:
 - 1. Remove the four screws retaining the steering column opening cover and remove the cover.
 - Remove the sound insulator under the glove compartment by removing the two push nuts securing the insulator to the studs on the climate control case.
 - Remove the steering column trim shrouds and disconnect all electrical connections from the steering column switches.
 - Remove the four screws at the steering column bracket to remove the steering column.
 - Remove the screws retaining the lower left and radio finish panels and remove the panels by snapping out.
 - Remove the cluster opening finish panel retaining screws. On Taurus remove jam nut behind the headlight switch and screw behind the clock or clock cover. Remove the finish panel by rocking the upper edge toward the driver.
 - Disconnect the speedometer cable by reaching up under the instrument panel and pressing on the flat surface of the plastic connector. The panel can be removed with the cluster installed.
 - 8. Release the glove compartment assembly by depressing the side of the glove compartment bin and swinging the door/bin down.
 - Using the steering column, cluster and glove compartment openings and by reaching under the instrument panel, tag and disconnect all electrical connections, vacuum hoses, heater/air conditioner control cables and the radio antenna cable.
 - Disconnect all underhood electrical connectors of the main wire loom. Disengage the rubber grommet from the dash panel and push the wire and connectors into the instrument panel area.
 - 11. Remove the right and left speaker opening covers by snapping out.
 - 12. Remove the two lower instrument panel-to-cowl side retaining screws from the right and left side. Remove the instrument panel brace retaining screw from under the radio area. On Sable, remove the defroster grille by snapping out.
 - 13. Remove the three instrument panel upper retaining screws and remove the instrument panel.
- 3. Remove the instrument panel on 1990-95 vehicles as follows:
 - 1. Position the front wheels in the straight-ahead position.

HEATER Стр. 13 из 19

- Remove the ignition lock cylinder and, if equipped, remove the tilt lever.
- Remove the steering column trim shrouds.
 Disconnect all electrical connections from the steering column switches.
- 4. Remove the four bolts and opening cover and the two bolts and reinforcement from under the steering column.
- Disengage the insulator retainer and remove the insulator. Remove the four nuts and reinforcement from under the steering column.

Do not rotate the steering column shaft.

- Remove the four nuts retaining the steering column to the instrument panel, disconnect the shift indicator cable and lower the column on the front seat. Install the lock cylinder to make sure the steering column shaft does not turn.
- 7. Remove bolt at the steering column opening attaching the instrument panel to the brace. Remove instrument panel brace retaining bolt from under the radio area.
- Remove the sound insulator under the glove compartment by removing the two push nuts that secure the insulator to the studs on the climate control case.
- Disconnect the wires of the main wire loom in the engine compartment. Disengage the rubber grommet from the dash panel, then feed the wiring through the hole in the dash panel into the passenger compartment.
- Remove the right and left cowl side trim panels.
 Disconnect the wires from the instrument panel at the right and left cowl sides.
- Remove one screw from each the left and right side retaining the instrument panel. Pull up to unsnap the right and left speaker opening covers and remove.
- 12. Release the glove compartment assembly by depressing the side of the glove compartment bin and swinging the door/bin down.
- 13. Using the steering column and glove compartment openings and by reaching under the instrument panel, tag and disconnect all electrical connections, vacuum hoses, heater/air conditioner control cables, speedometer cable and radio antenna cable.
- 14. Close the glove compartment door, support the panel and remove the three screws attaching the top of the instrument panel to the cowl top and disconnect any remaining wires. Remove the panel from the vehicle.
- 4. Drain the coolant from the radiator. Properly discharge the air conditioning

HEATER Стр. 14 из 19

system.

Be sure to consult the laws in your area before beginning any procedure which requires servicing the air conditioning system. In some states, it is illegal to perform repairs involving refrigerant unless the work is done by a certified technician.

- 5. Disconnect and plug the heater hoses at the heater core. Plug the heater core tubes
- 6. Disconnect the vacuum supply hose from the inline vacuum check valve in the engine compartment.
- 7. Disconnect the air conditioning lines from the evaporator core at the dash panel. Cap the lines and the core to prevent entrance of dirt and moisture.
- 8. Remove the screw holding the instrument panel shake brace to the evaporator case and remove the shake brace.
- Remove the two screws attaching the floor register and rear seat duct to the bottom of the evaporator case. Remove the three nuts attaching the evaporator case to the dash panel in the engine compartment.
- Remove the two screws attaching the support brackets to the cowl top panel.
 Carefully pull the evaporator assembly away from the dash panel and remove the evaporator case from the vehicle.
- Remove the vacuum source line from the heater core tube seal and remove the seal from the heater core tubes.
- 12. If equipped with automatic temperature control, remove the three screws attaching the blend door actuator to the evaporator case and remove the actuator.
- 13. Remove the four heater core access cover attaching screws and remove the access cover and seal from the evaporator case. Lift the heater core and seals from the evaporator case.

To install:

- 14. Transfer the seal to the new heater core, then install the heater core into the evaporator case.
- 15. Position the heater core access cover on the evaporator case and install the four attaching screws. If equipped with automatic temperature control, position the blend door actuator to the blend door shaft and install the three attaching screws.
- Install the seal on the heater core tubes and install the vacuum source line through the seal.
- 17. Position the evaporator case assembly to the dash panel and cowl top panel at the air inlet opening. Install the two screws attaching the support brackets to the cowl top panel.
- 18. Install the three nuts in the engine compartment attaching the evaporator case to the dash panel. Install the floor register and rear seat duct to the evaporator case and tighten the two attaching screws.
- 19. Install the instrument panel shake brace and screw to the evaporator case. Install the instrument panel in the reverse order of removal.
- Connect the air conditioning lines to the evaporator core and the heater hoses to the heater core.
- 21. Connect the black vacuum supply hose to the vacuum check valve in the engine compartment.

HEATER Стр. 15 из 19

- 22. Fill and bleed the cooling system. Connect the negative battery cable.
- 23. Leak test, evacuate and charge the air conditioning system. Observe all safety precautions.

Some 1992-93 and all 1994-95 vehicles covered by this manual are equipped with R-134a NOT R-12 refrigerant. These two refrigerants are NOT compatible. Using the incorrect refrigerant in an R-134a system will lead to compressor failure, refrigerant oil sludge and/or poor air conditioning system performance.

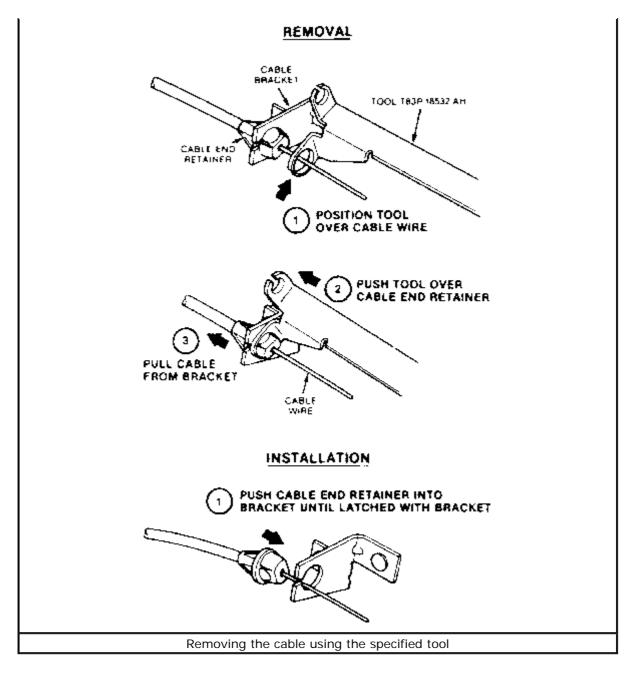
24. Check the system for proper operation.

Control Cables

REMOVAL & INSTALLATION

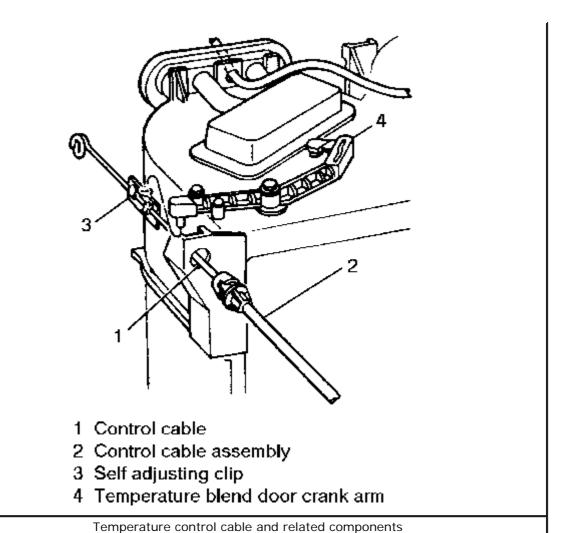
- 1. Disconnect the negative battery cable.
- 2. Remove the instrument cluster opening finish panel.
- 3. Rotate the temperature control knob to the "COOL" position.
- Disconnect the temperature control knob cable housing end retainer from the heater case bracket using Heater Control Cable Disconnect tool T83P-18532-AH, or equivalent.

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- 5. Disconnect the cable wire from the temperature door crank arm, using the proper tool.
- 6. Remove the retaining screws that secure the control assembly to the instrument panel. Pull the control assembly away from the instrument panel.
- 7. Disconnect the cable housing end retainer from the control assembly and the cable wire from the temperature control lever arm.
- Remove the cable assembly from the vehicle through the control assembly
 opening in the instrument panel, being careful not to hook or damage the wiring or
 other cables.

HEATER Стр. 17 из 19



Click to enlarge

To install:

- 9. Position the self-adjusting clip on the control cable.
- 10. Insert the cable through the control assembly opening of the instrument panel and over the left-hand duct to the left-hand side of the evaporator case.
- 11. Rotate the temperature control knob to the "COOL" position.
- 12. Insert the cable wire end into the hole in the temperature control arm. Connect the cable and retainer to the control assembly.
- 13. Position the control assembly to the instrument panel opening, then install the retaining screws.
- 14. Slide the cable housing and retainer into the heater case cable bracket, then push to secure the cable housing to the bracket.
- 15. Connect the self-adjusting clip at the temperature cable to the temperature door crank arm.
- 16. Connect the negative battery cable.

Control Panel

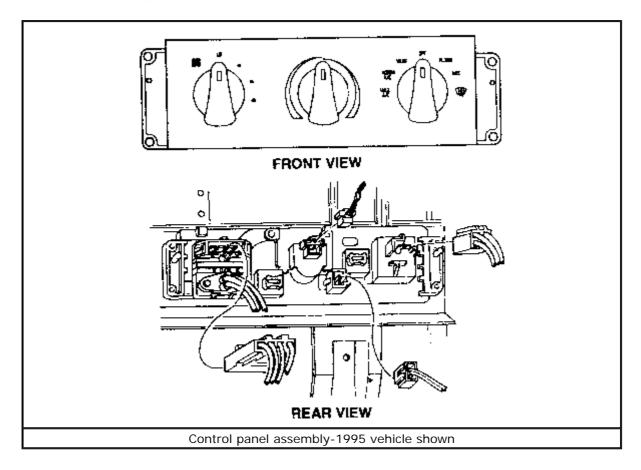
REMOVAL & INSTALLATION

HEATER Стр. 18 из 19

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument panel finish applique.

Depending on vehicle application, the control assembly may be retained to the instrument panel by Torx® screws, in which case a Torx® head screwdriver must be used to remove them.

- 3. Remove the four screws attaching the control assembly to the instrument panel.
- 4. Pull the control assembly from the instrument panel opening to allow access to the rear electrical connectors.
- 5. Disengage the wire connectors from the control assembly by depressing the latches at the top of the connectors and pulling.
- 6. Disconnect the vacuum harness and temperature control cable from the control assembly. Discard the used pushnut from the vacuum harness.



Click to enlarge

To install:

- 7. Connect the temperature cable to the control assembly.
- 8. Connect the wire connectors and vacuum harness to the control assembly using new pushnuts.

Push on the vacuum harness retaining nuts. Do not attempt to screw them onto the post.

Position the control assembly to the instrument panel opening and install the four attaching screws. HEATER Стр. 19 из 19

- 10. Install the instrument panel finish applique.
- 11. Connect the negative battery cable, then check the system for proper operation.

Blower Switch

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the climate control assembly from the instrument panel. For details, please refer to the procedure located earlier in this section.
- 3. Remove the blower switch knob.
- 4. Disengage the blower switch electrical connector.
- Remove the retaining screw, then remove the heater blower motor switch from the vehicle.

To install:

- 6. Install the blower switch, then secure using the retaining screw.
- 7. Engage the switch electrical connector.
- 8. Install the blower switch knob.
- 9. Install the climate control assembly to the instrument panel. For details, please refer to the procedure located earlier in this section.
- 10. Connect the negative battery cable, then check the switch for proper operation.

Vacuum Selector Switch

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the control assembly from the instrument panel. For details, please refer to the procedure located earlier in this section.
- 3. Remove the knob from the function selector shaft.
- 4. Remove the screw attaching the vacuum switch to the control assembly, then remove the switch.

To install:

- 5. Rotate the function selector shaft to the OFF position.
- 6. Position the vacuum selector switch on the control assembly bracket.
- 7. Install the screw attaching the vacuum switch to the control assembly.
- 8. Connect the negative battery cable.

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AIR CONDITIONER

Refer to Section 1 for air conditioning system discharging information.

Compressor

CAUTION

Please refer to **Section 1** of this manual before discharging/recovering the A/C system or disconnecting the air conditioning lines. Damage to the air conditioning system or personal injury could result. Consult your local laws concerning refrigerant discharge and recycling. In many areas it may be illegal for anyone but a certified technician to service the A/C system. Always use an approved recovery station when discharging the air conditioning.

REMOVAL & INSTALLATION

1986-94 Vehicles-Except 3.8L Engine

Whenever a compressor is replaced, it will be necessary to replace the suction accumulator/drier.

- 1. Disconnect the negative battery cable and properly discharge the system.
- 2. Disconnect the compressor clutch wires at the field coil connector on the compressor.
- 3. Loosen and remove the drive belt and disconnect the hose assemblies from the condenser and suction line.
- 4. Remove the mounting bolts, then remove the compressor and manifold and tube assembly from the vehicle as a unit. The assembly will not clear the sub-frame and radio support if an attempt is made to remove the unit from the bottom. It must be removed from the top.
- 5. Remove the manifold and tube assembly as an on-bench operation.
- 6. If the compressor is to be replaced, remove the clutch and field coil assembly.

To install:

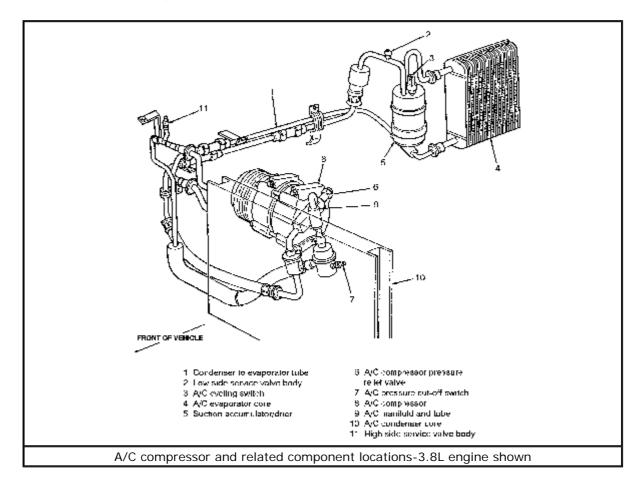
New service replacement FS-6 compressors contain 10 oz. (300 ml) of refrigerant oil. Before replacement compressor installation, drain 4 oz. (120 ml) of refrigerant oil from the compressor. This will maintain the total system oil charge within the specified limits. New service replacement 10P15F compressors contain 8 oz. (240 ml) of refrigerant oil and new service replacement FX15 compressors contain 7 oz. (207 ml) of refrigerant oil. Prior to installing either type replacement compressor, drain the refrigerant oil from the removed compressor into a calibrated container. Then, drain the refrigerant oil from the new compressor into a clean calibrated container. If the amount of oil drained from the removed

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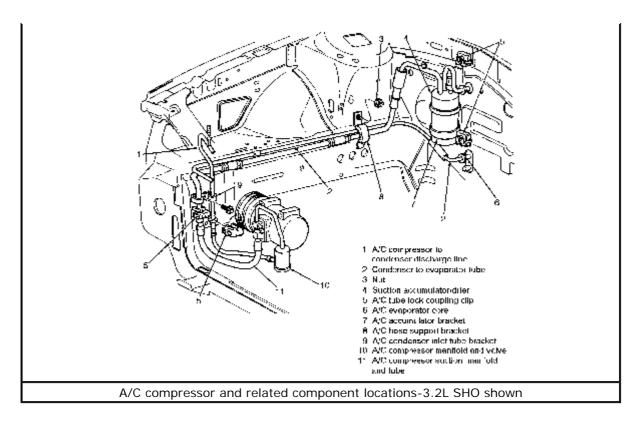
compressor was between 3-5 oz. (90-148 ml), pour the same amount of clean refrigerant oil into the new compressor. If the amount of oil that was removed from the old compressor is greater than 5 oz. (148 ml), pour 5 oz. (148 ml) of clean refrigerant oil into the new compressor. If the amount of refrigerant oil that was removed from the old compressor is less than 3 oz. (90 ml), pour 3 oz. (90 ml) of clean refrigerant oil into the new compressor.

- 7. Install the manifold and tube assembly on the air conditioning compressor.
- 8. Install the compressor and manifold and tube assembly on the air conditioning mounting bracket.
- Using new O-rings lubricated with clean refrigerant oil, connect the suction line to the compressor manifold and tube assembly. Attach the discharge line to the air conditioning condenser.
- 10. Connect the clutch wires to the field coil connector.
- 11. Install the drive belt.
- 12. Leak test, evacuate and charge the system according to the proper procedure.

 Observe all safety precautions.
- 13. Check the system for proper operation.



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Click to enlarge

1988-95 Vehicles With 3.8L Engine; All 1995 Vehicles

Whenever a compressor is replaced, it will be necessary to replace the suction accumulator/drier.

- 1. Disconnect the negative battery cable and properly discharge the air conditioning system.
- 2. Position a suitable clean drain pan under the radiator and drain the coolant, keeping the coolant to refill the system during installation.
- 3. Disconnect and remove the integrated relay controller/constant control relay module.
- 4. Disconnect and remove the fan and shroud assembly.
- 5. Disconnect the upper and lower radiator hoses, then remove the radiator.
- 6. Disconnect the air conditioning compressor magnetic clutch wire at the field coil connector on the compressor.
- 7. Remove the top two compressor mounting bolts.
- 8. Raise and safely support the vehicle.
- 9. Loosen and remove the compressor drive belt.
- 10. Disconnect the HEGO sensor wire connector and remove the air conditioning muffler supporting strap bolt from the sub-frame.
- 11. Disconnect the air conditioning system hose from the condenser and suction accumulator/drier using the spring-lock coupling tool or equivalent. Immediately install protective caps on the open lines.
- 12. Make sure the compressor is properly supported, then remove the bottom two compressor mounting bolts.
- 13. Remove the compressor, manifold and tube assemblies from the vehicle as a unit.

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The assembly can be removed from the bottom using care not to scrape against the condenser.

- 14. Remove the manifold and tube assemblies from the compressor.
- 15. If the compressor is to be replaced, remove the clutch and field coil assembly.

To install:

A new service replacement 10P15F compressor contains 8 oz. (240 ml) of refrigerant oil. Before installing a new compressor, drain 4 oz. (120 ml) of refrigerant oil from the compressor. This will maintain total system oil charge within specified limits.

- 16. Using new O-rings, lubricated with clean refrigerant oil, install the manifold and tube assemblies onto the new compressor.
- Install the compressor, manifold and tube assemblies onto the compressor mounting bracket.
- 18. Using new O-rings lubricated with clean refrigerant oil, connect the suction line to the compressor and manifold assembly.
- 19. Using new O-rings lubricated with clean refrigerant oil, connect the discharge line to the compressor and manifold assembly.
- Install the muffler support onto the sub-frame and connect the HEGO sensor wire connector.
- 21. Install the compressor drive belt and lower the vehicle.
- 22. Install the radiator and connect the radiator hoses.
- 23. Install the fan and shroud assembly and connect the integrated relay connector.
- Connect the negative battery cable and fill the radiator with the coolant that was saved.
- 25. Leak test, evacuate and charge the system according to the proper procedure. Check the system for proper operation.

Condenser

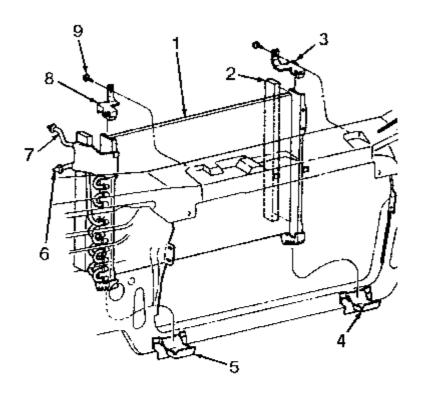
Refer to Section 1 for air conditioning system discharging information.

REMOVAL & INSTALLATION

Whenever a condenser is replaced, it will be necessary to replace the suction accumulator/drier.

- 1. Disconnect the negative battery cable and properly discharge the refrigerant from the air conditioning system. Observe all safety precautions.
- 2. Disconnect the two refrigerant lines at the fittings on the right side of the radiator. Perform the spring-lock coupling disconnect procedure located later in this section.
- 3. Remove the bolts or screws and washers attaching the condenser to the radiator support, then remove the condenser from the vehicle.

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- 1 A/C condenser core
- 2 A/C condenser seal (2 reg'd)
- 3 A/C condenser mounting bracket (upper LH)
- 4 A/C condenser mounting bracket (lower LH)
- 5 A/C condenser mounting bracket (lower RH)
- 6 To A/C evaporator core orifice and A/C evaporator core
- 7 From A/C manifold and tube.
- 8 A/C condenser mounting bracket (upper RH)
- Screw and washer assy (1 req'd each bracket assy)

A/C condenser core assembly-1995 vehicle shown

Click to enlarge

To install:

- 4. Add 1 oz. (30 ml) of clean refrigerant oil to a new replacement condenser.
- 5. Position the condenser assembly to the radiator support brackets, then install the attaching bolts or screws and washers.
- 6. Connect the refrigerant lines to the condenser assembly using new O-rings. Perform the spring-lock coupling connection procedure.
- 7. Leak test, evacuate and charge the refrigerant system following the proper procedures. Observe all safety precautions.

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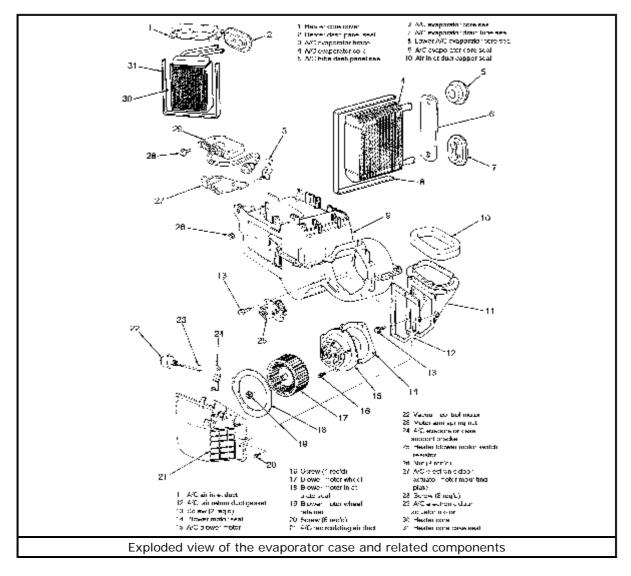
Evaporator Core

Refer to Section 1 for air conditioning system discharging information.

REMOVAL & INSTALLATION

Whenever an evaporator is removed, it will be necessary to replace the accumulator/drier.

- 1. Disconnect the negative battery cable.
- 2. Drain the coolant from the radiator into a clean container.

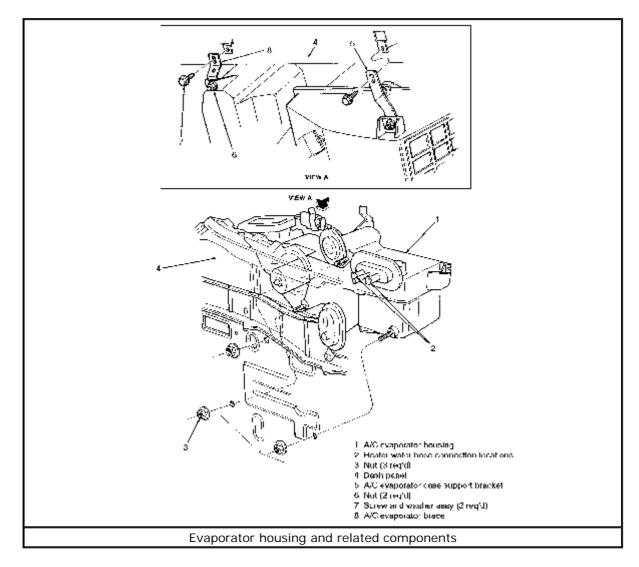


- 3. Properly discharge the refrigerant from the air conditioning system.
- 4. Disconnect the heater hoses from the heater core. Plug the heater core tubes.
- 5. Disconnect the vacuum supply hose from the in-line vacuum check valve in the engine compartment.
- 6. Disconnect the liquid line and the accumulator from the evaporator core at the dash panel. Cap the refrigerant lines and evaporator core to prevent entrance of

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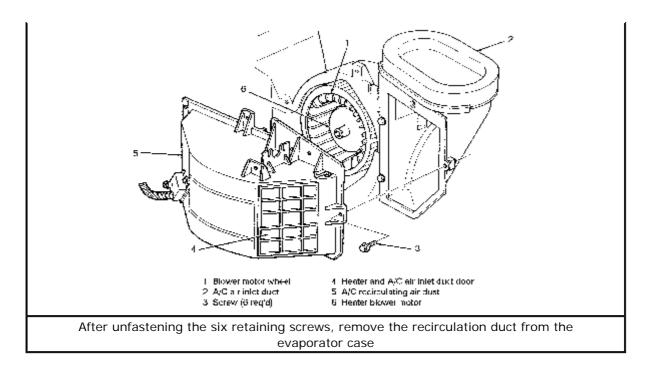
dirt and moisture.

- 7. Remove the instrument panel and place it on the front seat. For details, please refer to the procedure located in Section 10 of this manual.
- 8. Remove the screw holding the instrument panel shake brace to the evaporator case, then remove the instrument panel shake brace.
- 9. Remove the two screws attaching the floor register and rear seat duct to the bottom of the evaporator case.
- 10. Disconnect the vacuum line, electrical connections and aspirator hose from the evaporator case.
- 11. Remove the three nuts attaching the evaporator case to the dash panel in the engine compartment. Remove the two screws attaching the support brackets to the cowl top panel.
- 12. Carefully pull the evaporator assembly away from the dash panel and remove the evaporator case from the vehicle.



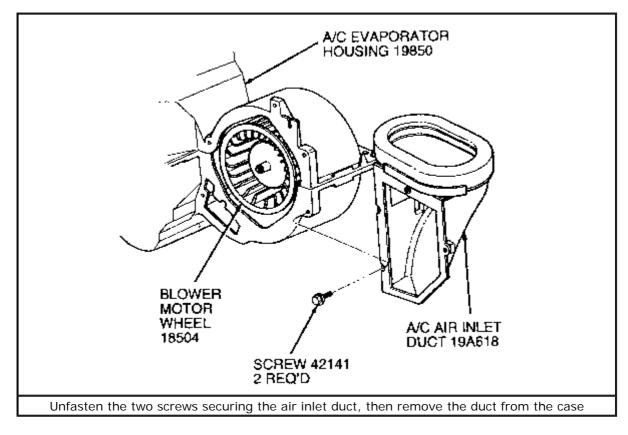
- 13. Disconnect and remove the vacuum harness.
- 14. Remove the six screws attaching the recirculation duct, then remove the duct from the evaporator case.

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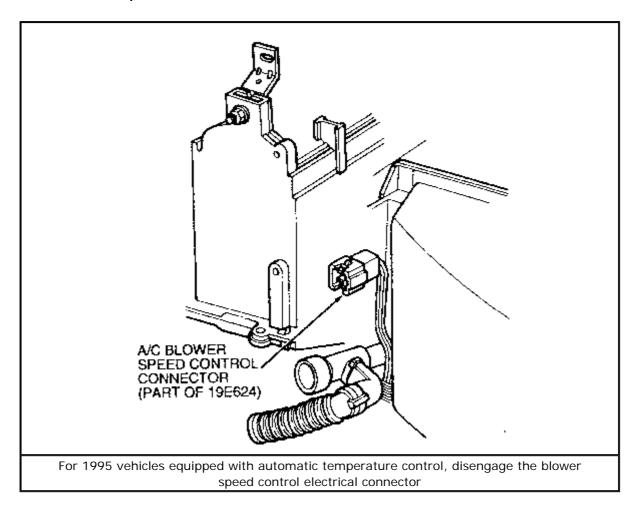
15. Remove the two screws from the air inlet duct, then remove the duct from the evaporator case.



- 16. Remove the support bracket from the evaporator case.
- 17. For 1986-94 vehicles if equipped with automatic temperature control, remove the screws holding the electronic connector bracket to the recirculation duct.
- 18. For 1995 vehicles if equipped with automatic temperature control, remove the

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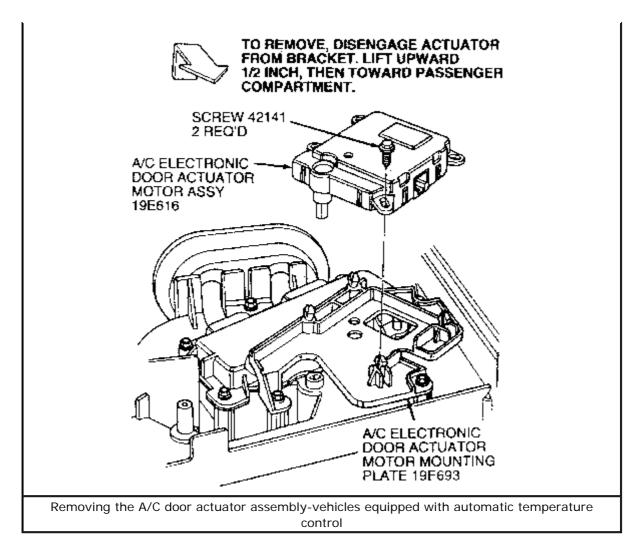
screw holding the electronic connector bracket to the A/C recirculating air duct. Disconnect the engine harness from the blower speed control connector. Release the three connectors from the bracket, then remove the bracket, then disconnect the aspirator duct.



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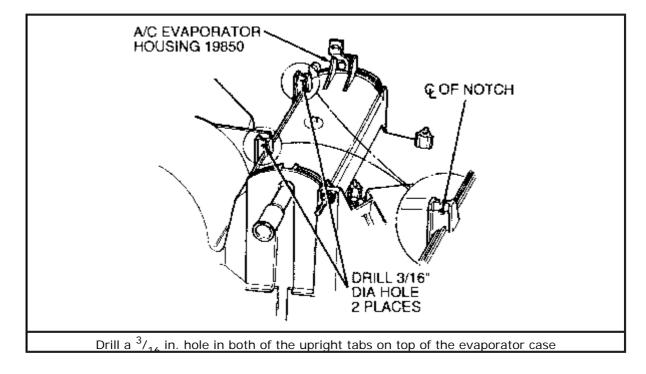
19. If equipped with automatic temperature control, remove the blend door actuator and cold engine lock out switch, which is held on by spring tension at the outermost heater core tube.

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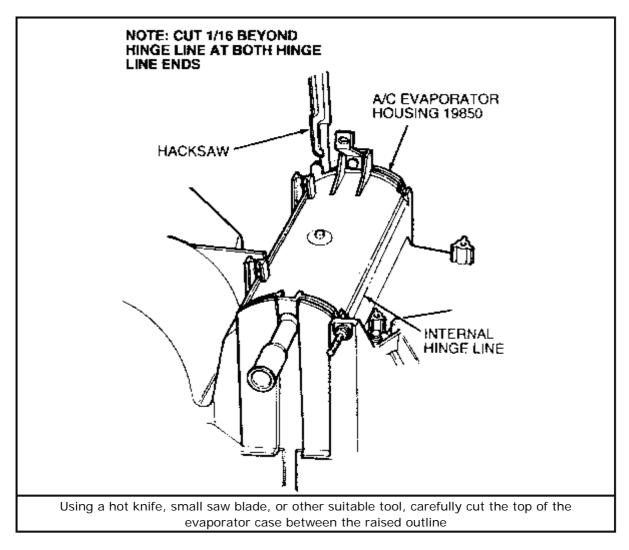
- 20. Remove the moulded seals from the evaporator core tubes.
- 21. Drill a $^{3}/_{16}$ in. (4.75mm) hole in both upright tabs on top of the evaporator case.



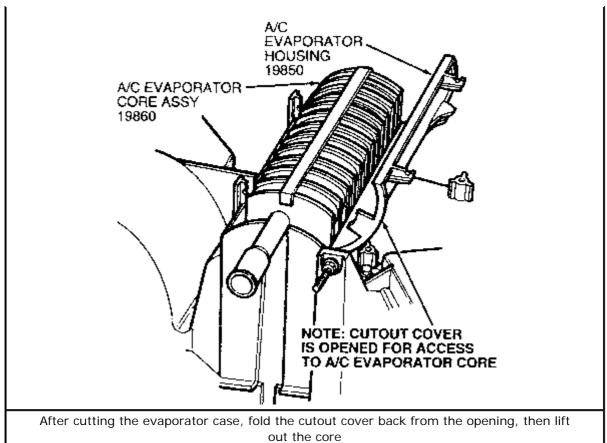
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22. Using a suitable tool, cut the top of the evaporator case between the raised outline. Fold the cutout cover back from the opening and lift the evaporator core from the case.



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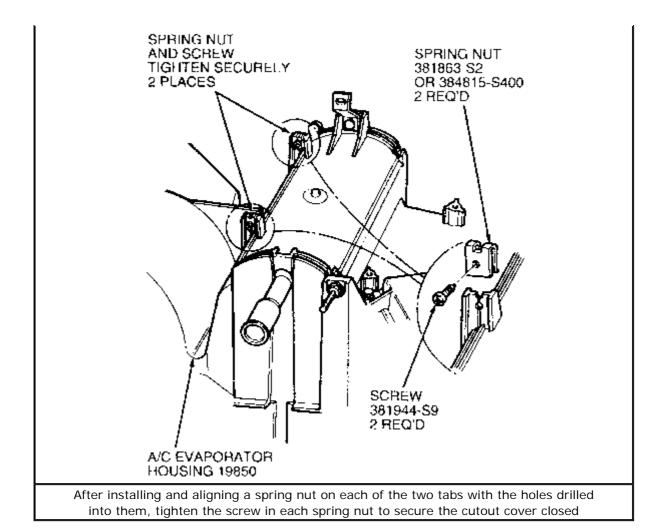
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To install:

Add 3 oz. (90 ml) of clean refrigerant oil to a new replacement evaporator core to maintain total system refrigerant oil requirements.

- 23. Transfer the foam core seals to the new evaporator core.
- 24. Position the evaporator core in the case and close the cutout cover.
- 25. Install a spring nut on each of the two upright tabs with two holes drilled in the front flange. Make sure the holes in the spring nuts are aligned with the ³/₁₆ in. (4.75mm) holes drilled in the tab and flange. Install and tighten the screw in each spring nut to secure the cutout cover in the closed position.

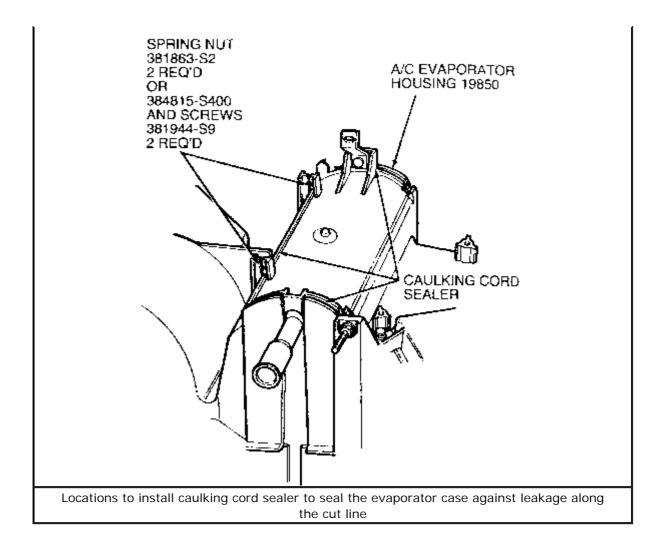
AIR CONDITIONER Cтр. 13 из 35



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26. Install Caulking Cord D6AZ-19560-A or equivalent, to seal the evaporator case against leakage along the cut line.

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Click to enlarge

- 27. Install the air inlet duct to the evaporator case and tighten the two screws. Install the recirculation duct to the evaporator case, then tighten the six screws.
- 28. If equipped with automatic temperature control, install the electrical connector bracket to the recirculation duct, install the speed controller connector to the bracket and attach the blend door actuator to the evaporator case. Install the electrical connector to the bracket. Attach the cold engine lock out switch by snapping the spring clip in place on the outermost heater core tube.
- 29. Install the vacuum harness to the evaporator case, then install the foam seals over the evaporator tubes. Assemble the support bracket to the evaporator case.
- Position the evaporator case assembly to the dash panel and cowl top panel at the air inlet opening. Install the two screws attaching the support brackets to the top cowl panel.
- 31. Install the three nuts in the engine compartment attaching the evaporator case to the dash panel.
- 32. Connect the vacuum line, electrical connections and aspirator hose at the evaporator case.
- 33. Install the floor register and rear seat duct to the evaporator case and tighten the two attaching screws.
- 34. Install the instrument panel shake brace and screw to the evaporator case.
- 35. Install the instrument panel. For details, please refer to the procedure located in *Section 10* of this manual.

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36. Connect the liquid line and accumulator/drier to the evaporator core and connect the heater hoses to the heater core.

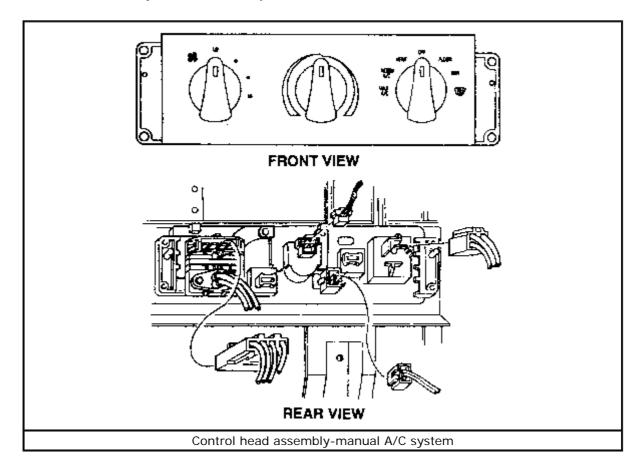
- 37. Connect the black vacuum supply hose to the vacuum check valve in the engine compartment.
- 38. Fill the radiator to the correct level with the previously removed coolant.
- 39. Connect the negative battery cable and leak test, evacuate and charge the air conditioning system according to the proper procedure.
- 40. Check the system for proper operation.

Control Panel

REMOVAL & INSTALLATION

Manual Control Head

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument panel finish applique.
- Remove the four screws attaching the control assembly to the instrument panel.
 Pull the control head away from the instrument panel into a position which provides access to the rear connectors.
- 4. Disengage the two harness connectors from the control assembly by depressing the latches at the top of the connectors and pulling.
- 5. Disconnect the vacuum harness and temperature control cable from the control assembly. Discard the used pushnut from the vacuum harness.



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To install:

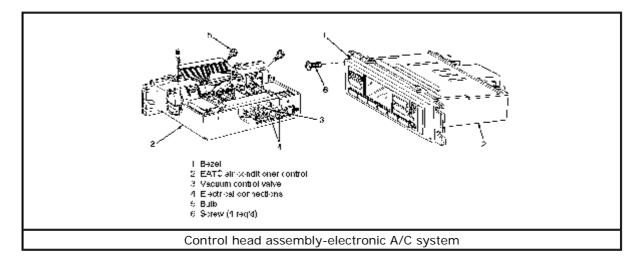
- 6. Connect the temperature cable to the control assembly.
- 7. Engage the harness connectors and vacuum harness to the control assembly using new pushnuts.

Push on the vacuum harness retaining nuts. Do not attempt to screw them onto the post.

- 8. Position the control assembly to the instrument panel opening and install four attaching screws.
- 9. Install the instrument panel finish applique.
- 10. Connect the negative battery cable and check the system for proper operation.

Electronic Control Head

- 1. Disconnect the negative battery cable.
- 2. Perform the following:
 - Pull out the lower left and lower right instrument panel snap-on finish panel inserts. Remove the eight screws retaining the upper finish panel.
 - Pull the lower edge of the upper finish panel away from the instrument panel. It is best to grasp the finish panel from the lower left corner and pull the panel away by walking the hands around the panel in a clockwise direction.
- 3. Remove the four Torx® head screws retaining the control assembly. Pull the control assembly away from the instrument panel into a position which provides access to the rear connectors.
- 4. Disengage the two harness connectors from the control assembly by depressing the latches at the top of the connectors and pulling.
- 5. Remove the nuts retaining the vacuum harness to the control assembly. Pull the control assembly away from the instrument panel.



Click to enlarge

To install:

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6. Engage the two electrical harness connectors to the control assembly. Push the keyed connectors in until a click is heard.

- 7. Attach the vacuum harness to the vacuum port assembly. Secure the harness by tightening the two nuts.
- 8. Position the control assembly into the instrument panel opening and install the four attaching Torx® head screws. Make sure, as the control is positioned, the locating posts are correctly aligned with their respective holes.
- Carefully place the instrument panel applique into it's assembly position. Make sure the spring clips are aligned with their proper holes. Press the applique into place. Make sure all spring clips and screws are secure.
- 10. Install the eight screws retaining the upper finish panel. Insert the lower left and lower right instrument panel snap-on finish panel inserts.
- 11. If removed, install the left and right shelf mouldings.
- 12. Connect the negative battery cable, then check the system operation.

Blower Switch

Refer to Section 1 for air conditioning system discharging information.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable. Remove the control assembly from the instrument panel.
- 2. Remove the fan switch knob from the fan switch. Remove the screws attaching the control switch to the instrument panel.
- 3. Disconnect the electrical connector. Remove the switch retaining screw. Remove the switch.
- 4. Installation is the reverse of the removal procedure.

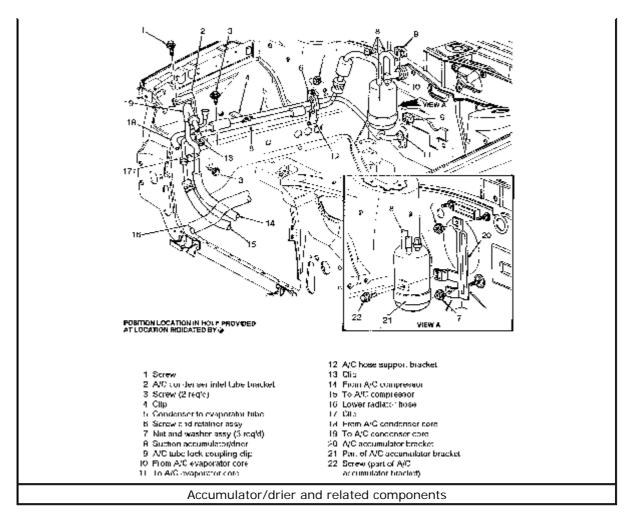
Accumulator/Drier

Refer to Section 1 for air conditioning system discharging information.

REMOVAL & INSTALLATION

- Disconnect the negative battery cable and discharge the refrigerant from the air conditioning system according to the proper procedure. Observe all safety precautions.
- 2. Disconnect the suction hose at the compressor. Cap the suction hose and the compressor to prevent entrance of dirt and moisture.
- Disconnect the accumulator/drier inlet tube from the evaporator core outlet.
 Perform the spring-lock coupling disconnect procedure described in detail later in this section.
- 4. Disengage the wire harness connector from the A/C cycling/pressure switch on top of the accumulator/drier.
- 5. Remove the screw holding the accumulator/drier in the accumulator bracket, then remove the accumulator/drier.

AIR CONDITIONER Cтр. 18 из 35



Click to enlarge

To install:

- 6. On Taurus SHO, Taurus and Sable equipped with the 3.8L engine, drill a ¹/₂ in. hole in the removed accumulator/drier body and drain the refrigerant oil through the hole. Add the same amount of oil removed, plus 2 oz. (60 ml) of clean refrigerant oil to the new accumulator/drier. On all other vehicles, drain the oil from the removed accumulator/drier. Add the same amount plus 2 oz. (60 ml) of clean refrigerant oil to 3.0L engine equipped vehicles and the same amount plus 1 oz. (30 ml) to 2.5L engine equipped vehicles.
- 7. Position the accumulator/drier on the vehicle and route the suction hose to the compressor.
- 8. Using a new O-ring lubricated with clean refrigerant oil, connect the accumulator/drier inlet tube to the evaporator core outlet.
- 9. Install the screw in the accumulator/drier bracket.
- 10. Using a new O-ring lubricated with clean refrigerant oil, connect the suction hose to the compressor.
- 11. Connect the negative battery cable. Leak test, evacuate and charge the system according to the proper procedure. Check the system for proper operation.

Refrigerant Lines

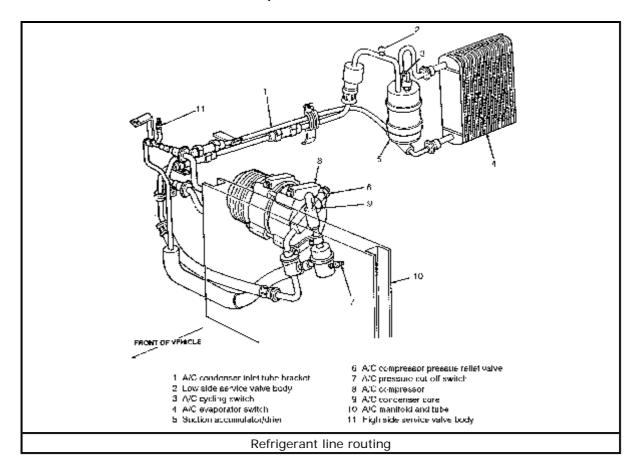
Refer to Section 1 for air conditioning system discharging information.

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REMOVAL & INSTALLATION

Whenever a refrigerant line is replaced, it will be necessary to replace the suction accumulator/drier.

- 1. Disconnect the negative battery cable. Properly discharge the air conditioning system using the correct equipment. Observe all safety precautions.
- 2. Disconnect the condenser-to-evaporator tube at the A/C condenser core inlet connections using the spring lock coupling procedure located later in this section.
- 3. Remove the condenser-to-evaporator tube from the vehicle.



Click to enlarge

To install:

4. Route the new condenser-to-evaporator rube (and integral A/C evaporator core orifice) with the protective caps installed.

Make sure that the correct green O-ring seals are installed on the spring lock coupling A/C fittings.

- Remove the protective caps, then connect the new condenser-to-evaporator tube into the system using new O-ring seals lubricated with clean refrigerant oil. Connect the spring lock couplings.
- 6. Connect the negative battery cable, then leak test, evacuate and charge the A/C system using the properly equipment and observing all safety precaution.

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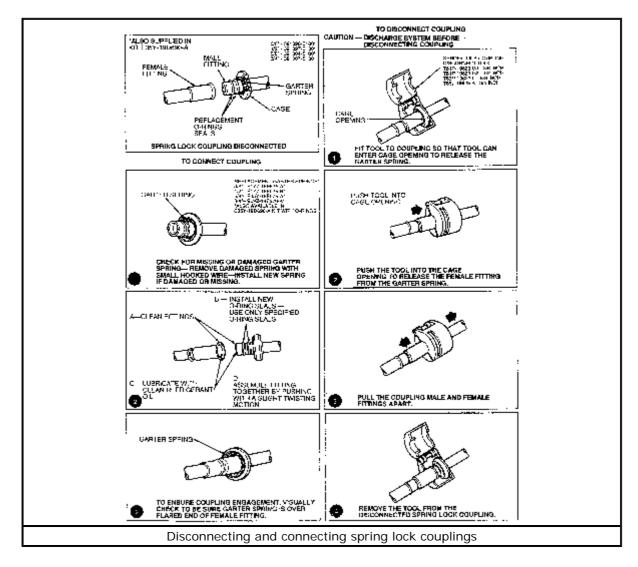
Spring Lock Coupling

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable, then discharge the A/C system properly.
- 2. Fit a $\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{5}{8}$ in., or $\frac{3}{4}$ in. Spring Lock Coupling Tool to the coupling.

The garter spring may not release if the tool is cocked while pushing it into the cage opening.

- 3. Close the tool and push into the open side of the cage to expand the garter spring and release the female fitting.
- 4. After the garter spring is expanded, pull the fitting apart, then remove the tool from the disconnected coupling.



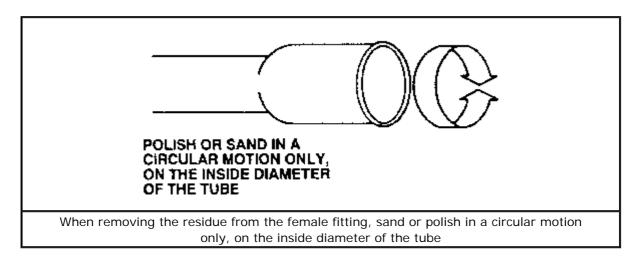
Click to enlarge

To install:

Check to make sure the garter spring is in the cage of the male fitting. If the garter spring is missing, install a new spring by pushing it into the cage opening. If the garter spring is damaged, remove it from the cage with a small wire hook (do not AIR CONDITIONER Cтр. 21 из 35

use a screwdriver), then install a new spring.

- 6. Clean all dirt or foreign material from both pieces of the coupling.
- 7. On the female spring lock design, check the inside of each fitting for scratches, corrosion, or debris from deteriorated O-rings. If any is found, the fitting should be cleaned as follow:
 - Remove any surface residue from the inside of the female spring lock coupling by polishing with 400grit emery cloth (or equivalent). Polish the female surface using a twisting motion so that any scratches make will not cross the O-ring sealing surface.
 - 2. Perform additional polishing of the surface using 600-grit emery cloth or equivalent.
 - All residue from the polishing operations should be removed from the fitting by wiping with a line-free cloth.



8. Lubricate and install new green O-ring seals on the male fitting.

Only use the specified green O-ring seals because they are made of a special material. The use of any O-ring seal other than the specified type, may allow the connection to leak intermittently during operation.

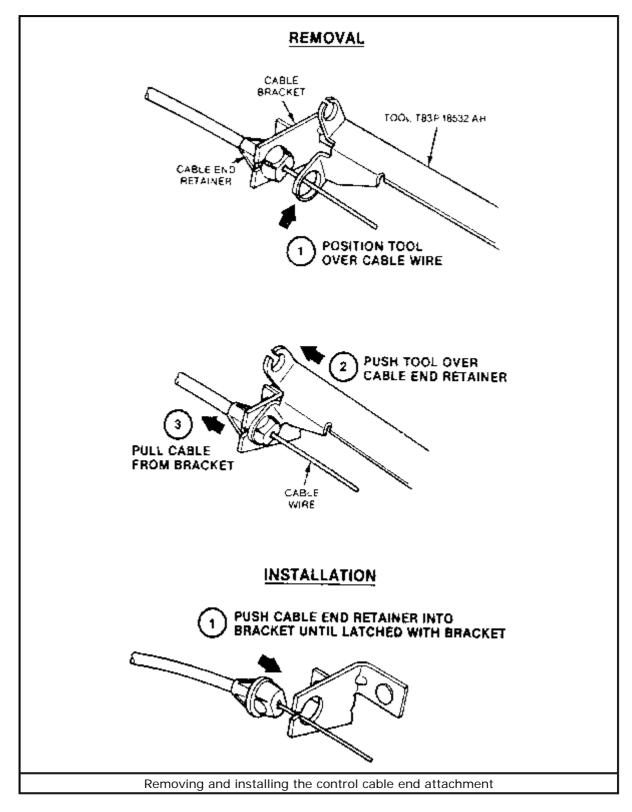
- 9. Lubricate the male fitting, green O-ring seals and the inside of the female fitting with clean refrigerant oil.
- Install a plastic indicator ring into the cage opening if the indicator ring is to be used.
- 11. Fit the female fitting to the male fitting, then push into the garter spring snaps over the flared end of the female fitting. If the plastic indicator ring is used, it will snap out of the cage opening when the coupling is connected to indicate engagement. If the ring is not used, check the coupling engage by making sure the garter spring is over the flared end of the female fitting.
- 12. Connect the negative battery cable, then properly leak test, evacuate and charge the system using the correct equipment. Check the system for proper operation.

Control Cables

REMOVAL & INSTALLATION

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- 1. Remove the control assembly from the instrument panel.
- 2. Disconnect the cable retainer and wire from the control assembly.
- 3. Disconnect the temperature cable from the plenum temperature blend door crank arm and cable mounting bracket.



Click to enlarge

To install:

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- 4. Check to make sure the self-adjusting clip is at least 1 in. (25.4mm) from the end loop of the control cable.
- 5. Route the cable behind the instrument panel and connect the control cable to the mounting bracket on the plenum.
- 6. Install the self-adjusting clip on the temperature blend door crank arm.
- 7. Snap the cable housing into place at the control assembly. Connect the "S" bend end of the control cable to the temperature lever arm on the control assembly.
- 8. Install the control assembly into the instrument panel.

ADJUSTMENT

The temperature control cable is self-adjusting when the temperature selector knob is rotated to it's fully clockwise (red) position, as marked on the face of the control assembly. A preset adjustment should be made before attempting to perform the self-adjustment operation, to prevent kinking the control wire. The preset adjustment can be performed either with the cable installed in the vehicle or before cable installation.

Before Cable Installation

- 1. Insert the end of a suitable tool in the end loop of the temperature control cable.
- 2. Slide the self-adjusting clip down the control wire, away from the loop, approximately 1 in. (25.4mm).
- 3. Install the cable assembly.
- 4. Rotate the temperature selector knob to the clockwise (red) position marked on the control assembly face to position the self-adjusting clip.
- 5. Check for proper control operation.

After Cable Installation

- 1. Move the selector knob clockwise to the COOL position.
- 2. Hold the crank arm firmly in position and insert a suitable tool into the wire loop. Pull the cable wire through the self-adjusting clip until there is a space of approximately 1 in. (25.4mm) between the clip and the wire end loop.
- 3. Rotate the selector knob clockwise to allow positioning of the self-adjusting clip.
- 4. Check for proper control operation.

Vacuum Selector Switch

Refer to Section 1 for air conditioning system discharging information.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the control assembly from the instrument panel. Remove the knob from the function selector shaft.
- 3. Remove the screw from the switch and its mounting. Remove the switch.
- 4. Installation is the reverse of the removal procedure. Before installation rotate the function selector shaft to the OFF position.

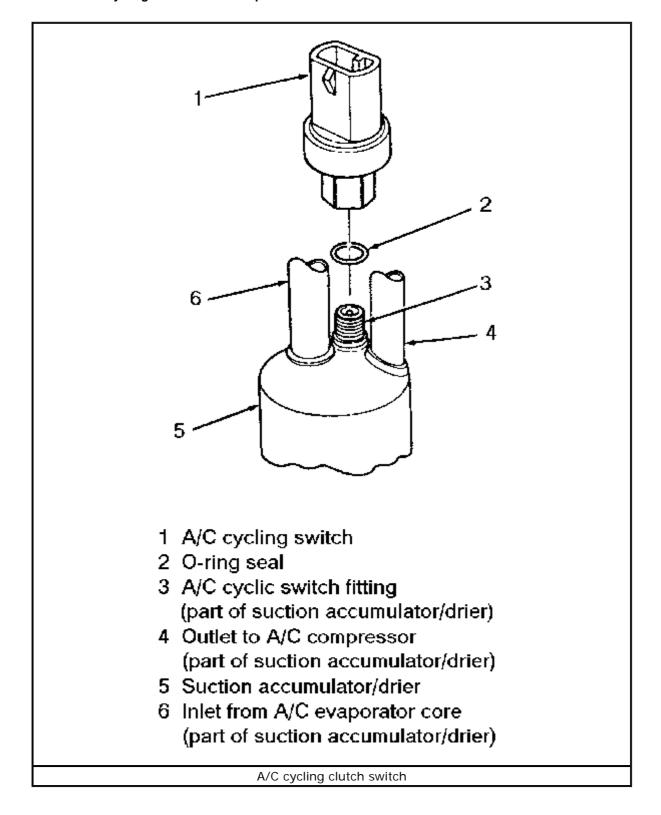
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Cycling Clutch Switch

Refer to Section 1 for air conditioning system discharging information.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Disconnect the wire harness connector from the pressure switch. Unscrew the A/C cycling switch from the top of the suction accumulator/drier.



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Click to enlarge

To install:

- 3. Install a new O-ring seal, lubricated with clean refrigerant oil, on the A/C cycling switch
- 4. Lubricate the O-ring seal on the suction accumulator/drier nipple with clean refrigerant oil.
- 5. Screw the A/C cycling switch on the suction accumulator/drier nipple, then tighten the switch hand-tight.
- 6. Engage the wiring connector to the switch.
- 7. Check the switch installation for refrigerant leaks, then connect the negative battery cable and check the system for proper operation.

Orifice Tube

Refer to Section 1 for air conditioning system discharging information.

The A/C evaporator core orifice should be replaced whenever the compressor is replaced for lack of performance.

The A/C evaporator core orifice located in the condenser to evaporator tube cannot be serviced as a component of the line. If replacement is necessary, use the procedure for refrigerant line removal and installation located earlier in this section.

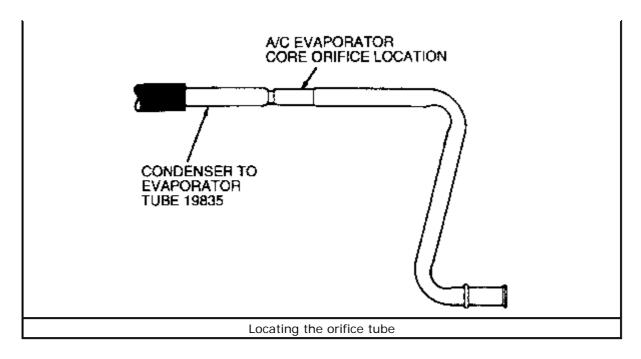
An orifice tube replacement service kit may be used for an optional service procedure. The procedure for installation and removal of the service it are as follows:

REMOVAL & INSTALLATION

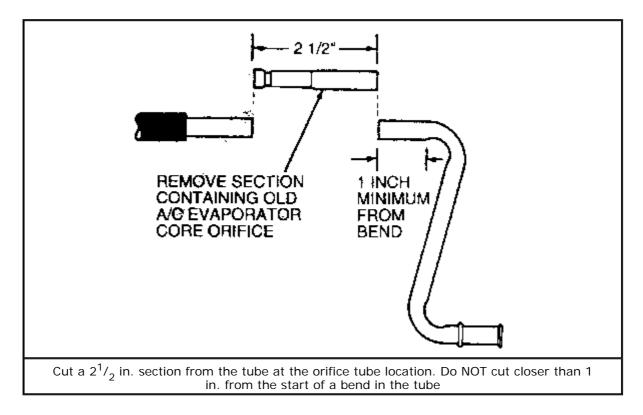
Fixed Orifice Tube Replacement Kit

- 1. Disconnect the negative battery cable.
- 2. Discharge the refrigerant from the air conditioning system according to the proper procedure.
- 3. Remove the liquid line from the vehicle.
- 4. Locate the orifice tube by three indented notches or a circular depression in the metal portion of the liquid line. Note the angular position of the ends of the liquid line so that it can be reassembled in the correct position.

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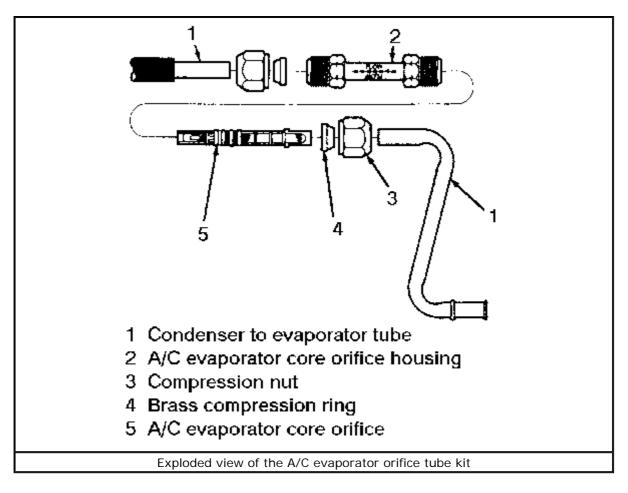
5. Cut a $2^1/_2$ in. (63.5mm) section from the tube at the orifice tube location. Do not cut closer than 1 in. (25.4mm) from the start of the bend in the tube.



- Remove the orifice tube from the housing using pliers. An orifice tube removal tool cannot be used.
- 7. Flush the two pieces of liquid line to remove any contaminants.
- 8. Lubricate the O-rings with clean refrigerant oil and assemble the orifice tube kit, with the orifice tube installed, to the liquid line. Make sure the flow direction arrow is pointing toward the evaporator end of the liquid line and the taper of each compressor ring is toward the compressor nut.

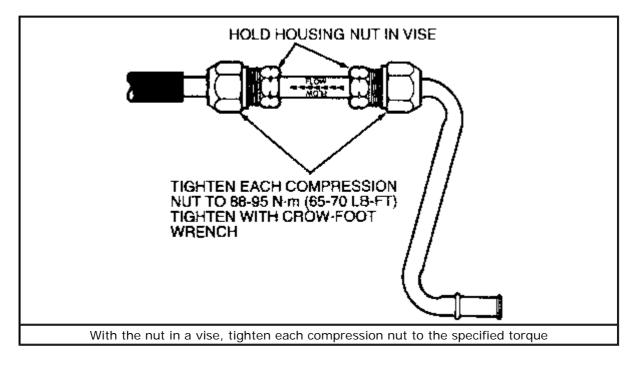
The inlet tube will be positioned against the orifice tube tabs when correctly assembled.

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Click to enlarge

9. While holding the hex of the tube in a vise, tighten each compression nut to 65-70 ft. lbs. (88-94 Nm) with a crow foot wrench.



Click to enlarge

10. Assemble the liquid line to the vehicle using new O-rings lubricated with clean refrigerant oil. Use only the specified O-rings at the spring lock coupling.

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- 11. Leak test, evacuate and charge the system according to the proper procedure.

 Observe all safety precautions.
- 12. Check the system for proper operation.

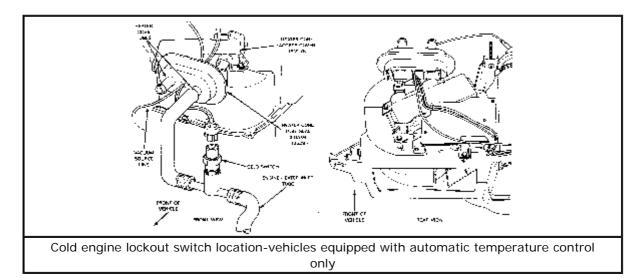
Cold Engine Lockout Switch

OPERATION

The cold engine lockout switch is used in the automatic temperature control systems. It prevents the air conditioning compressor from running when the engine is cold. The switch screws into a fitting in the heater core inlet tube in the engine compartment.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Disconnect the two-wire connector from the switch.
- 3. Partially drain the coolant from the radiator.
- 4. Unscrew the switch body from the fitting in the heater inlet tube.



Click to enlarge

To install:

- 5. Apply sealer to the switch threads and install it into the fitting in the heater tube. Tighten to 8-14 ft. lbs. (11-19 Nm).
- 6. Attach the electrical connector to the top of the switch.
- 7. Refill the radiator with the removed coolant to the proper level.
- 8. Connect the negative battery cable.

Ambient Temperature Sensor

OPERATION

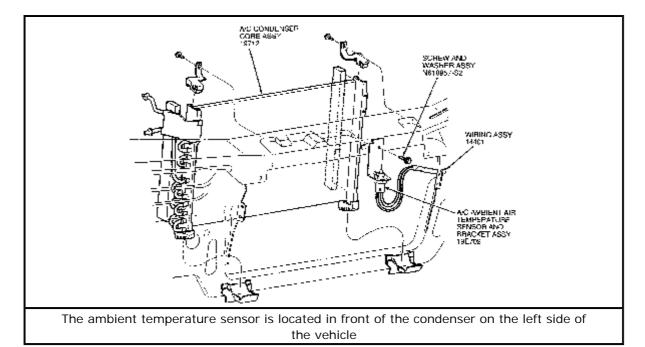
The ambient temperature sensor is used in the automatic temperature control systems. It contains a thermistor which measures the temperature of the outside

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air. The sensor is located in front of the condenser on the left side of the vehicle.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the ambient sensor and bracket mounting nut, then remove the sensor.
- 3. Disengage the electrical connector from the ambient sensor and bracket.



Click to enlarge

To install:

- 4. Engage the electrical connector to the ambient sensor.
- 5. Position the ambient sensor and bracket, then install the mounting nut. Tighten to 55-65 inch lbs. (6.2-7.3 Nm).
- 6. Connect the negative battery cable, then check the system for proper operation.

In-Vehicle Temperature Sensor

OPERATION

The in-vehicle temperature sensor is used in the automatic temperature control systems. It contains a thermistor which measures the temperature of the air inside the passenger compartment. The sensor is located behind the instrument panel above the glove compartment.

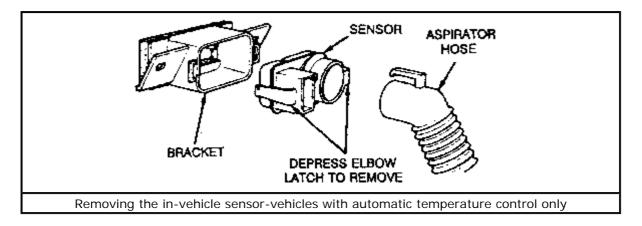
REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Disengage the glove compartment door stops and allow the door to hang by the hinge.
- 3. Working through the glove compartment opening, unclip the sensor from the

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retainer by squeezing the side tabs.

4. Pull the sensor down into the glove compartment, then disengage the electrical connector and aspirator flex hose from the sensor.



Click to enlarge

To install:

- 5. Engage the electrical connector and aspirator flex hose to the sensor.
- 6. Working through the glove compartment opening, attach the sensor to the retaining clip.
- 7. Engage the glove compartment door stops, then close the door.
- 8. Connect the negative battery cable.

Sunload Sensor

OPERATION

The sunload sensor is used in the automatic temperature control systems. It contains a photovoltaic (sensitive to sunlight) diode that provides input to the system microcomputer. The sensor is located in the left radio speaker grille assembly, except on 1992-95 vehicles, where it is located on the right side upper outer finish panel.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the left-hand speaker grille assembly, except 1992-95 vehicles. On 1992-95 vehicles remove the right side upper outer finish panel.
- 3. Remove the sunload sensor assembly from the two mounting studs and disconnect the electrical connector.

To install:

- 4. Connect the electrical connector to the sunload sensor.
- 5. Install the sensor to the speaker grille by pushing the sensor firmly over the two mounting studs.
- Install the left-hand speaker grille assembly, except 1992-95 vehicles. On 1992-95 vehicles install the right side upper outer finish panel.

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7. Install the negative battery cable.

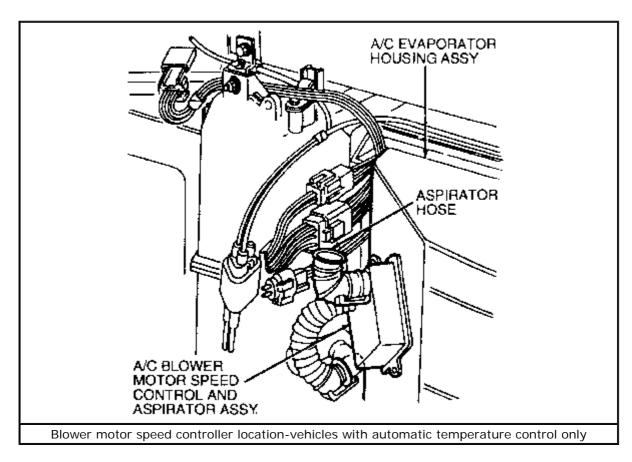
Blower Motor Speed Controller

OPERATION

The blower speed controller is used with automatic temperature control. It converts the base current received from the electronic control assembly into high current, variable ground feed to the blower motor. The blower fan speed is therefore infinitely variable. The blower speed controller is located in the evaporator case, upstream of the evaporator core.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- Disengage the glove compartment door stops and allow the door to hang by the hinge.
- 3. Working through the glove compartment opening, unfasten the electrical snaplock connector and aspirator hose at the blower motor controller. Also, disengage the snap-lock connector from it's mounting bracket.
- 4. Remove the two screws attaching the blower controller to the evaporator case and remove the controller. Do not touch the fins of the controller until it has had a sufficient time to cool.



Click to enlarge

To install:

5. Position the blower controller on the evaporator case, then install the two

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attaching screws.

6. Engage the wire connector and aspirator hose to the blower controller. Install the connector on the mounting bracket.

7. Close the glove compartment door, connect the negative battery cable and check the system for proper operation.

Temperature Blend Door Actuator

OPERATION

The temperature blend door actuator is used on vehicles equipped with automatic temperature control. The actuator controls blend door movement on command from the control assembly. The blend door actuator is located on top of the evaporator assembly.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Loosen the instrument panel and pull back from the cowl.
- Remove the blend door actuator electrical connector and plastic clamp from the bracket on the evaporator case. Remove the three actuator attaching screws.
- 4. Lift the actuator vertically for a distance of approximately ¹/₂ in. (12mm) to disengage it from the bracket and blend door shaft. Pull the actuator back toward the passenger compartment.

The mounting bracket remains in place on the evaporator case.

To install:

- 5. Insert the blend door actuator horizontally over the actuator bracket on the evaporator case.
- 6. Insert the actuator shaft into the blend door. Manually moving the door will help engage the shaft.
- 7. Attach the actuator bracket with the three attaching screws.
- 8. Attach the actuator electrical connector and plastic clamp to the bracket on the evaporator case.
- 9. Install the instrument panel and connect the negative battery cable.

After replacement of the blend door actuator, the system must be recalibrated for proper operation. To recalibrate, disconnect the positive battery cable from the battery, wait 30 seconds and reconnect the battery cable. Calibration will be performed automatically when the automatic temperature control electronic control assembly is energized.

Recirculate/Fresh Air Selector Door Actuator Motor

OPERATION

The recirculate/fresh air selector door actuator motor is used on vehicles equipped with automatic temperature control. The motor controls the position of the door which allows fresh air or recirculated air, or a combination of the two,

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into the vehicle. The motor is mounted on the recirculate/fresh air duct.

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- Lower the glove compartment door to provide access to the recirculation duct assembly.
- 3. Disconnect the vacuum hose from the end of the vacuum motor and the motor arm retainer from the door crank arm.
- 4. Remove the two nuts retaining the vacuum motor to the recirculation duct, then remove the motor.

To install:

- 5. Position the vacuum motor to the fresh air/recirculate door crank arm, position the motor to the recirculation duct and install the two retaining nuts.
- 6. Install the retainer on the door crank arm.
- 7. Connect the white vacuum hose to the vacuum motor, connect the negative battery cable, then check the operation of the vacuum motor.
- 8. Close the glove compartment door.

Function Control Actuator Motor

OPERATION

The function control actuator motor is used on vehicles equipped with automatic temperature control. The motor controls the door which directs the flow of air to the defroster ducts, instrument panel ducts or floor ducts. Two motors are used to perform the control function and they are both located on the plenum.

REMOVAL & INSTALLATION

Panel/Floor Door Vacuum Motor

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument panel.
- 3. Depress the tabs and disconnect the vacuum motor arm from the door shaft.
- 4. Remove the two screws retaining the vacuum motor to the mounting bracket.
- Remove the vacuum motor from the mounting bracket and disconnect the vacuum hose.

- 6. Position the vacuum motor on the mounting bracket and door shaft.
- 7. Install the two screws attaching the vacuum motor to the mounting bracket.
- Connect the vacuum hose to the vacuum motor and check the operation of the motor.
- 9. Install the instrument panel and connect the negative battery cable.

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Panel/Defrost Door Vacuum Motor

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument panel.
- 3. Remove the panel-defrost door vacuum motor arm to door shaft.
- 4. Remove the two nuts retaining the vacuum motor to the mounting bracket.
- Remove the vacuum motor from the mounting bracket and disconnect the vacuum hose.

To install:

- 6. Position the vacuum motor to the mounting bracket and door shaft.
- 7. Install the two nuts attaching the vacuum motor to the mounting bracket and connect the vacuum hose. Check the operation of the motor.
- 8. Install the instrument panel and connect the negative battery cable.

Air Conditioning System Diagnosis

DIAGNOSTIC PROCEDURE

- 1. Perform the Self Diagnostic Test. Record all error codes displayed during the test.
- 2. If error codes appear during the Self Diagnostic Test, follow the diagnostic procedures indicated in the Error Code Key.
- 3. If a malfunction exists but no error code appears during the Self Diagnostic Test, perform the Functional Test.

SELF-DIAGNOSTIC TEST

The control assembly will detect electrical malfunctions occurring during the selftest.

- 4. Make sure the coolant temperature is at least 120°F (49°C).
- 5. To display error codes, push the OFF and FLOOR buttons simultaneously and then the AUTOMATIC button within 2 seconds. The test may run as long as 20 seconds, during which time the display will be blank. If the display is blank for more than 20 seconds, consult the No Error Code Found Diagnosis and Testing chart.
- 6. The Self-Diagnostic Test can be initiated at any time with the resulting error codes being displayed. Normal operation of the system stops when the Self-Diagnostic Test is activated. To exit the self-test and restart the system, push the COOLER button. The self-test should be deactivated before powering the system down.

FUNCTIONAL TEST

The Functional Test is designed to catch those system failures that the self-test is unable to test.

- 7. Make sure the engine is cold.
- 8. The in-vehicle temperature should be greater than 50°F (10°C) for proper evaluation of system response.

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9. Follow the instructions in each step of the Functional Test.

VACUUM SYSTEM DIAGNOSIS

To test the automatic temperature control vacuum system, start the engine and depress the function buttons slowly from one position to another. A momentary hiss should be heard as each button is depressed from one position to another, indicating that vacuum is available at the control assembly. A continuous hiss at the control assembly indicates a major leak somewhere in the system. It does not necessarily indicate that the leak is at the control assembly.

If a momentary hiss cannot be heard as each function button is depressed from 1 position to another, check for a kinked, pinched or disconnected vacuum supply hose. Also, inspect the check valve between the vacuum intake manifold and the vacuum reservoir to ensure it is working properly.

If a momentary hiss can be heard as each function button is depressed from one position to another, vacuum is available at the control assembly. Cycle the function buttons through each position with the blower on HI and check the location(s) of the discharge air. The airflow schematic and vacuum control chart shows the vacuum motors applied for each function selection along with an airflow diagram of the system. The airflow diagram shows the position of each door when vacuum is applied and their no-vacuum position. With this chart, airflow for each position of the control assembly can be determined. If a vacuum motor fails to operate, the motor can readily be found because the airflow will be incorrect.

If a vacuum motor is inoperative, check the operation of the motor with a vacuum tester. If the vacuum motor operates properly, the vacuum hose is probably kinked, pinched, disconnected or has a leak.

If the function system functions normally at idle, but goes to defrost during acceleration, a small leak exists in the system. The leak can best be located by shutting **OFF** the engine and using a gauge to check for vacuum loss while selectively blocking off vacuum hoses.

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CRUISE CONTROL

General Description and Operation

The Integrated Vehicle Speed Control (IVSC) system consists of operator controls, servo (throttle actuator), brake light switch, speed sensor (not required for vehicles equipped with an electronic cluster), horn relay, vacuum dump valve, vacuum reservoir (called an aspirator on some models), check valve(s), wiring and hoses for vacuum. The vacuum reservoir or aspirator provides an additional vacuum signal when the engine is under heavy load to improve speed control performance. In the IVSC system, speed control amplifier assembly function has been integrated into the EEC-IV Electronic Control Assembly (ECA). The servo assembly is mounted in the engine compartment and is connected to the throttle linkage with an actuator cable. The servo is connected to the vacuum reservoir (aspirator) and to manifold vacuum through the check valve. The speed control sensor is located on the transmission or transaxle.

For the system to be activated, the engine must be running and the vehicle must be greater than approximately 25-35 mph (40-56 km/h), depending upon vehicle application. Under these conditions, the system is activated and is ready to accept a set speed signal by pressing the ON switch in the steering wheel. Then, the operator must depress and release the SET ACCEL switch. This will result in the current speed being maintained until a new speed is set by the operator, the brake pedal is depressed, the clutch pedal is depressed or the OFF switch is depressed.

To decrease the set speed, the vehicle speed may by reduced by applying the brake or clutch pedal and then resetting the speed using the foregoing method or by depressing the COAST switch. When the vehicle has slowed to the desired speed, the COAST switch is released and the new speed is set automatically. If the vehicle speed is reduced below approximately 25-35 mph (40-60 km/h), depending upon vehicle application, the operator must manually increase the speed and reset the system.

To increase the set speed, the vehicle set speed may be manually increased at any time by depressing the accelerator until the higher speed is reached and stabilized, then depressing and releasing the SET ACCEL button. Speed may also be increased by depressing the SET ACCEL switch button, at speeds over approximately 25-35 mph (40-56 km/h), depending upon vehicle application, and holding it in that position. The vehicle will then automatically increase speed. When the desired rate of speed is attained and the button is released, that new set speed will be maintained.

The speed control system may be deactivated by depressing the brake or clutch pedal. To resume the set speed prior to deactivation, the RESUME switch is depressed and prior set speed may be re-established. The RESUME switch is hinged on the side closest to the SET ACCEL switch. Therefore, it should be depressed on the side farthest from the SET ACCEL switch. The resume feature will not function if the system is deactivated with the OFF switch, or if the vehicle speed has been reduced to below approximately 25-35 mph (40-56 km/h)

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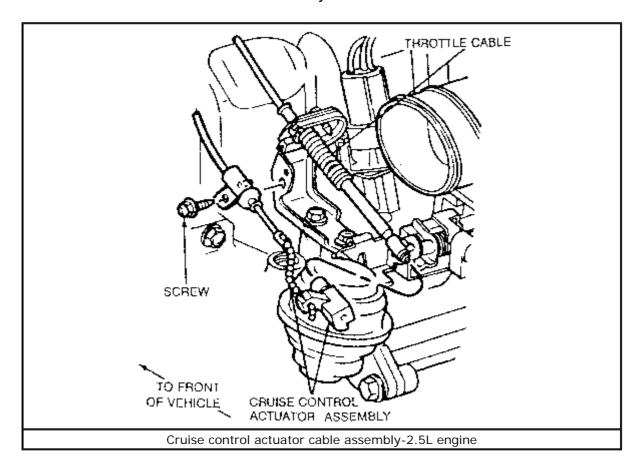
depending upon vehicle application. In addition, when the ignition switch is turned **OFF**, the speed control memory is erased and the resume feature will not function.

Actuator Cable

REMOVAL & INSTALLATION

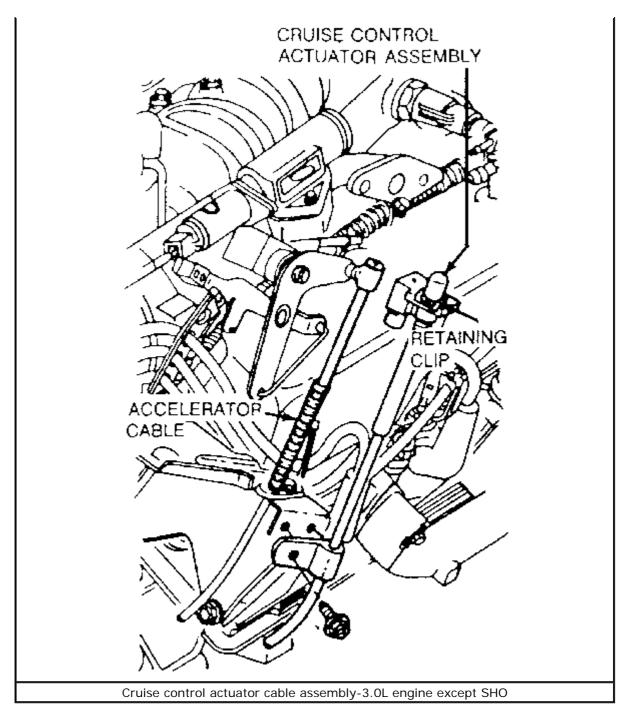
Except .2L SHO

- 1. Disconnect the negative battery cable.
- 2. Remove the servo assembly. For details, please refer to the procedure located later in this section.
- 3. Attach the new actuator cable assembly to the servo.



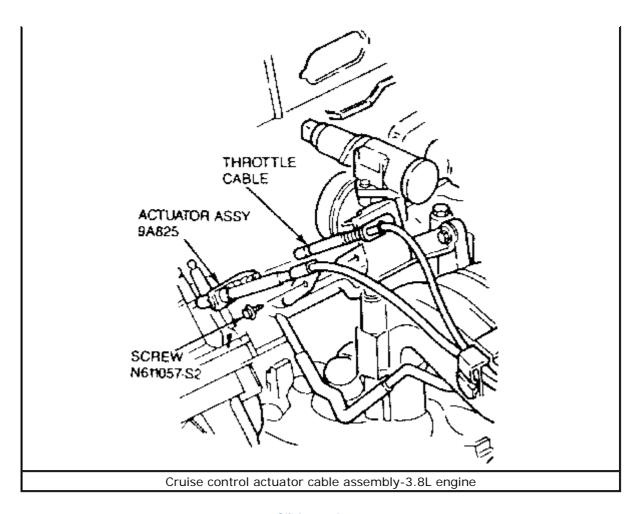
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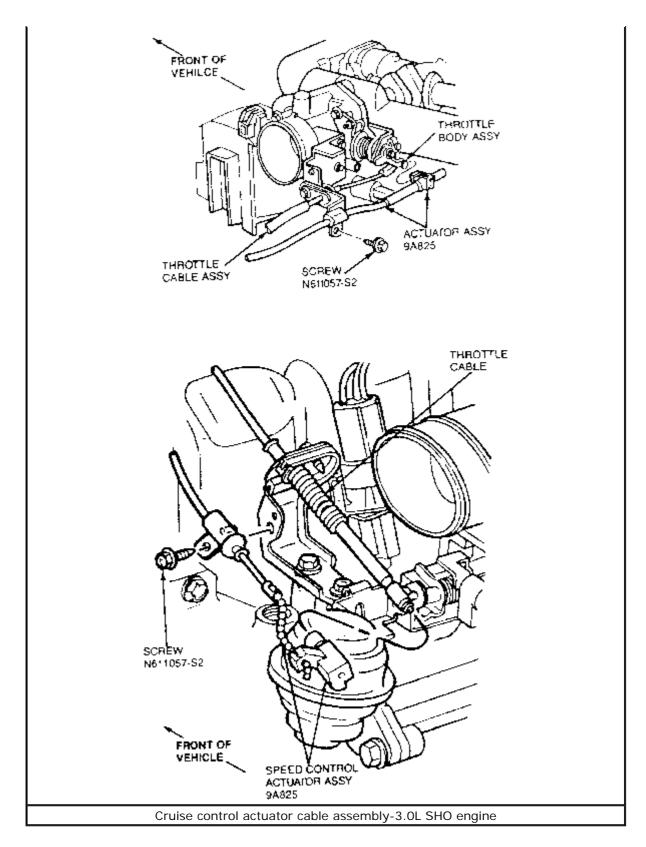
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CRUISE CONTROL Cтр. 5 из 33



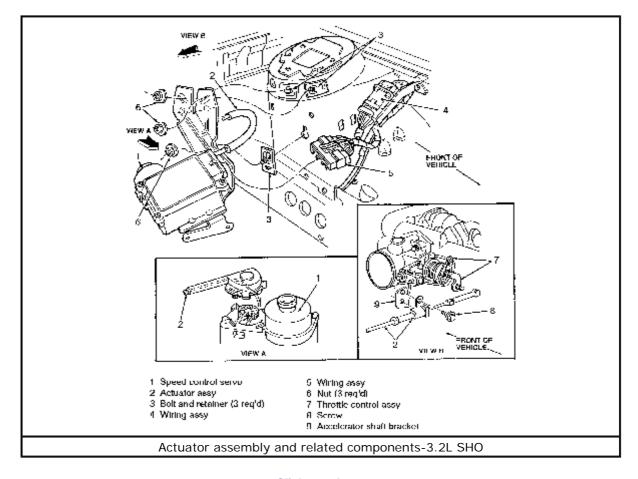
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- 4. Install the complete actuator cable/servo assembly. For details, please refer to the servo procedure located later in this section.
- 5. Connect the negative battery cable.

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3.2L SHO Vehicles

1. Disconnect the negative battery cable.

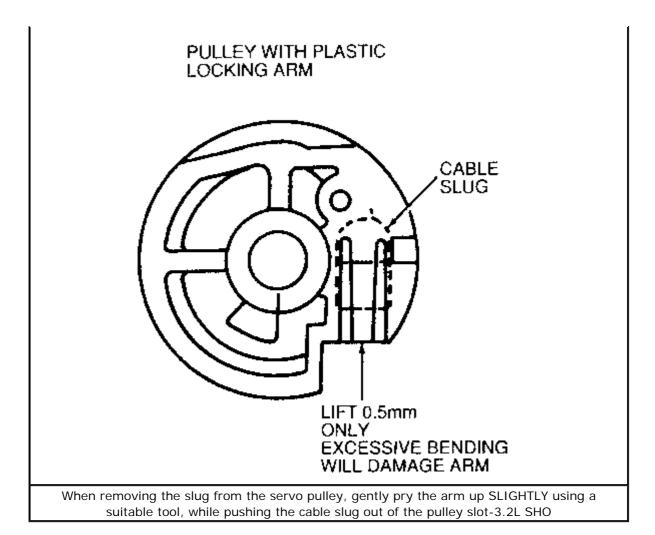


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- 2. Remove the screw attaching the actuator assembly cable to the accelerator shaft bracket.
- 3. Remove the actuator assembly cable from the throttle control.
- 4. Remove the actuator cable cap from the speed control servo by depressing the cap locking arm and rotating the cap counterclockwise.
- Remove the cable slug from the servo pulley. Gently pry-up the arm slightly with a suitable small prytool, and at the same time push the cable slug out of the pulley slot.

Excessive bending of the arm will cause it to break. DO NOT USE servos with damaged or missing locking arms.

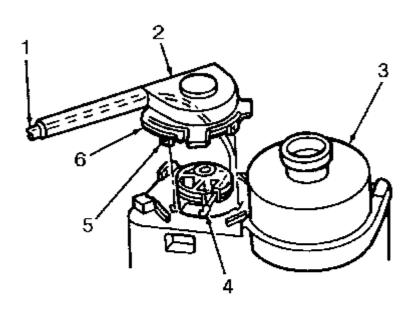
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- 6. Make sure that the rubber seal is fully seated on the actuator cap.
- 7. Lock the cable ball slug into the servo pulley slot.
- 8. Pull on the throttle attachment end of the cable to draw the cable cap onto the servo pulley.
- 9. Align the cable cap tabs with slots in the servo housing. Insert the cap into the speed control servo and rotate it clockwise until the locking arm engages.

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- 1 Actuator assy
- 2 Actuator cable cap
- 3 Speed control servo
- 4 Cable ball slug
- 5 Cap locking tabs
- 6 Locking arm

Align the cable cap tabs with the slots in the servo housing, then insert the cap into the speed control servo and rotate it until the locking arm engages-3.2L SHO

Click to enlarge

- 10. Snap the actuator assembly cable onto the throttle control, then install the screw at the accelerator shaft. Tighten to 27-35 inch lbs. (3-4 Nm).
- 11. Check the cable adjustment.
- 12. Make sure that the cable is routed properly, then position the retaining clips.

Incorrect wrapping of the cable core wire around the servo pulley may result in a high idle condition. Make sure that the throttle lever is at idle position after cable installation and adjustment.

13. Connect the negative battery cable.

ADJUSTMENT

Except 3.2L SHO

- 1. Remove speed control cable retaining clip.
- 2. Push speed control cable through adjuster until a slight tension is felt.
- 3. Insert the cable retaining clip and snap into place.

3.2L SHO

CRUISE CONTROL Cтр. 9 из 33

- 1. Remove the retaining clip from the actuator cable adjuster at the throttle.
- 2. Make sure the throttle is in a fully closed position.
- 3. Pull on the actuator cable to take up the slack. Loosen at least one notch so there is about 0.118 in. (3mm) of slack in the cable.

The cable must not be pulled tight, otherwise the cruise control may not operate properly.

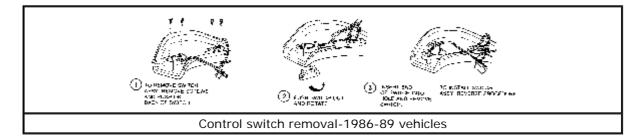
- 4. Insert the cable retaining clip, then snap it into place.
- 5. Check to make sure that the throttle linkage operates freely and smoothly.

Control Switches

REMOVAL & INSTALLATION

1986-89 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Remove the steering wheel horn pad cover by removing the two retaining screws from the back of the steering wheel.
- 3. Disengage the electrical wiring connector from the slip ring terminal.
- 4. Remove the speed control switch assembly from the horn pad cover by removing the two attaching screws from each switch.



Click to enlarge

To install:

- 5. Install the control switches into the horn pad cover. Attach each switch with the two retaining screws.
- 6. Attach the control switch connector to the terminal on the slip ring.
- 7. Install the steering wheel horn pad cover. Snap latching hook in at the 12 o'clock position, then attach with the two retaining screws.
- 8. Connect the negative battery cable.

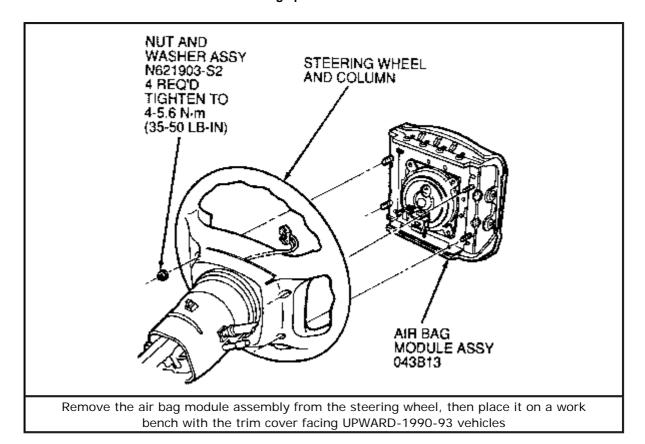
1990-93 Vehicles

CAUTION

Some vehicles are equipped with an inflatable restraint or air bag system. The air bag system must be disabled before performing service on or around the air bag, instrument panel components, or CRUISE CONTROL Cтр. 10 из 33

wiring. Failure to follow safety and disabling procedures could result in possible air bag deployment, personal injury or unnecessary air bag system repairs.

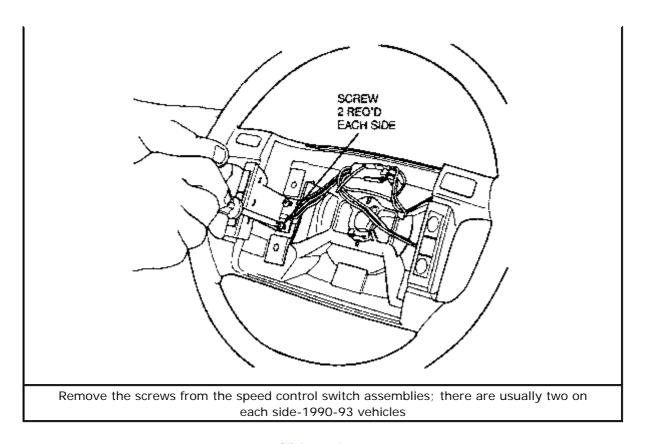
- 1. Disconnect the negative battery cable and air bag back up power supply.
- 2. Remove the four nut and washer assemblies retaining the air bag module to the steering wheel.
- 3. Disengage the air bag electrical connector from the clockspring contact connector.
- 4. Remove the air bag module from the steering wheel. Place the module on the work bench with the trim cover facing upward.



Click to enlarge

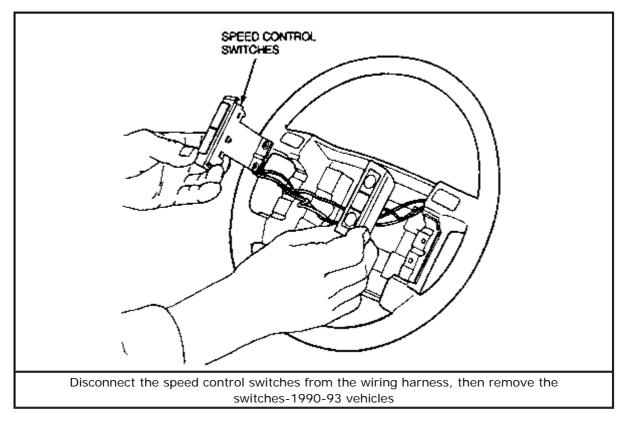
- 5. Remove the horn buttons from the steering wheel by using a suitable small prytool.
- 6. Disengage the horn wiring electrical connector(s).
- 7. Remove the screws from the speed control switch assemblies.

CRUISE CONTROL Cтр. 11 из 33



Click to enlarge

8. Disconnect the speed control switches from the wiring harness, then remove the switches.



Click to enlarge

CRUISE CONTROL Cтр. 12 из 33

- 9. Position the switches onto the steering wheel, then install the retaining screws.
- 10. Connect the wiring harness to the horn buttons, then install the horn buttons.
- 11. Connect the speed control switches. Make sure the wires are positioned so that no interference is encountered when installing the air bag module.
- 12. Position the air bag module on the steering wheel so that the clockspring contact connector can be fastened to the air bag module.
- 13. Install the air bag module on the steering wheel, then install the four nut and washer assemblies behind the steering wheel. Tighten to 4-6 inch lbs. (36-53 Nm).
- 14. Connect the air bag back up power supply, then connect the negative battery cable.

1994-95 Vehicles

CAUTION

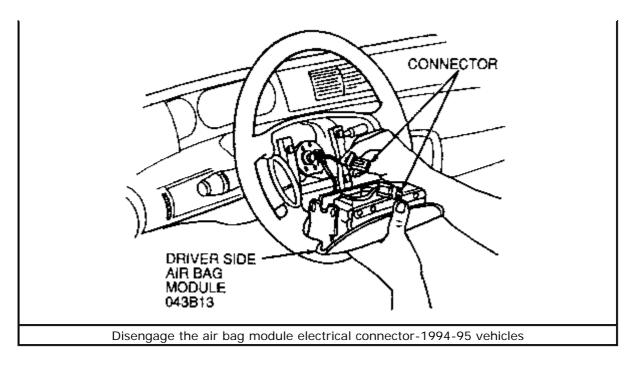
Some vehicles are equipped with an inflatable restraint or air bag system. The air bag system must be disabled before performing service on or around the air bag or instrument panel components or wiring. Failure to follow safety and disabling procedures could result in possible air bag deployment, personal injury or unnecessary air bag system repairs.

1. Disconnect the negative battery cable.

Before any air bag component is serviced, the positive battery cable MUST be disconnected for one minute to de-engergize the backup power supply.

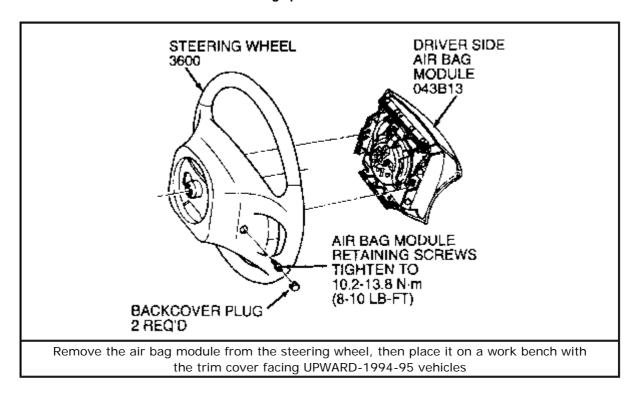
- 2. Disconnect the positive battery cable, then wait one minute for the backup power supply to deplete its stored energy.
- 3. Remove the two back cover plugs. Remove the two screw and washer assemblies securing the driver side air bag module to the steering wheel .
- 4. Disengage the air bag electrical connector from the air bag sliding contact connector.

CRUISE CONTROL Cтр. 13 из 33



Click to enlarge

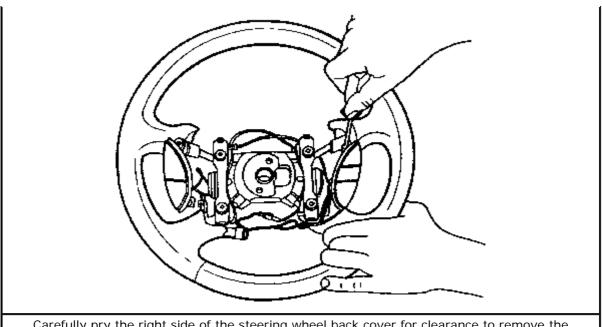
5. Remove the driver side air bag module from the steering wheel, then place it on a bench with the trim cover facing up.



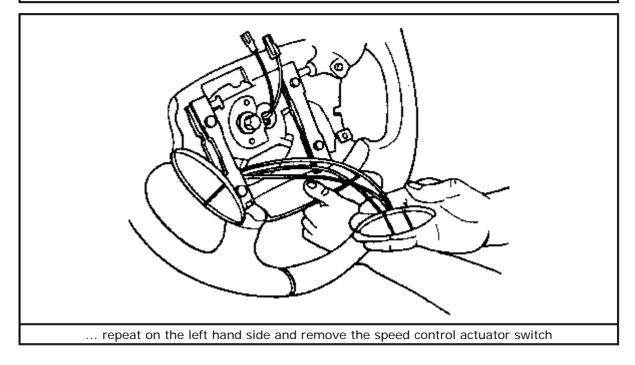
Click to enlarge

- 6. Disconnect the speed control wire harness, then disconnect the horn switch wire.
- 7. Remove the four retaining screws from the speed control actuator switch.
- Carefully pry away the right-hand side of the steering wheel back cover to provide enough clearance to remove the right-hand speed control switch wiring from the steering wheel. Repeat on the left-hand side, then remove the speed control actuator switch.

CRUISE CONTROL Cтр. 14 из 33



Carefully pry the right side of the steering wheel back cover for clearance to remove the right hand speed control switch wiring, then ...



To install:

- Carefully pry away the right-hand side of the steering wheel back cover to allow enough clearance to insert the right-hand aide of the speed control switch wiring into the steering wheel, then repeat the process on the left side.
- 10. Position the speed control actuator switch onto the steering wheel, then install the four retaining screws.

Make sure that the wires are positioned so that no interference is encountered when installing the air bag module.

- 11. Engage all of the harness connectors and route the wiring in the steering wheel cavity, then install the wire organizer.
- 12. Position the driver side air bag module on the steering wheel, then connect the air

CRUISE CONTROL Cтр. 15 из 33

- bag sliding contact.
- Install the driver side air bag module on the steering wheel, then install the two screw and washer assemblies. Tighten to 8-10 ft. lbs. (10.2-13.8 Nm).
- 14. Install the two back cover plugs.

Because battery voltage to the PCM was interrupted, performance may be affected until the PCM re-learns its driving strategy.

- 15. Connect the positive, then the negative battery cables.
- 16. Check the operation of the speed control actuator switch, then make sure the air bag is operating properly by checking the air bag lamp in the dash panel.

TESTING

- 1. Check to see that main fuse and stop lamp fuse are good. If so, detach 6-way connector at amplifier assembly.
- 2. Connect a voltmeter between light blue/black wire and ground. Depress ON button and check for battery voltage.
- 3. Connect an ohmmeter between light blue/black wire and ground.
- 4. Rotate steering wheel through its full range and make the following checks:
 - Depress OFF button and check for a reading of 0-1 ohms.
 - Depress SET/ACCEL button and check for a reading pf 714-646 ohms.
 - Depress COAST button and check for a reading of 126-114 ohms.
 - Depress RESUME button and check for a reading of 2090-2310 ohms.
- If the resistance values are not as indicated, but the ohmmeter fluctuates, remove the steering wheel and clean the brushes and slip ring surface. Apply slip ring grease E1AZ-19590-A or equivalent, equally on the ring, approximately 0.02 in. (0.5mm) thick.
- 6. If the resistance values are greater than those specified above, check the switch assemblies and ground circuit.
- 7. Reconnect the 6-way connector at amplifier.

Ground Brush/Clockspring Assembly/Air Bag Sliding Contact

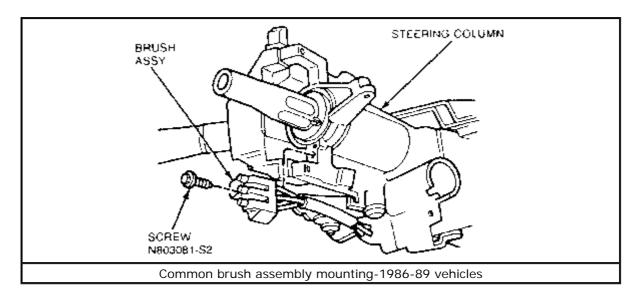
REMOVAL & INSTALLATION

1986-89 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Remove the steering wheel hub horn pad cover by removing the two screws from the back of the steering wheel.
- 3. Remove and discard the steering wheel attaching bolt.
- 4. Remove the steering wheel from the upper shaft by grasping the rim of the steering wheel and pulling it off. Do not use a steering wheel puller.

CRUISE CONTROL Cтр. 16 из 33

- 5. Remove the tilt lever, if so equipped.
- 6. Remove the ignition lock cylinder and steering column lower trim shroud.
- 7. Separate the speed control brush wire harness at the connector and remove the wire harness retainers from the steering column.
- 8. Remove the screw securing the brush assembly to the upper steering column.



Click to enlarge

To install:

- Position the brush assembly housing on the upper steering column and secure with the screw.
- 10. Install the wire harness into the steering column with the attached retainers. Connect the harness to the main wiring harness.
- 11. Attach the lower trim shroud to the upper shroud with the three retaining screws.
- 12. Install the ignition lock cylinder and tilt lever, if equipped.
- Position the steering wheel on the end of the steering wheel shaft. Align the index mark on the wheel with the index mark on the shaft.
- 14. Install a new steering wheel bolt. Tighten to 23-33 ft. lbs. (31-45 Nm).
- 15. Install the steering wheel horn pad.

1990-95 Vehicles

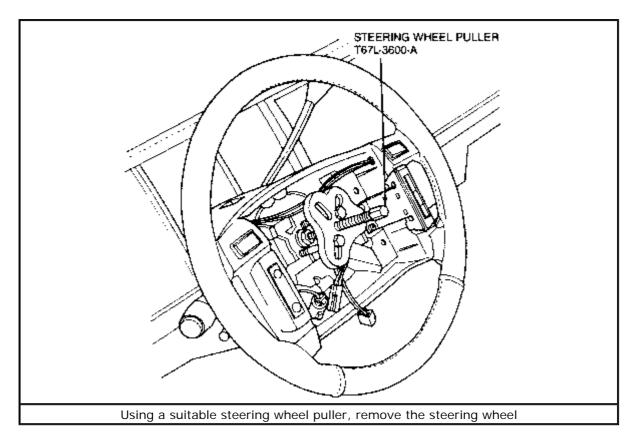
- 1. Set the steering wheel in the straight ahead position.
- 2. Disconnect the negative battery cable.
- Remove the four nut and washer assemblies retaining the air bag module to the steering wheel.
- 4. Disengage the air bag electrical connector from the clockspring contact connector.
- 5. Remove the air bag module from the steering wheel.

CAUTION

CRUISE CONTROL Cтр. 17 из 33

Place the air bag module on the bench with the trim cover facing upward to prevent personal injury in the event of accidental deployment of the air bag.

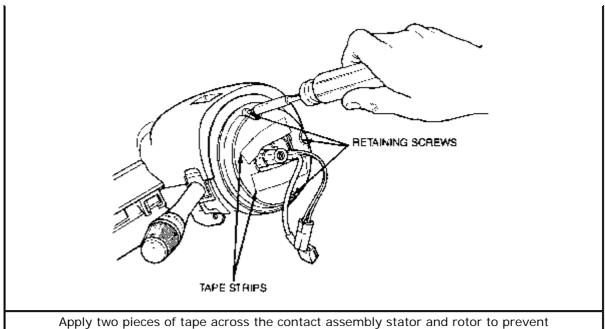
- 6. Disconnect the speed control switches and horn switches from the contact assembly.
- 7. Remove the steering wheel retaining bolt.
- 8. Using Steering Wheel Puller T67L-3600-A or equivalent suitable puller, remove the steering wheel.



Click to enlarge

- 9. If equipped, remove the tilt lever.
- 10. Remove the lower trim panel and lower steering column shroud.
- 11. Disconnect the contact assembly wiring harness.
- 12. Apply two pieces of tape across the contact assembly stator and rotor to prevent accidental rotation.
- 13. Remove the three contact assembly retaining screws, then lift the contact assembly off the steering column shaft.

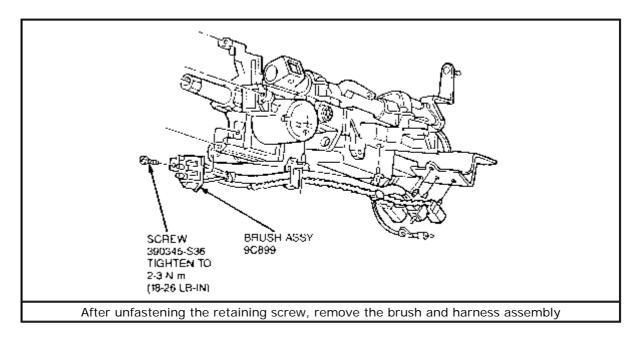
CRUISE CONTROL Cтр. 18 из 33



Apply two pieces of tape across the contact assembly stator and rotor to prevent accidental rotation, then remove the three contact assembly retaining screws

Click to enlarge

- 14. Disengage the speed control brush wiring harness at the connector, then remove the wiring harness retainers from the steering column.
- 15. Remove the screw retaining the brush assembly to the upper steering column. Remove the brush and harness assembly.



Click to enlarge

- 16. Position the brush assembly wire on the upper steering column and install the retaining screw. Tighten to 18-26 inch lbs. (2-3 Nm).
- 17. Install the wiring harness retainer into the steering column and connect the harness to the main wiring.

CRUISE CONTROL Cтр. 19 из 33

18. Align the contact assembly to the column shaft and mounting bosses and slide the contact assembly onto the shaft.

- 19. Install the three screws that retain the contact assembly, then tighten to 18-26 inch lbs. (2-3 Nm). Remove the tape from the contact assembly.
- Route the contact assembly harness down the column and connect to the main wiring harness.

If installing a new contact assembly, remove the lock mechanism.

- 21. Install the steering column shroud.
- 22. Install the lower trim panel.
- 23. If equipped, install the tilt lever.

Route the contact assembly wiring through the steering wheel as the wheel is being positioned.

- 24. Position the steering wheel on the steering shaft and install a new steering wheel retaining bolt. Tighten to 23-33 ft. lbs. (31-45 Nm).
- 25. Connect the speed control and horn switches to the contact assembly.
- Position the air bag module on the steering wheel so that the clockspring contact connector can be connected to the air bag module.
- Install the air bag module on the steering wheel and install the four nut and washer assemblies.
- 28. Connect negative battery cable.

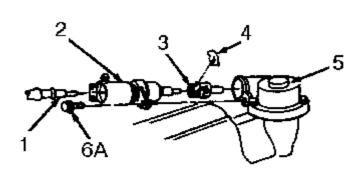
Vehicle Speed Sensor (VSS)

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Raise and safely support the vehicle. Remove the mounting clip.
- On 1992-95 vehicles equipped with an automatic transaxle, remove the Y-pipe and HEGO sensors from the exhaust system. Remove the speed sensor exhaust heat shield.
- 4. Loosen the retaining nut/bolt holding the sensor in the transaxle. Remove the driven gear with the sensor from the transaxle.
- 5. Disconnect the electrical connector from the speed sensor.
- 6. Disconnect the speedometer cable by pulling it out of the speed sensor.

Do not attempt to remove the spring retainer clip with the speedometer cable in the sensor.

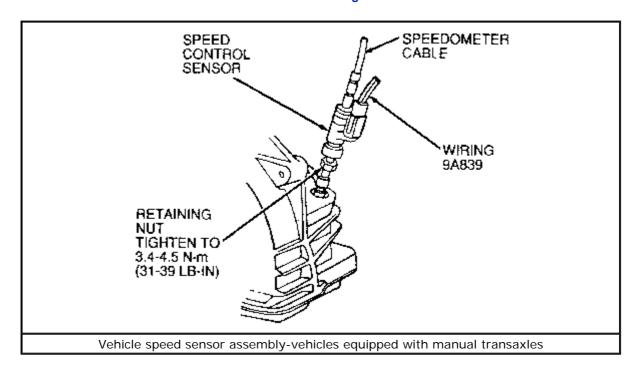
For 1992-95 vehicles equipped with and automatic transaxle, remove the driven gear retainer and driven gear from the speed sensor. CRUISE CONTROL Cтр. 20 из 33



- 1 Speed control cable and vehicle speed sensor
- 2 Vehicle speed sensor
- 3 Speedometer driven gear
- 4 Speedometer driven gear retainer
- 5 Speedometer cover
- 6 Bolt
- A Tighten to 3.4-4.5 Nm (31-39 lb.in.)

Vehicle speed sensor assembly-vehicles equipped with automatic transaxles

Click to enlarge



Click to enlarge

- 8. Position the driven gear to the speed sensor. Install the gear retainer.
- 9. Engage the electrical connector.
- 10. Make sure the internal O-ring is properly seated in the sensor housing. Snap the

CRUISE CONTROL CTp. 21 из 33

- speedometer cable into the sensor housing.
- 11. Insert the sensor assembly into the transaxle housing. Tighten the retaining nut/bolt to 30-40 inch lbs. (3.4-4.5 Nm). Install the retaining clip.
- 12. On 1992-95 vehicles equipped with an automatic transaxle, install the Y-pipe and HEGO sensors to the exhaust system. Install the speed sensor exhaust heat shield.
- 13. Carefully lower the vehicle.
- 14. Connect the negative battery cable, then check to make sure the speedometer and odometer are operating properly.

TESTING

Without Electronic Instrument Cluster

1. Disconnect connector at speed sensor and connect an ohmmeter between wire connector terminals and speed sensor end. Reading should be 200-300 ohms.

A reading of 0 ohms indicates a shorted coil and the speed sensor should be replaced. A maximum reading indicates an open coil and speed sensor should be replaced.

- 2. If the ohmmeter reading is between 200-300 ohms, and speedometer operates properly within needle waver, speed sensor is probably functioning properly.
- 3. If available, a known good quality speed sensor can also be substituted in place of existing sensor to check for proper operation.

With Electronic Instrument Cluster

Because AC and DC voltage measurements are required in the diagnosis of the speed control system on vehicles equipped with an electronic instrument cluster, a special diagnostic tool, Fluke 8022A or equivalent, should be used. Do not perform speed sensor testing on vehicles equipped with an electronic speedometer.

- 1. Raise and safely support the vehicle drive wheels.
- 2. Bring vehicle speed to approximately 30 mph (48 km/h).
- 3. Connect an AC voltmeter to dark green/white wire and ground.
- 4. Back probe the amplifier connector. Voltmeter should read about 6-24 volts. If not, check speed sensor and related wiring. Repair and/or replace as necessary.
- 5. Lower the vehicle.

Amplifier

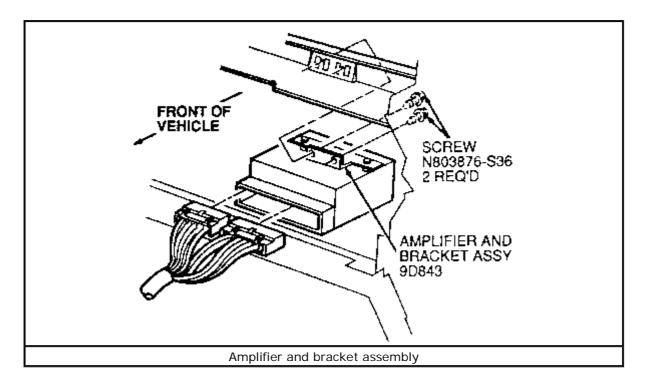
REMOVAL & INSTALLATION

On Integrated Vehicle Speed Control (IVSC) equipped vehicles, the amplifier assembly has been incorporated into the EEC-IV system Electronic Control Assembly (ECA).

Non-IVSC Vehicles

CRUISE CONTROL Cтр. 22 из 33

- 1. Disconnect the negative battery cable.
- 2. Disengage the two electrical connectors at the amplifier.
- 3. Remove the two screws retaining the amplifier and bracket assembly.
- 4. Remove the amplifier and bracket assembly from the instrument panel.
- Remove the two bolts and nuts retaining the amplifier assembly to the mounting bracket.



Click to enlarge

To install:

- 6. Place the amplifier assembly into position, then install the two bolts and nuts which secure the amplifier assembly to the mounting bracket.
- 7. Install the amplifier and bracket assembly to the instrument panel using the two retaining screws, then tighten to 45-61 inch lbs. (5-7 Nm).
- 8. Engage the two amplifier electrical connectors.
- 9. Connect the negative battery cable.

TESTING

Do not use a test lamp to perform the amplifier tests as excessive current draw will damage electronic components inside the amplifier. Use a voltmeter of 5000 ohm/volt rating or higher.

ON Circuit

- With the ignition in the RUN position, connect a voltmeter between the white/pink wire and black wire (ground) in the 6-way connector at the amplifier. Voltmeter should read battery voltage.
- 2. Connect the voltmeter between light blue/black wire and black wire (ground) in the 6-way connector at the amplifier. Voltmeter should read battery voltage only when

CRUISE CONTROL Cтр. 23 из 33

- ON switch in steering wheel is depressed and held. If voltage is not present, perform control switch test.
- 3. Release ON button, voltmeter should read about 7.8 volts, this indicates that ON circuit is engaged. If voltmeter reads 0.0, check for a bad ground at amplifier.
- 4. If there is no ground at amplifier, check system ground connections and wiring. Also check the fuse.
- 5. If available, substitute a known good amplifier and check for proper circuit operation.

Brake Circuit

- 1. Connect an ohmmeter between the red/light green wire on the 6-way connector and ground. Resistance should be less than 5 ohms.
- 2. If resistance is greater than indicated, check for improper wiring, burned out stop lamp lights or clutch malfunction, if equipped.

OFF Circuit

- With ignition in RUN, connect voltmeter between light blue/black wire of 6-way amplifier connector and ground. Depress OFF switch on steering wheel. Voltage on light blue/black wire should drop to 0 which indicates that ON circuit is not energized.
- 2. If voltage does not drop to 0, perform the control switch test. If control switch checks out good, install a good amplifier and recheck OFF circuit.

SET/ACCEL Circuit

- 1. With ignition in RUN, connect voltmeter between light blue/black of 6-way amplifier connector and black wire (ground). Depress and hold SET/ACCEL button on steering wheel. Voltmeter should read about 4.5 volts.
- 2. Rotate steering wheel back and forth and watch voltmeter for fluctuations.
- 3. If voltage varies more than 0.5 volts, perform control switch test.

COAST Circuit

- With ignition in RUN, connect voltmeter between light blue/black of 6-way amplifier connector and ground. Depress and hold COAST button on steering wheel.
 Voltmeter should read about 1.5 volts.
- 2. If circuit checks out good, perform servo assembly test. If servo test checks out good, install a new amplifier and repeat tests. Do not substitute amplifier until after performing servo assembly test.

RESUME Circuit

- With ignition in RUN, connect voltmeter between light blue/black of 6-way amplifier connector and ground. Depress and hold RESUME button on steering wheel. Voltmeter should read about 6.5 volts.
- If circuit checks out good, perform servo assembly test. If servo test checks out good, install a new amplifier and repeat tests. Do not substitute amplifier until after performing servo assembly test.

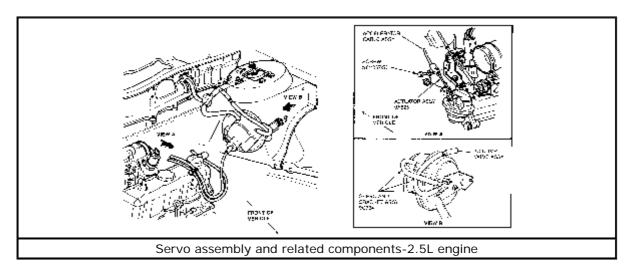
Servo

CRUISE CONTROL CTp. 24 из 33

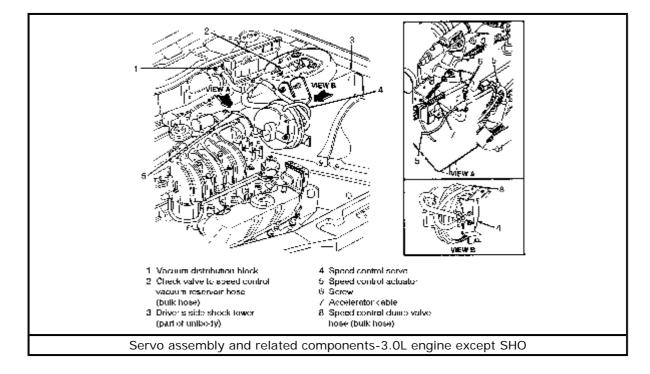
REMOVAL & INSTALLATION

Except 3.2L SHO

- 1. Disconnect the negative battery cable.
- 2. Remove the screw, then disconnect the speed control actuator cable from the accelerator cable bracket.
- 3. Disconnect the speed control actuator cable with the adjuster from the accelerator cable.
- 4. Remove the two vacuum hoses and electrical connector from the servo assembly.
- 5. Remove the two nuts attaching the servo to its mounting bracket.
- 6. Carefully remove the servo and cable assembly.
- 7. Remove the two nuts securing the cable cover to the servo.
- 8. Pull off the cover, then remove the cable assembly.

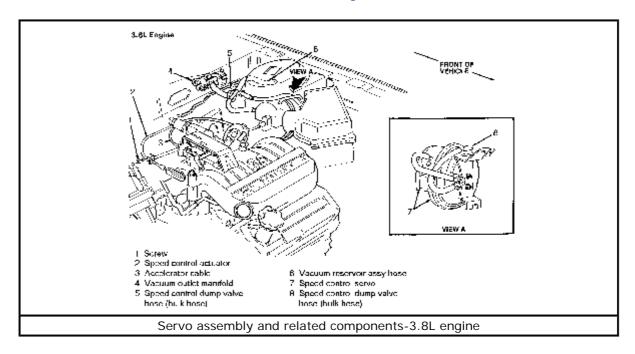


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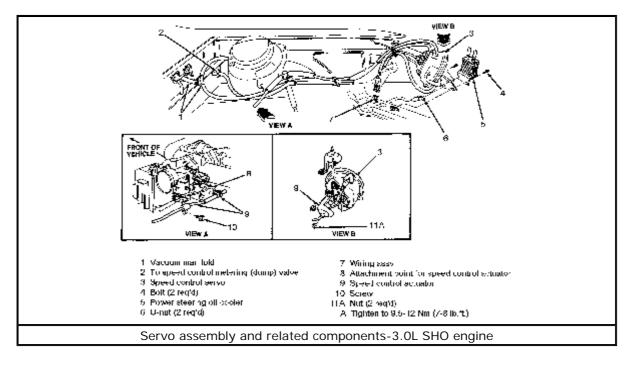


CRUISE CONTROL Cтр. 25 из 33

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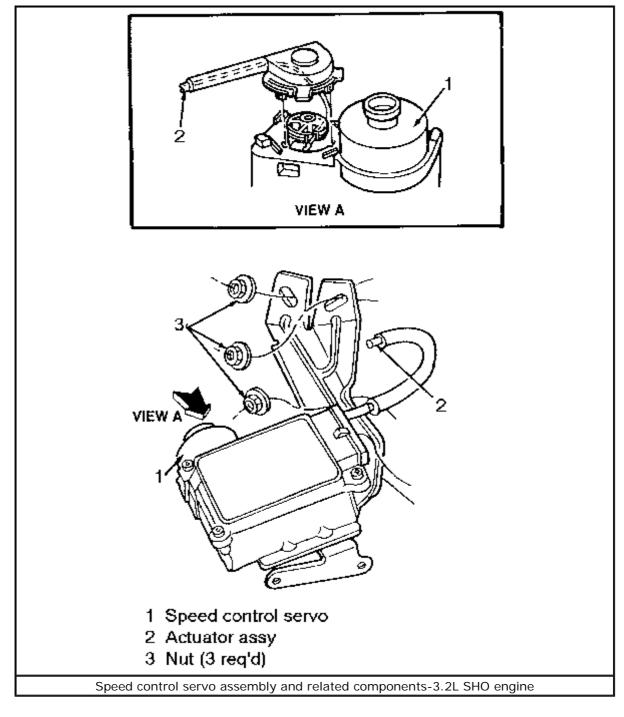
- 9. Attach the cable to the servo.
- 10. Attach the cable cover to the servo with the two retaining nuts. For vehicles through 1993, tighten the nuts to 45-61 inch lbs. (5-7 Nm). For 1994-95 vehicles, tighten the nuts to 62-80 inch lbs. (7-9 Nm).
- 11. Attach the servo to the mounting bracket. For vehicles through 1993, tighten the retaining nuts to 45-61 inch lbs. (5-7 Nm). For 1994-95 vehicles, tighten the retaining nuts to 62-80 inch lbs. (7-9 Nm).
- 12. Feed the actuator cable under the air cleaner air duct.

CRUISE CONTROL Cтр. 26 из 33

- 13. Snap the actuator cable with the adjuster onto the accelerator cable bracket and install the screw.
- 14. Connect the actuator cable to the accelerator cable bracket and install the fastener
- 15. Install the two vacuum hoses and electrical connector at the servo.
- 16. Connect negative battery cable.

3.2L SHO

1. Disconnect the negative battery cable.



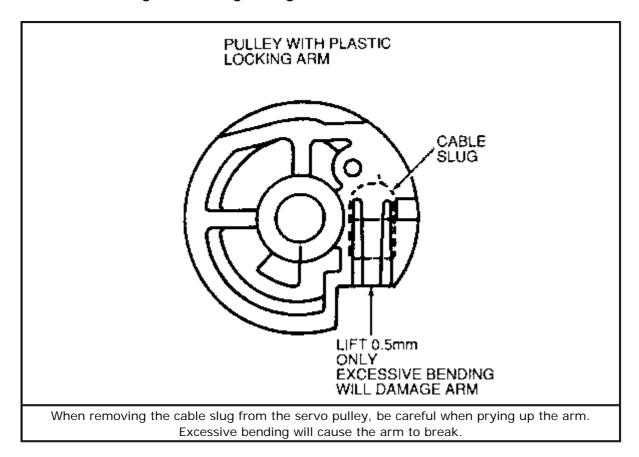
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2. Remove the retaining clip from the actuator cable adjuster fitting.

CRUISE CONTROL Cтр. 27 из 33

- 3. Push the actuator tube out of the adjuster fitting attached to the throttle cable.
- 4. Disengage the harness connector at the speed control servo.
- 5. Remove the three nuts attaching the assembly to the vehicle.
- 6. Remove the actuator cable cap from the speed control servo by depressing the cap locking arm and rotating the cap counterclockwise.
- 7. Remove the cable slug from the servo pulley. Gently pry-up the arm slightly with a suitable small prybar and at the same time, push the cable slug out of the pulley slot.

Excessive bending of the arm will cause it to break. DO NOT USE servos with damaged or missing locking arms.



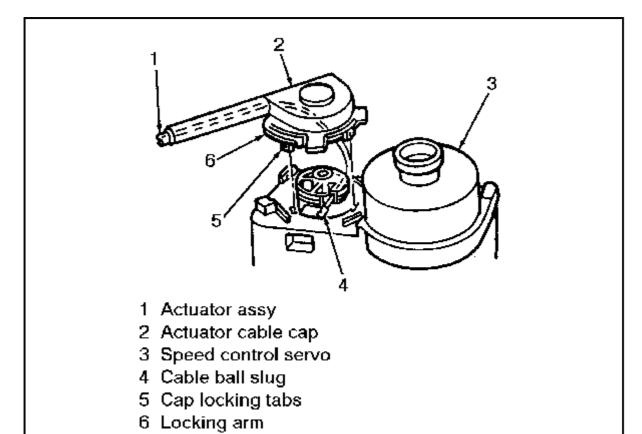
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8. Remove the bracket from the speed control servo. Retain the bracket and three screws for reinstallation on the speed control servo.

- 9. Attach the bracket to the speed control servo with the three screws. Tighten the screw to 6-8 ft. lbs. (8-11 Nm).
- 10. Make sure that the rubber seal is fully seated on the actuator cap.
- 11. Lock the cable ball slug into the servo pulley slot.
- 12. Pull on the throttle attachment end of the cable to draw the cable cap onto the servo pulley.
- 13. Align the cable cap tabs with slots in the servo housing. Insert the cap into the speed control servo and rotate it clockwise until the locking arm engages the

CRUISE CONTROL Cтр. 28 из 33

locking tab on the speed control servo.



Align the cable cap tabs with the slots in the servo housing, then insert the cap into the speed control servo and rotate it clockwise until the locking arm engages the locking tab on the servo

Click to enlarge

- 14. Position the actuator cable and servo assembly in the vehicle. Tighten the mounting nuts to 45-61 inch lbs. (5-7 Nm).
- 15. Attach the harness connector to the speed control servo.
- Adjust the actuator clip as outlined earlier in this section, then install the retaining clip.

Incorrect wrapping of the cable core wire around the servo pulley may result in a high idle condition. Make sure that the throttle lever is at idle position after cable installation and adjustment.

17. Connect the negative battery cable.

TESTING

- Disconnect 8-way amplifier connector. At connector, connect an ohmmeter between orange/yellow wire and grey/black wire. Resistance should be 40-125 ohms.
- 2. Connect an ohmmeter between orange/yellow wire and white/pink wire. Resistance should be 60-190 ohms.
- 3. Connect an ohmmeter between pink/light blue wire and brown/light green wire. Resistance should be 40,000-60,000 ohms.

CRUISE CONTROL Cтр. 29 из 33

- 4. Connect an ohmmeter between yellow/red wire and brown/light green wire. Resistance should be 20,000-30,000 ohms.
- 5. If proper reading is not obtained, check wiring and servo assembly separately for damage. Repair and/or replace as required.
- 6. Start engine and, with servo disconnected from amplifier, connect orange/yellow wire of servo to battery positive terminal. Connect white/pink wire of servo to ground.
- 7. Momentarily touch grey/black wire of servo to ground. Servo throttle actuator arm should pull in and engine speed should servo throttle actuator arm should hold in that position or slowly release.
- When white/pink is removed from ground servo throttle actuator arm should release.
- 9. Replace servo assembly if it does not perform as indicated.
- 10. If orange/yellow wire is shorted to either white/pink wire or grey/black wire it may be necessary to replace amplifier assembly.

Brake Light Switch and Circuit

TESTING

This test is performed when brake pedal application will not disconnect the speed control system.

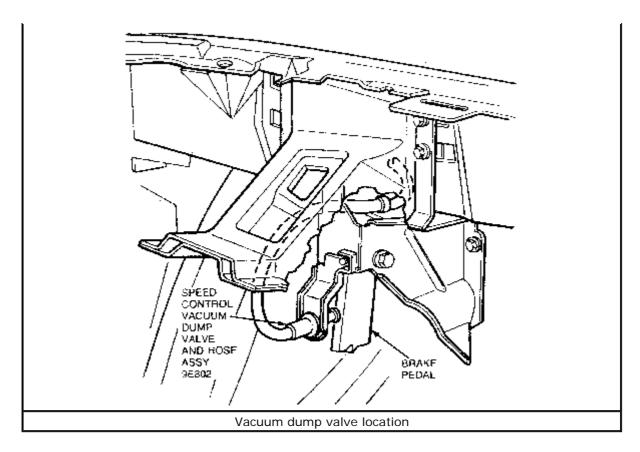
- Check the brake light operation with maximum brake pedal effort of about 6 lbs. If more than about 6 lbs. is required, check brake actuation of brake light switch. Repair and/or replace as necessary.
- 2. If brake lights do not work, check fuse, bulbs and switch. Repair and/or replace as necessary.
- 3. If brake lights are working properly check for battery voltage at white/pink or pink/orange wire at 6-way electrical connector.
- 4. Depress brake pedal until tail lamps light. Check voltage on dark green/white wire at 6-way electrical connector.
- 5. Difference between the two voltage readings should not exceed 1.5 volts. If reading is higher, resistance in brake light circuit must be found and repaired.
- 6. There should be no voltage present on dark green/white wire with brake lights off.
- 7. Perform vacuum dump valve test.

Vacuum Dump Valve

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the vacuum hose from the dump valve.
- 3. Remove the dump valve from the bracket.

CRUISE CONTROL Cтр. 30 из 33



Click to enlarge

To install:

- 4. Install the valve to the bracket.
- 5. Connect the vacuum hose.
- 6. Adjust vacuum dump valve. For details, please refer to the adjustment procedure located later in this section.
- 7. Connect the negative battery cable.

ADJUSTMENT

Adjust the vacuum dump valve so that it is closed (no vacuum leak) when the brake pedal is up (brakes released) and open when the pedal is depressed.

TESTING

The vacuum dump valve releases vacuum in the servo assembly whenever the brake pedal is depressed and thus acts as a redundant safety feature. The vacuum dump valve should be checked whenever brake application does not disconnect the speed control system.

- 1. Disconnect vacuum hose with the white stripe from the dump valve. Connect a vacuum pump to hose and apply vacuum.
- 2. If a vacuum cannot be obtained, hose or dump valve is leaking. Replace or repair defective components as required.
- 3. Step on the brake pedal, vacuum should be released. If not, adjust or replace dump valve.

CRUISE CONTROL Cтр. 31 из 33

4. The dump valve black housing must clear white plastic pad on brake pedal by 0.05-0.10 in. (1.3-2.5mm) with the brake pedal pulled to rearmost position.

Clutch Switch

REMOVAL & INSTALLATION

Except 1995 3.0L SHO

- 1. Disconnect the negative battery cable.
- 2. Remove the bracket mounting screw.
- 3. Disengage the electrical connector.
- 4. Remove the switch assembly, then remove the switch from the bracket.

To install:

- 5. Install the switch on the bracket.
- 6. Engage the switch electrical connector.
- 7. Install the bracket mounting screw.
- 8. Adjust the clutch switch.
- 9. Connect negative battery cable.

1995 3.0L SHO

- 1. Disconnect the negative battery cable.
- 2. Disengage the harness connector from the clutch pedal position switch.
- 3. Remove the clutch switch retaining screw and clip, then remove the switch.

To install:

4. Install the clutch switch on the clutch pushrod, then secure with the retaining screw and clip.

An audible "click" will be heard when the clutch switch is mountedproperly on the clutch pushrod.

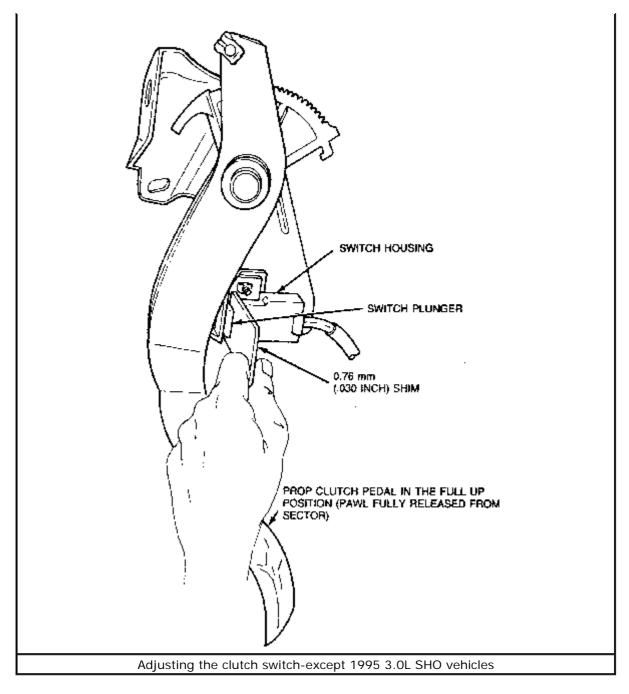
- 5. Engage the clutch switch harness connector.
- 6. Connect the negative battery cable.

ADJUSTMENT

Except 1995 3.0L SHO

- 1. Prop the clutch pedal in a full-up position (pawl fully released from the sector).
- 2. Loosen the switch retaining screw.

CRUISE CONTROL Cтр. 32 из 33



Click to enlarge

- 3. Slide the switch forward toward the clutch pedal until the switch plunger cap is 0.030 in. (0.76mm) from contacting the switch housing. Tighten the retaining
- 4. Remove the prop from the clutch pedal, then test drive the vehicle to ensure that the clutch switch cancellation of cruise control operates properly.

1995 3.0L SHO

The clutch pedal position switch is self-adjusting. To adjust, press the clutch pedal to the floor to reset the clutch switch.

TESTING

Manual Transaxle

CRUISE CONTROL Cтр. 33 из 33

The speed control system is designed to disengage when the clutch pedal is depressed. This is accomplished with a clutch switch. The speed control system disengage function is operated by opening the circuit between the speed control module and the brake lamps. This prevents engine over speed when the clutch is depressed and the speed control system is engaged.

The disengagement switch is a plunger switch that operates when the clutch pedal is depressed and the pedal moves away from the switch plunger. The switch is adjustable and attaches to a mounting bracket on the clutch module assembly.

Do NOT use a test light to perform the clutch switch test, as the lightcannot properly indicate the condition of the switch. Do not use a strongmagnet near the clutch switch, as it can be affected by magnetic fields.

- 1. Disconnect clutch pigtail connector from speed control harness connector. Connect an ohmmeter to the two switch connector terminals.
- 2. With the clutch pedal in full up position, resistance should be less than 5 ohms.
- 3. With the clutch pedal depressed, the circuit should be open.
- 4. If switch does not perform as indicated, it must be replaced.

Automatic Transaxle

Vehicles equipped with automatic transmission use a shorting plug instead of a clutch switch. Make sure the plug is installed and has good contact.

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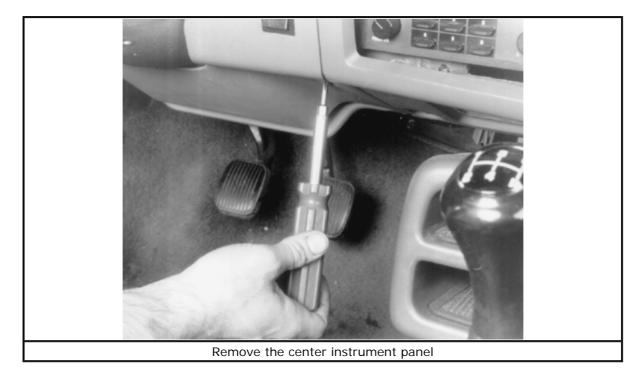
ENTERTAINMENT SYSTEMS

Radio Receiver/Tape Player

REMOVAL & INSTALLATION

1986-89 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Remove the trim panel-to-center instrument panel.

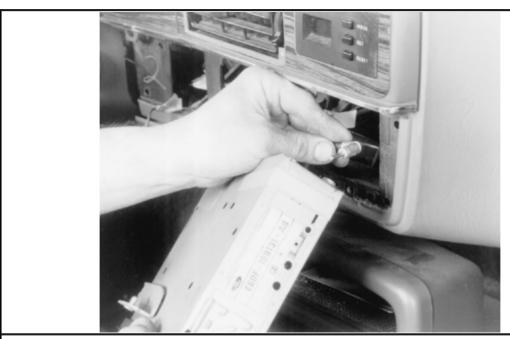


3. Remove the radio/bracket-to-instrument panel retaining screws.

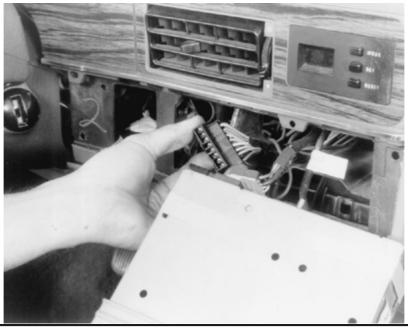


Remove the four screws retaining the radio and mounting bracket to the instrument panel

- 4. Push the radio toward the front, then raise the rear of the radio slightly so that the rear support bracket clears the clip in the instrument panel. Slowly, pull the radio from the instrument panel.
- 5. Disengage the electrical connectors and the antenna cable from the radio.



Disconnect the antenna cable from the radio



Disengage the electrical connector from the radio

To install:

- 6. Engage the wiring connectors and antenna cable to the radio.
- 7. Slide the radio into the instrument panel, keeping the rear of the radio slightly raised to engage the rear mounting bracket to clip in the instrument panel.
- 8. Install the four retaining screws, then torque the radio/bracket-to-instrument panel screws to 14-16 inch lbs. (1.6-1.8 Nm).
- 9. Install the center instrument trim panel.
- 10. Connect the negative battery cable, then test the radio/tape player for operation.

Radio Receiver/CD Player

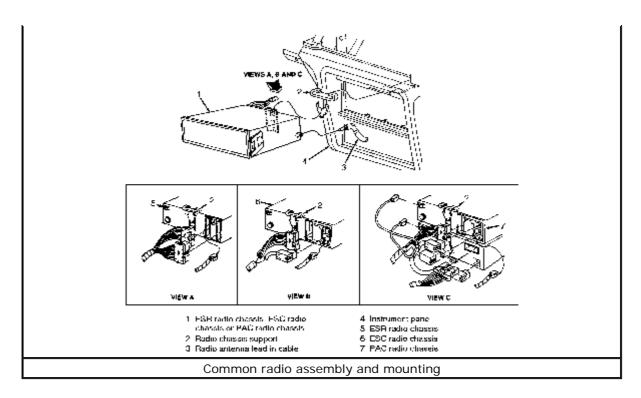
REMOVAL & INSTALLATION

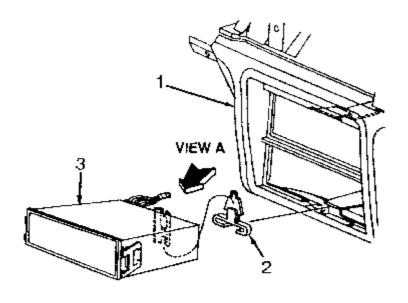
1990-95 Vehicles

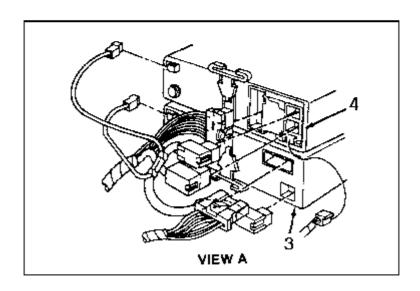
- 1. Disconnect the negative battery cable.
- 2. Install Radio Removal Tool T87P-19061-A into the radio or CD player face plate. Push the tool in about 1 in. (25mm) in order to release the retaining clips.

Do not use excessive force when installing the special tool because this will cause damage to the retaining clips.

- 3. Apply a light spreading force to the tool, then pull the assembly out from the instrument panel.
- 4. Disengage the electrical wiring connectors and the antenna wire from the assembly, then remove the radio or CD player from the vehicle.







- Instrument panel
- 2 Radio chassis support
- 3 Digital audio compact disc player
- 4 PAC radio chassis

Compact disc player mounting

Click to enlarge

To install:

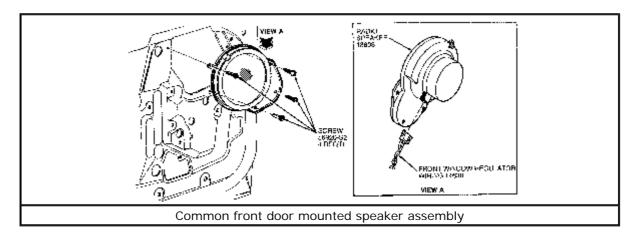
- 5. Engage the electrical wiring connectors, then connect the antennal cable to the radio or CD player assembly.
- 6. Slide the assembly into the instrument panel, making sure that the rear radio or CD player assembly support is engaged on the upper support rail.
- 7. Push the radio or CD player assembly inward until the retaining clips are fully engaged.
- 8. Connect the negative battery cable. Test the radio and/or CD player for operation.

Speakers

REMOVAL & INSTALLATION

Door Mounted

- 1. Disconnect the negative battery cable.
- 2. Remove the front door trim panel.
- 3. Remove the screws retaining the speaker to its mounting bracket.
- 4. Pull the speaker away from the mounting bracket far enough to disconnect the speaker electrical wires.



Click to enlarge

5. Remove the speaker from the vehicle.

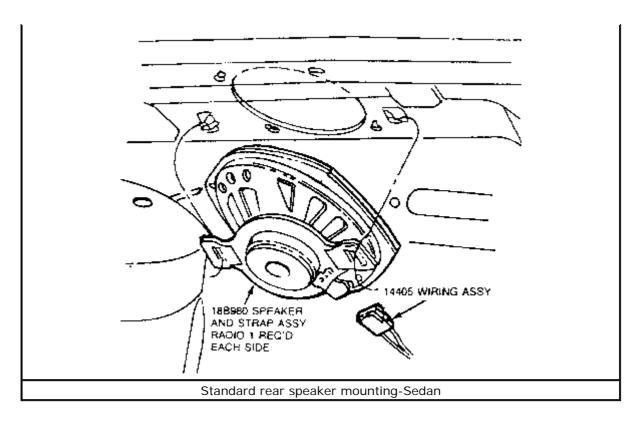
To install:

- 6. Connect the speaker electrical wires, then install the speaker to the mounting bracket using the retaining screws.
- 7. Install the front door trim panel.
- 8. Connect the negative battery cable.

Rear Seat Mounted

STANDARD SPEAKER

- 1. Disconnect the negative battery cable.
- 2. From the inside of the trunk, disconnect the speaker wiring harness from the speaker.
- 3. Remove the speaker cover.
- 4. Pull one end of the speaker rubber retaining strap to disengage it from the tab on the package tray, then remove the speaker from the vehicle.



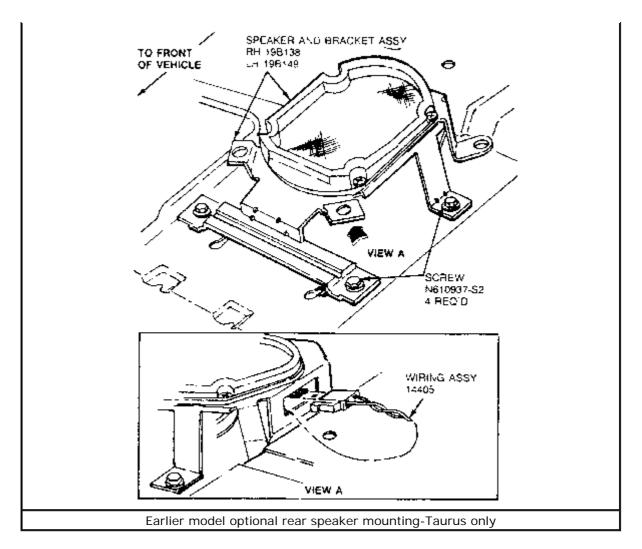
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To install:

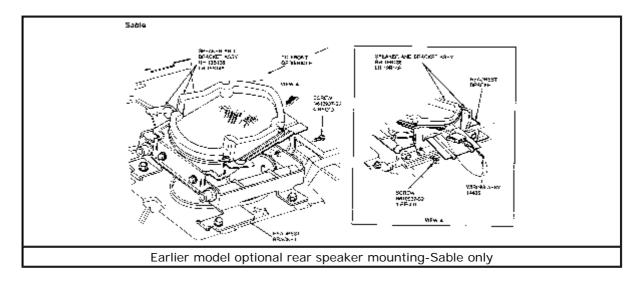
- 5. Position the speaker and strap assembly in place with one end of the strap over the tab on the package tray. Pull the opposite end of the strap to index over the other tab, securing the assembly.
- 6. Connect the speaker harness wiring, then connect the negative battery cable and check speaker operation.
- 7. Connect the negative battery cable.

OPTIONAL SPEAKER

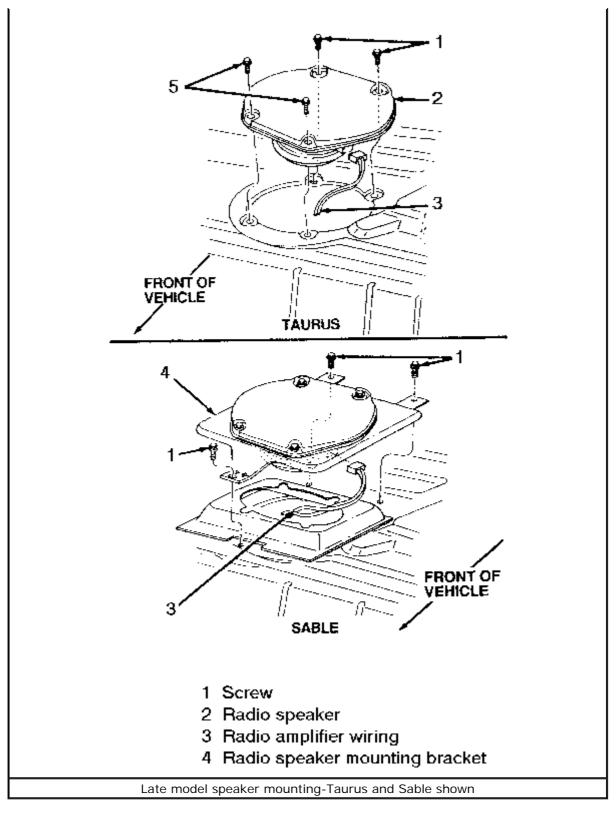
- 1. Disconnect the negative battery cable.
- 2. Remove the speaker grille from the package tray panel.
- 3. Remove the speaker retaining screws.
- 4. Pull the speaker forward, then disconnect the speaker electrical wiring. Remove the speaker from the vehicle.



Click to enlarge



Click to enlarge



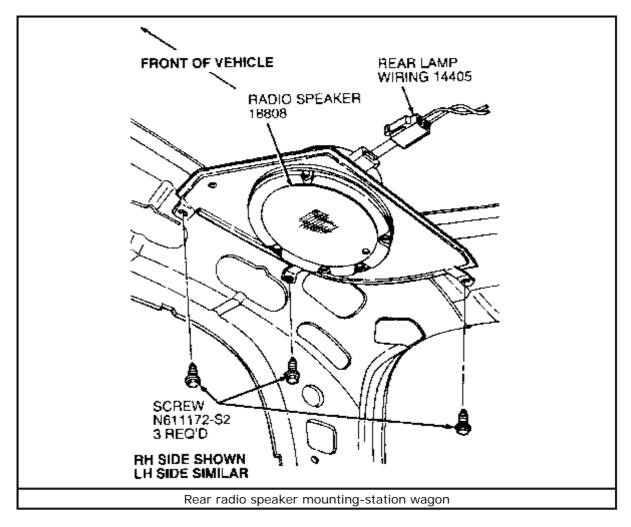
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To install:

- 5. Connect the speaker electrical wiring, then install the speaker in the vehicle. Secure using the retaining screws.
- 6. Install the speaker grille to the package tray panel.
- 7. Connect the negative battery cable.

Station Wagon

- 1. Disconnect the negative battery cable.
- 2. Remove the inner rear corner of the upper finish panel.
- 3. Remove the screws retaining the speaker mounting bracket and speaker assembly.
- 4. Disconnect the speaker electrical wiring, then slide the speaker mounting bracket edge out from under the headlining. Remove the speaker from the vehicle.



Click to enlarge

To install:

- 5. Position the speaker, then slide the speaker mounting bracket edge under the headlining and connect the speaker electrical wiring.
- 6. Install the speaker and mounting bracket retaining screws.
- 7. Install the inner rear corner of the upper finish panel.
- 8. Connect the negative battery cable.

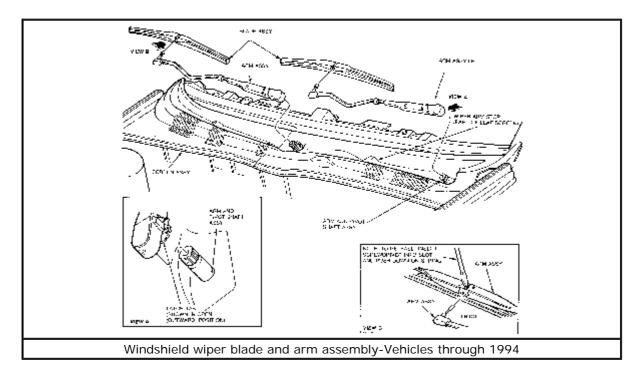
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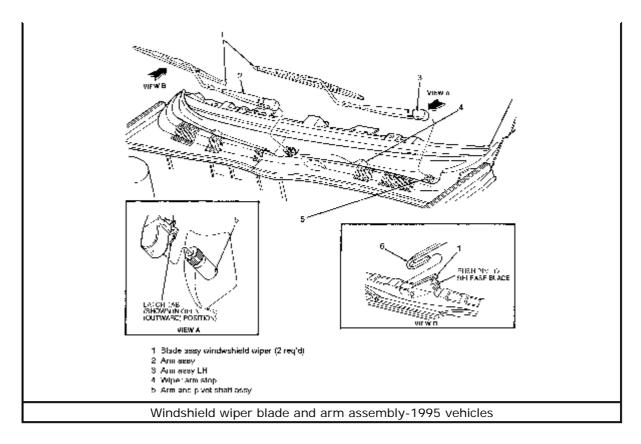
WINDSHIELD WIPERS AND WASHERS

Windshield Wiper Blade and Arm

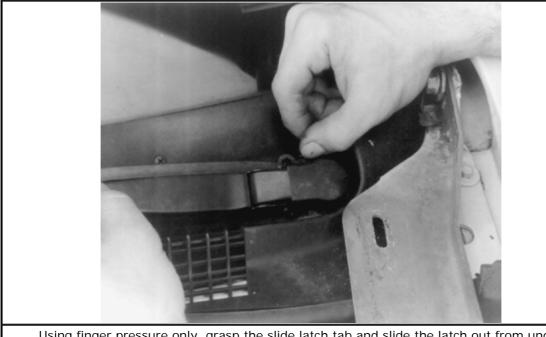
REMOVAL & INSTALLATION

- Turn the ignition switch to the ACC position. Turn the wiper switch ON. Allow the
 motor to move the pivot shafts 3 or 4 cycles, then turn off the switch. This
 operation will place the pivot shafts in the PARK position. Turn the ignition switch
 to the OFF position.
- 2. Disconnect the negative battery cable.

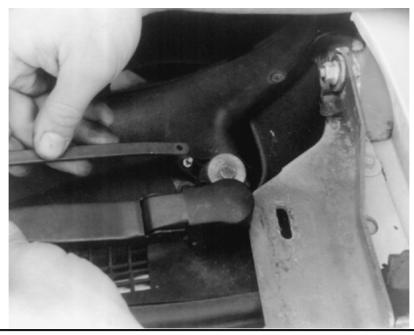




Remove the wiper arm and blade assembly by first applying downward pressure
on the wiper arm head while holding the wiper arm. Then, lift the arm to the
highest position and, using finger pressure only, grasp the slide latch tab and
slide the latch out from under the arm head. Remove the arm and blade assembly.

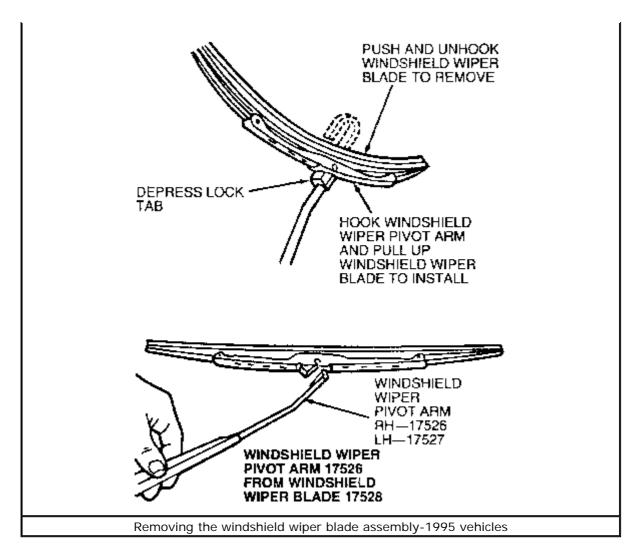


Using finger pressure only, grasp the slide latch tab and slide the latch out from under the arm head, then ...



... remove the arm and blade assembly

- 4. To remove the blade assembly for vehicles through 1994, insert a screwdriver into the slot provided at the top of the blade frame, push down on the spring lock and pull the blade assembly from the wiper arm pin.
- 5. To remove the blade assembly for 1995 vehicles, depress the locking tab on the windshield wiper blade, then slide the blade downward away from the windshield wiper pivot arm and remove the blade.

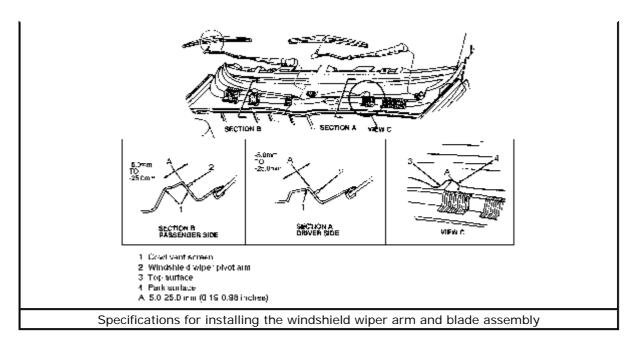


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6. Install the blade onto the new replacement wiper arm assembly.

To install:

- 7. Position the bottom surface of the wiper arm parallel with the top surface of the cowl screen louvers, making sure that arm rests against the top surface of the cowl screen. Install the arm onto the pivot shaft with the latch slide in the unlatched (outward position).
- 8. While applying downward pressure on the arm head to ensure full seating, raise the other end of the arm enough to allow the latch to slide under the pivot assembly to the latched position.
- Lift the (latched) wiper arm and blade assembly away from the top surface of the cowl screen louvers and position the arm only on the rearward surface of the wiper arm stop.



10. Make sure the blade is fully seated on the arm and the arm is against (rearward of) the the wiper stop, before operating the wipers to verify the correction.

If the blade does not touch the windshield, the slide latch is not completely in place.

11. Connect the negative battery cable, then check for correct wiper operation.

ADJUSTMENT

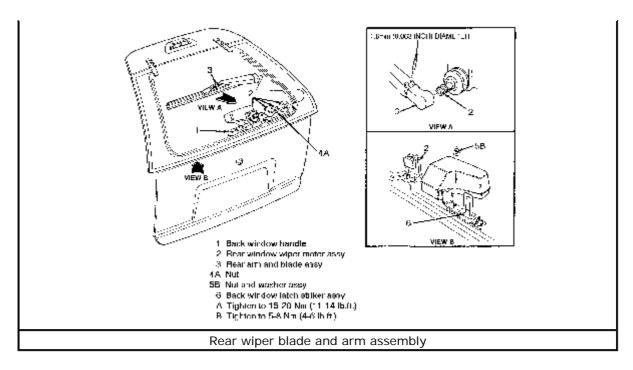
- 1. With the arm and blade assemblies removed from the pivot shafts, turn on the wiper switch and allow the motor to move the pivot shaft three or four cycles, then turn the wiper switch off. This will place the pivot shafts in the park position.
- Install the arm and blade assemblies on the pivot shafts to the correct distance between the windshield lower molding or weatherstrip and the blade saddle centerline.

Rear Window Wiper Blade and Arm

REMOVAL & INSTALLATION

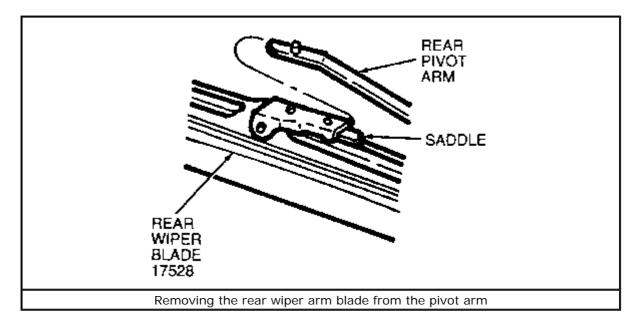
To avoid scratching the glass and/or paint, do not pry the wiper mounting arm and pivot shaft from the pivot arm with a metal or sharp tool

- 1. Raise the arm away from the back window glass, then insert a 0.062 in. (1.6mm) pin into the holes in the retainer arm.
- 2. Lower the arm to the glass to relieve arm spring tension.
- 3. Lift the arm assembly off of the pivot shaft.



Click to enlarge

4. To remove the rear wiper blade, press down on the arm to unlatch the top stud, then pull the blade from the rear wiper pivot arm.



Click to enlarge

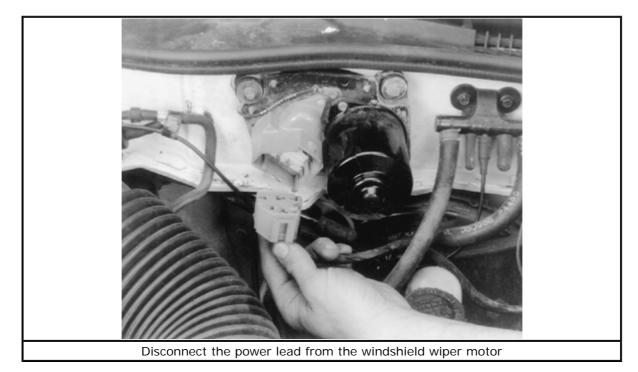
To install:

- 5. To install the rear wiper blade, slide the blade assembly on the the rear wiper pivot arm, then make sure that the top stud and bottom saddle are securely latched.
- 6. Push the main arm head over the pivot shaft. Be sure that the pivot shaft is in the park position.
- 7. Hold the main arm head on the pivot shaft while raising the blade end of the wiper arm and remove the 0.062 in. (1.6mm) pin.
- 8. Lower the blade to the glass.

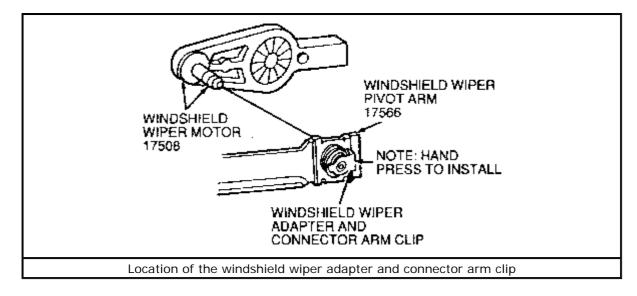
Windshield Wiper Motor

REMOVAL & INSTALLATION

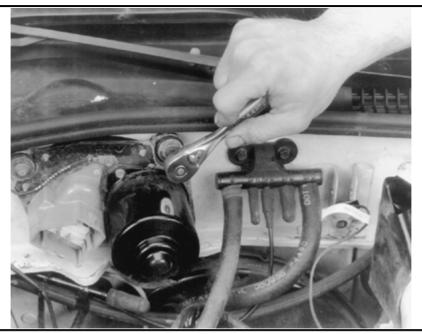
- 1. Disconnect the negative, then the positive battery cables.
- 2. Disconnect the power lead from the windshield wiper motor.



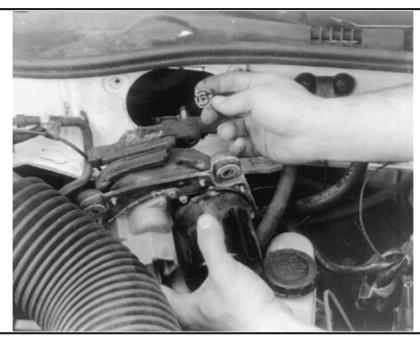
- 3. Remove the left windshield wiper pivot arm.
- On 1991-95 vehicles, lift the water shield cover from the cowl on the passenger side.
- 5. On 1986-90 vehicles, remove the left cowl screen.
- 6. Remove the windshield wiper mounting arm and pivot shaft retaining clip from the operating arm on the motor by lifting the locking tab up, then pulling the clip away from the pin.



7. Remove the attaching screws/bolts from the windshield motor and bracket assembly, then remove the assembly.



Remove the retaining bolts from the motor, then \dots



... remove the windshield wiper motor assembly from the vehicle

To install:

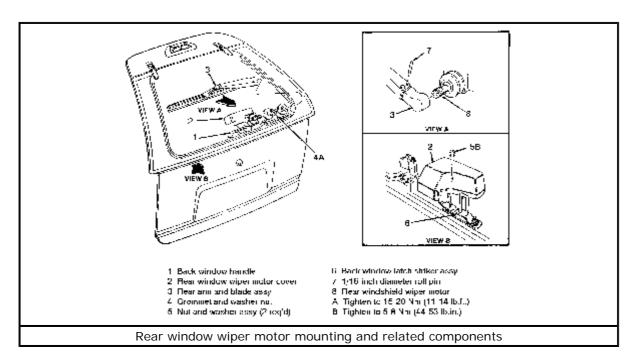
- 8. Position the windshield wiper motor, then install the retaining bolts/screws. Tighten to 60-80 inch lbs. (7-9 Nm).
- 9. Connect the power lead to the windshield wiper motor.
- 10. Install the retaining clip on the windshield wiper mounting arm.
- 11. Install the windshield wiper mounting arm and pivot shaft on the windshield wiper motor. Make sure that the mounting arm and pivot shaft is securely attached to the windshield wiper motor. Install the mounting arm and pivot shaft by pulling until the clip snaps in place.

- 12. Install the left-hand watershield or cowl screen, as applicable.
- 13. Connect the positive, then the negative battery cables, then check the wiper operation through all of the modes.
- 14. Install the left-hand windshield wiper blade.

Rear Window Wiper Motor

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the rear wiper pivot arm and blade.
- 3. Remove the rear wiper pivot arm retaining nut and spacers.
- 4. By pulling on the connector only, not the wires, disengage the wiper motor electrical connector.
- Remove the nut retaining the rear wiper motor to the handle, then remove the motor.



Click to enlarge

To install:

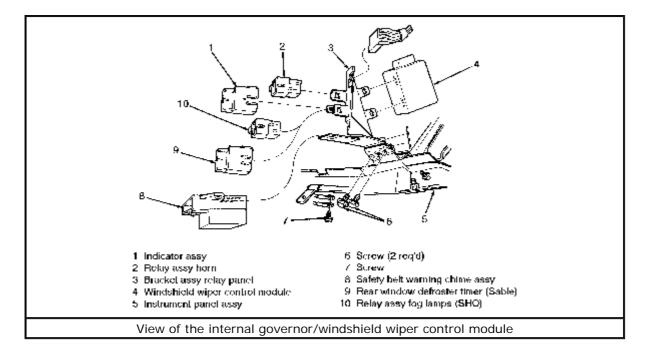
- 6. Install the motor to the handle, then secure using the retaining nut.
- 7. Engage the wiper motor electrical connector.
- 8. Install the rear wiper pivot arm retaining nut and spacers.
- 9. Install the rear wiper arm and blade.
- 10. Connect the negative battery cable.

Internal Governor/Windshield Wiper Control Module

REMOVAL & INSTALLATION

The internal governor is mounted on a bracket near the steering column support bracket.

- 1. Disconnect the negative battery cable.
- 2. Disengage the electrical connector.
- 3. Remove the two retaining screws, then remove the component from the vehicle.



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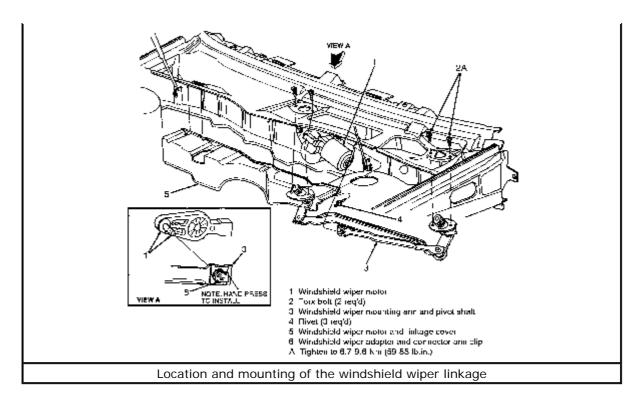
To install:

- 4. Install the component in the vehicle, then secure using the retaining screws.
- 5. Engage the electrical connector.
- 6. Connect the negative battery cable, then check the wiper system for proper operation.

Wiper Linkage

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the wiper pivot arm and blade assembly from the wiper mounting arm and pivot shafts.
- 3. Remove both the right and left cowl vent screens.
- 4. Disconnect the linkage drive arm/windshield wiper mounting arm and pivot shaft from the motor crank pin after removing the clip.
- 5. Remove the screws/bolts retaining the windshield wiper mounting arm and pivot shafts to the cowl. Remove the linkage/wiper mounting arm and pivot shafts from the cowl chamber.



To install:

- 6. Install the linkage/wiper mounting arm and pivot shafts in the cowl chamber, then secure using the retaining screws/bolts.
- 7. Connect the linkage drive arm/wiper mounting arm and pivot shaft to the motor crank pin, then install the clip.
- 8. Install the left and right side cowl vent screens.
- 9. Install the wiper pivot arm and blade assembly to the wiper arm mounting arm and pivot shafts.
- 10. Connect the negative battery cable.

Windshield Washer Fluid Reservoir

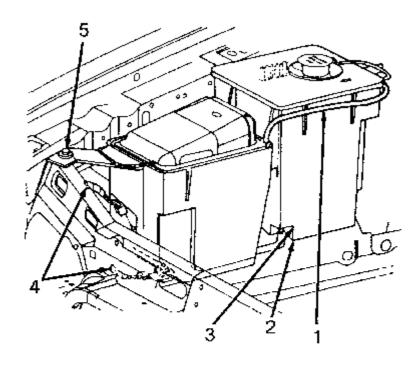
REMOVAL & INSTALLATION

Except Taurus SHO

- 1. Disconnect the negative battery cable.
- 2. Remove the assembly retaining screw.
- 3. Disengage the electrical connectors.

The reservoir will drain with the washer hose(s) disconnected.

4. Disconnect the windshield washer hose(s), then remove the assembly from the vehicle.



- Windshield washer hose
- 2 Windshield washer reservoir
- 3 Windshield washer pump
- 4 Headlamp dash panel junction wire
- 5 Screw

Windshield washer fluid reservoir location and mounting-except SHO vehicles

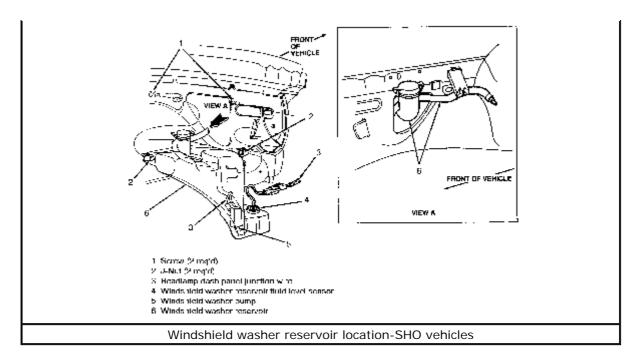
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To install:

- 5. Install the reservoir assembly into the vehicle, then connect the windshield washer hose(s).
- 6. Engage the electrical connectors.
- 7. Install the reservoir assembly retaining screw.
- 8. Connect the negative battery cable, then fill the windshield washer reservoir with fluid.

Taurus SHO

- 1. Disconnect the negative battery cable.
- 2. Remove the two assembly retaining screws.
- 3. Remove the right side inner splash shield.
- 4. Disengage the electrical connectors.
- 5. Disconnect the hoses, then remove the windshield washer reservoir assembly from the vehicle.



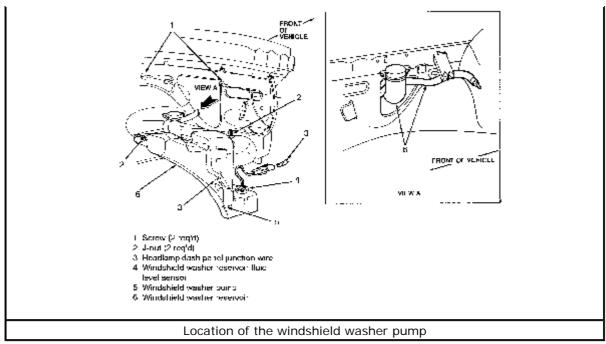
To install:

- 6. Install the reservoir assembly in the vehicle, then connect the hoses.
- 7. Engage the electrical connectors.
- 8. Install the right side inner splash shield.
- 9. Install the two windshield washer reservoir retaining screws.
- 10. Connect the negative battery cable, then fill the reservoir with fluid.

Windshield Washer Pump

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the reservoir from the vehicle, then disengage the electrical connector and hoses.
- 3. Using a small suitable prytool, pry out the windshield washer pump, being careful not to damage the plastic housing.
- 4. Remove the one piece seal and filter, then inspect for damage and replace if necessary. Flush out the reservoir and clean any foreign material from the wiper motor cavity or washer reservoir.



To install:

5. Insert the seal. Lubricate the inside of the seal with soapy solution, then insert the pump into the reservoir cavity until it is firmly seated in the seal.

Click to enlarge

6. Engage the electrical connector, connect the hose, then install the reservoir in the vehicle.

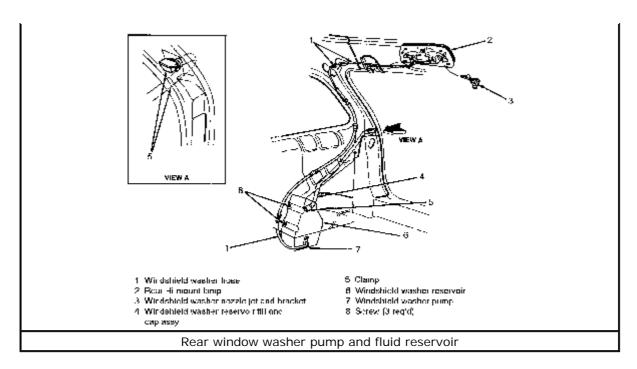
Do not operate the pump until fluid has been added to the reservoir.

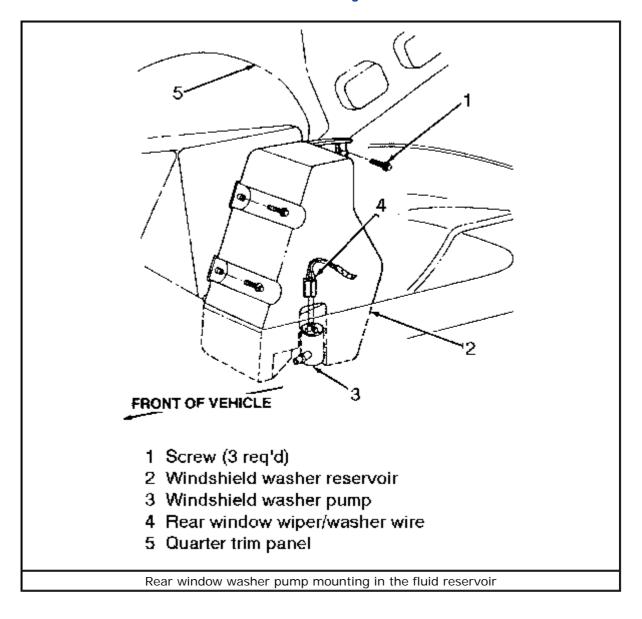
7. Connect the negative battery cable, then add fluid to the windshield washer

Rear Window Washer Pump and Fluid Reservoir

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Remove the right-hand quarter trim panel.
- 3. Disengage the reservoir electrical connector, supply window washer hose, and the windshield washer nozzle jet and bracket.
- 4. Remove the reservoir retaining screws, then remove the reservoir assembly from the vehicle.
- 5. Using a small suitable prytool, pry out the windshield washer pump, being careful not to damage the plastic housing.
- 6. Remove the one piece seal and filter, then inspect for damage and replace if necessary. Flush out the reservoir and clean any foreign material from the wiper motor cavity or washer reservoir.





To install:

- 7. Insert the seal. Lubricate the inside of the seal with soapy solution, then insert the pump into the reservoir cavity until it is firmly seated in the seal.
- 8. Engage the electrical connector, connect the supply window washer hose, then install the reservoir in the vehicle and secure using the retaining screws.

Do not operate the pump until fluid has been added to the reservoir.

- 9. Connect the negative battery cable, then add fluid to the windshield washer reservoir.
- 10. Install the quarter trim panel.

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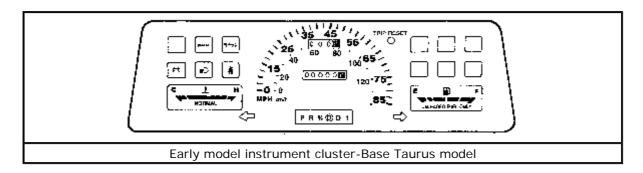
INSTRUMENTS AND SWITCHES

Instrument Cluster

REMOVAL & INSTALLATION

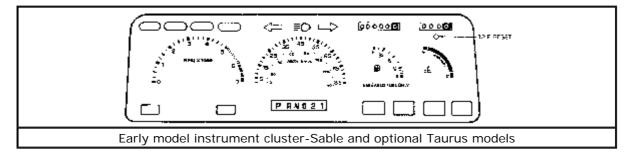
Except Electronic Cluster

- 1. Disconnect the negative battery cable.
- Remove the ignition lock cylinder to allow removal of the steering column shrouds.

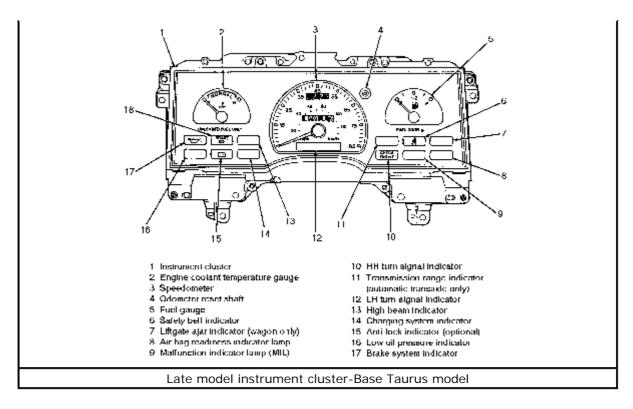


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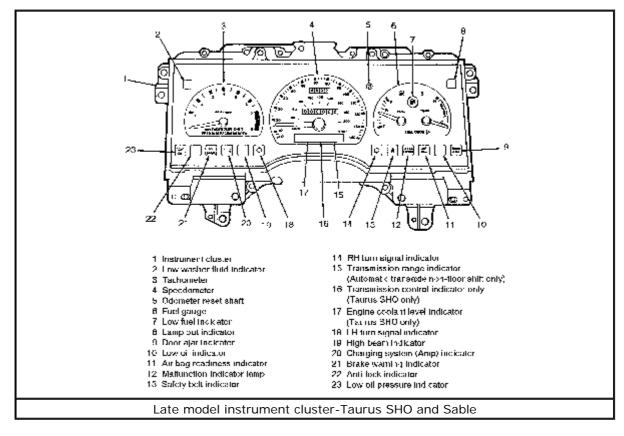
- 3. Remove the steering column trim shrouds.
- 4. Remove the screws retaining the lower left-hand side instrument panel finish panels and radio finish panels, then remove the panels by snapping them out.



- 5. On the Taurus only, remove the clock assembly (or clock cover) to gain access to the finish panel screw behind the clock.
- Remove the seven cluster opening finish panel retaining screws, and the jam nut behind the headlight switch. Remove the finish panel by rocking the upper edge toward the driver.



- 7. On column shift vehicles, disconnect the transaxle selector indicator from the column by removing the retaining screw and cable loop.
- 8. Disconnect the upper speedometer cable from the lower speedometer cable in the engine compartment.

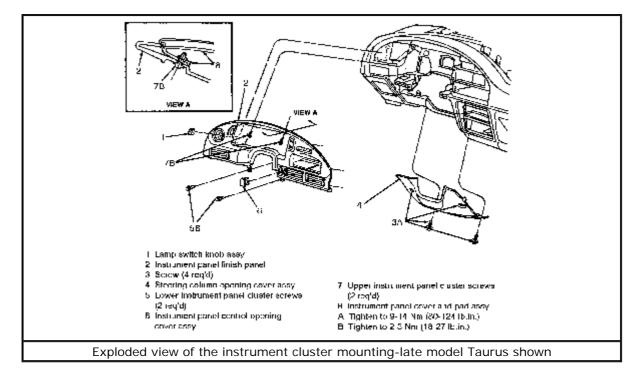


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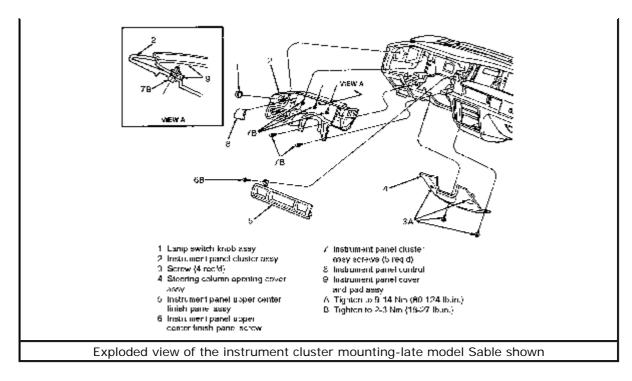
- 9. Remove the four cluster-to-instrument panel retaining screws, then pull the cluster assembly forward.
- 10. Disengage the cluster electrical connector and the speedometer cable. Press the cable latch to disengage the cable from the speedometer head while pulling the cable away from the cluster. Remove the instrument cluster.

To install:

11. Position the cluster in front of the cluster opening.



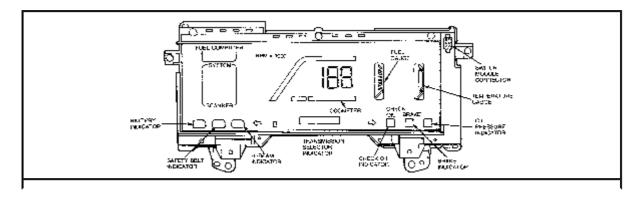
- 12. Connect the speedometer cable, then engage the electrical connectors.
- Install the cluster, then secure using the four cluster-to-instrument panel retaining screws.
- 14. Connect the upper speedometer cable to the lower speedometer cable in the engine compartment.
- 15. On column shift vehicles, connect the transaxle selector indicator.



- 16. Install the cluster opening finish panel.
- 17. On Taurus vehicles, install the clock assembly or clock cover.
- 18. Install the lower left and radio finish panels.
- 19. Install the steering column trim shrouds.
- 20. Install the ignition lock cylinder, then connect the negative battery cable.

Electronic Cluster

- 1. Disconnect the negative battery cable.
- 2. Remove the upper and lower steering column shrouds.
- 3. Remove the steering column cover, then disconnect the shift indicator cable from the cluster by removing the two retaining screws.
- Disconnect the cluster message center switch module, then remove the cluster trim/finish panel.
- 5. Remove the cluster mounting screws, then pull the bottom of the instrument cluster toward the steering wheel.
- 6. Reaching behind and underneath the instrument cluster, disengage the three electrical connectors.



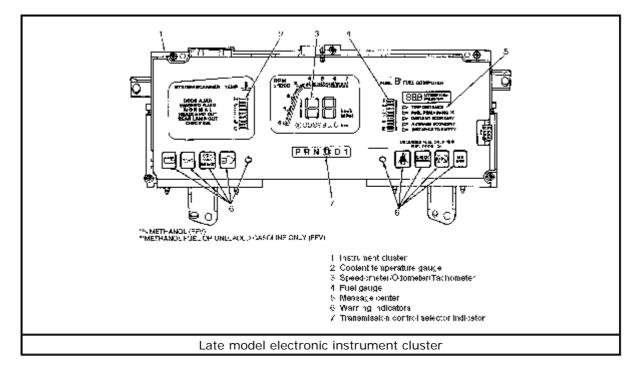
Early model electronic instrument cluster

Click to enlarge

7. Swing the bottom of the cluster out to clear the top of the cluster from the crash pad, then remove the instrument cluster.

To install:

- 8. Insert the top of the cluster under the crash pad, leaving the bottom out.
- 9. Engage the three electrical connectors.



Click to enlarge

- 10. Properly seat the cluster, then install the retaining screws. Tighten the screws to 7-12 inch lbs. (0.8-1.4 Nm).
- 11. Connect the battery negative battery cable, then check the instrument cluster for proper operation.
- 12. Connect the shift indicator assembly to the cluster and secure with the retaining screw. Install the steering column cover.
- 13. Connect the cluster message center switch module to the cluster, then install the cluster trim/finish panel.
- 14. Install the lower and upper steering column shrouds.

Speedometer

REMOVAL & INSTALLATION

Except Electronic Cluster

1986-89 VEHICLES

1. Disconnect the negative battery cable.

- Remove the instrument cluster finish panel retaining screws, then remove the finish panel. On Sable, remove the lower trim panel attaching screws, then remove the trim panel.
- 3. Remove the mask-and-lens mounting screws, then remove the mask and lens. If equipped, remove the lower floodlight bulb and socket assemblies.
- 4. Remove the entire dial assembly from the instrument cluster by carefully pulling it away from the cluster back plate.

The speedometer, tachometer and gauges are mounted to the main dial and some effort may be required to pull the quick-connect electrical terminals from the clips.

- 5. On column shift vehicles, remove the screws attaching the transaxle selector indicator to the main dial. Remove the transaxle selector indicator from the main dial/instrument cluster. On Sable and optional Taurus, remove the odometer drive jack shaft and remove the attachment clip at the odometer, slip the jack shaft out of the odometer bracket and speedometer bridge.
- 6. Pull the reset knob from the trip odometer, if equipped. To remove the speedometer from the main dial, manually rotate the speedometer pointer to align it with the slot in the dial. Remove the mounting screws and carefully pull the speedometer away from the dial, making sure to guide the pointer through the slot.
- If necessary, remove the odometer assembly by pulling the reset knob from the lever.

To install:

- 8. Position the odometer on the mounting bosses, then install the retaining screws. Tighten the screws to 7-12 inch lbs. (0.8-1.4 Nm).
- 9. If removed, install the trip odometer reset knob.
- Carefully position the speedometer pointer parallel to the rectangular raised portion of the speedometer dial.

WARNING

The speedometer is calibrated at the factory. Overly rough handling could disturb the calibration.

- 11. Carefully guide the pointer through the slot in the main dial. Position the speedometer on the mounting bosses, then install the retaining screws. Tighten the screws to 7-12 inch lbs. (0.8-1.4 Nm).
- 12. On column shift vehicles, install the transaxle selector indicator.
- Install the main dial assembly to the cluster back plate by aligning it on the guides then pressing it carefully and firmly to seat all electrical terminals.
- 14. Position the mask and lens assembly, then secure using the retaining screws.
- 15. Install the instrument cluster finish panel.
- 16. Connect the negative battery cable.

1990-95 VEHICLES

1. Disconnect the negative battery cable.

- 2. Remove the instrument cluster. For details, please refer to the procedure located earlier in this section.
- 3. Remove the screws retaining the mask and warning lamp, then remove the mask and lens
- For vehicles through 1992, remove the two screws attaching the transaxle selector indicator or the filler bezel to the speedometer and remove the indicator or filler bezel from the cluster.
- 5. For 1993-95 vehicles, detach the speed control speedometer cable.
- 6. Lift the speedometer from the instrument cluster.

To install:

- 7. For 1993-95 vehicles, position the speedometer assembly to the back plate, then attach the speed control speedometer cable, if removed, then install.
- 8. For 1990-92 vehicles, align the speedometer with the pins, then press carefully and firmly to seat the speedometer dial on the locators. Install the transmission selector indicator or filler bezel, and secure using the retaining screws.
- 9. Position the instrument cluster mask and instrument cluster warning lamp lens assembly to the back plate, then secure it using the retaining screws.
- Install the instrument cluster. For details, please refer to the procedure located earlier in this section.
- Connect the negative battery cable, then check for proper operation of the speedometer.

Electronic Cluster

1988-89 VEHICLES

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument cluster assembly. For details, please refer to the procedure located earlier in this section.
- 3. Using a clean cloth to protect the lens, place the cluster face down on a bench.
- Remove the five black hex head screws attaching the back plate to the mask assembly.
- Carefully remove the speedometer and fuel computer flex circuit from their respective locating pins.
- 6. With even pressure on both sides of the back plate, lift up on the back plate to separate it from the mask assembly.

The area near the gauge clips will cause the most resistance.

- Turn the cluster assembly over and disconnect the switch connector from the mask assembly by squeezing in on the retaining clips and pushing the connector through the hole in the mask.
- 8. Remove the four screws attaching the speedometer to the mask assembly, then remove the speedometer assembly.

To install:

9. Install the speedometer module with the flex circuit and switch connector toward

the gauge side of the cluster.

- 10. Install the four speedometer retaining screws.
- 11. Push the switch connector through the hole in the mask.

Make sure that the wires are routed to the top of the mask, out of the way of the gauges.

- 12. Position the back plate onto the mask assembly making sure that the speedometer and fuel computer flex circuits are fed through their respective holes.
- 13. With the back plate properly aligned to the mask assembly, push down firmly on the gauge clips to seat the gauges properly into the clips.
- 14. Carefully position the speedometer and fuel computing flex circuits over their respective locating pins.
- 15. Install the five back plate-to-mask assembly screws.
- Install the instrument cluster. For details regarding, please refer to the procedure located earlier in this section.
- 17. Connect the negative battery cable.

1990-95 VEHICLES

The speedometer is part of a single electronic instrument cluster module and cannot be removed separately.

Tachometer

REMOVAL & INSTALLATION

Except Electronic Cluster

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument cluster.
- Remove the cluster main lens and mask retaining screws, then remove the mask and lens.
- 4. Remove the tachometer from the gauge clips by pulling the tachometer from the instrument cluster back plate.

To install:

The tachometer is calibrated at the factory. Excessive rough handling could disturb the calibration.

- 5. Carefully position the tachometer over the gauge clips.
- 6. Being careful not the get fingerprints on the applique, press the tachometer into the gauge clips in the cluster back plate.
- Install the cluster mask and lens using the retaining screws, then install the instrument cluster.
- 8. Connect the negative battery cable.

Electronic Cluster

The tachometer is part of a single electronic instrument cluster module and cannot be removed separately.

Speedometer Core

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Disconnect the speedometer cable from the speedometer head. Pull the speedometer core out of the upper end of the casing.
- 3. Install a new core in the casing.

Fuel Gauge

REMOVAL & INSTALLATION

- 1. Disconnect the negative battery cable.
- Remove the instrument cluster finish panel retaining screws, then remove the finish panel.
- 3. On vehicles equipped with a tachometer, remove the lower trim panel retaining screws, then remove the lower trim panel.
- 4. Remove the mask and lens mounting screws, then remove the cluster mask and warning lamp lens.

The lower flood lamp bulb filters are not secured and may fall out.

5. On vehicles equipped with a tachometer, remove the two lower flood lamp bulb and socket assemblies.

The gauges are mounted to the main dial, and some effort may be required to pull the quick connect electrical terminals from the clips.

- 6. Lift the main dial assembly from the instrument cluster assembly back plate.
- On column shift vehicles only, remove the two screws retaining the transmission range indicator to the main dial, them remove the transmission range indicator from the cluster.
- 8. Manually rotate the fuel gauge pointer to align it with the slot in the dial. Remove the mounting screws and carefully pull the fuel gauge away from the dial, guiding the pointer through the slot.

To install:

- 9. Carefully position the pointer parallel to the rectangular raised portion of the dial.
- Guide the pointer carefully through the slot in the main dial. Then position the fuel gauge on mounting bosses, then install the mounting screws. Tighten the screw to 8-12 inch lbs. (0.8-1.4 Nm).
- 11. On column shift vehicles, install the transmission control selector indicator.
- 12. Install the main dial assembly to instrument cluster back plate by aligning it on the guides. Press carefully and firmly to seat all electrical terminals.
- 13. On vehicles equipped with a tachometer, install the two lower flood lamp bulb and

socket assemblies.

- 14. Position the mask and lens assembly, then install the cluster mask and warning lamp lenses retaining screws.
- 15. Install the instrument finish panel.
- 16. Connect the negative battery cable.

Engine Coolant Temperature Gauge

REMOVAL & INSTALLATION

The engine coolant temperature gauge is integral to the fuel gauge. Refer to *Fuel Gauge*, *Removal & Installation* for more information.

Printed Circuit Board

REMOVAL & INSTALLATION

- Disconnect the negative battery cable. Remove the instrument cluster from the vehicle.
- 2. If equipped, remove the low fuel warning switch assembly by depressing the clip retaining assembly to the lower left of the (rear view) instrument cluster back plate, then remove the low fuel level warning switch.
- 3. Remove all miniature bulb and instrument lamp panel socket assemblies by twisting counterclockwise.
- 4. Remove the speedometer and gauges.

Do not overbend the retaining clips as they may break.

- Remove the retaining clips using long-nose pliers. Squeeze both ends of the clip equally so that the locking ears will slide through the clip opening in the instrument cluster back plate, then push the clips through the opening.
- 6. After the clips are removed remove the printer circuit from its mounting.

To install:

7. Position the instrument cluster printed circuit on the back plate and install the clips by bending the taps on the clips with fingers. Push the clips into the clip opening until the locking ears are locked into the back plate.

An audible "click" will be heard when the clips are locked into position.

- 8. Install the speedometer and gauges.
- 9. Install all miniature bulb and instrument panel lamp socket assemblies into the instrument cluster back plate by twisting clockwise.
- If removed, position the low fuel level warning switch in the pocket slides, then
 push inward to fully snap the low fuel level warning switch in the instrument
 cluster.
- 11. Install the instrument cluster. For details, please refer to the procedure located earlier in this section. heard.
- 12. Connect the negative battery cable.

Windshield Wiper Switch

REMOVAL & INSTALLATION

The front windshield wiper switch is located deep inside the steering column assembly and is actuated by the multi-function lever on the left of the steering column. For details concerning removal and installation, please refer to the steering column procedures located in **Section 8** of this manual.

Rear Window Wiper Switch

REMOVAL & INSTALLATION

1986-89 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Remove the four cluster opening finish panel retaining screws, then remove the finish panel by rocking the upper edge toward the driver.
- 3. Disengage the electrical wiring connector from the rear wiper switch.
- 4. Remove the wiper switch from the instrument panel. On Sable, the switch is retained with two screws.

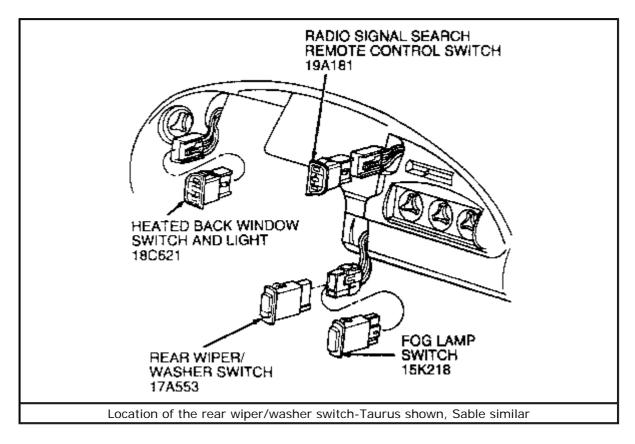
To install:

- 5. Push the rear washer switch into the cluster finish panel until it snaps into place. On Sable, install the two retaining screws.
- 6. Engage the electrical wiring connector.
- Install the cluster opening finish panel, then secure using the four retaining screws.
- 8. Connect the negative battery cable.

1990-95 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Remove the cluster opening finish panel as follows:
 - 1. Disconnect the positive battery cable.
 - 2. Engage the parking brake.
 - 3. Remove the ignition lock cylinder.
 - 4. If equipped with a tilt column, tilt the column to the full down position and remove the tilt lever.
 - 5. Remove the four bolts and the opening cover from under the steering column.
 - Remove the steering column trim shrouds.
 Disconnect all electrical connections from the multifunction switch.
 - 7. Remove the two screws retaining the multi-function switch, then remove the switch.
 - 8. Pull the gear shift lever to the full down position.

- Remove the cluster opening finish panel retaining screws. There are four retaining screws on the Taurus and five on the Sable.
- Remove the finish panel by pulling it toward the driver to unsnap the snap-in retainers and disconnect the wiring from the switches, clock and warning lights.
- 3. Disengage the electrical wiring connector from the rear wiper/washer switch.
- 4. Remove the washer switch from the cluster finish panel.



To install:

- 5. Push the rear washer switch into the cluster finish panel until it snaps into place.
- 6. Engage the wiring connector to the rear wiper/washer switch.
- 7. Install the cluster finish panel as follows:
 - 1. Engage the electrical wiring to the switches, clock and warning lights, then install the finish panel by snapping it into place.
 - Install the cluster opening finish panel retaining screws.
 - 3. Place the gear shift lever to its original position.
 - Install the multi-function switch by engaging the electrical connectors, then secure using the retaining screws.
 - 5. Install the steering column shrouds.
 - Install the opening cover from under the steering column and secure using the retaining bolts.

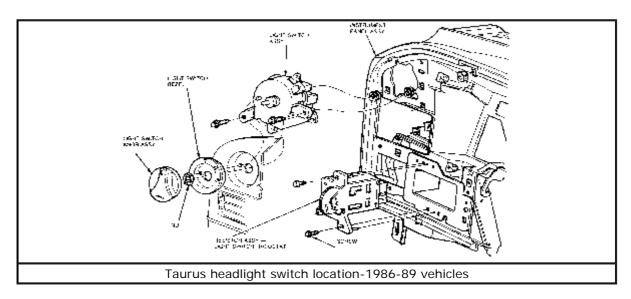
- 7. If removed, install the tilt lever, then return the column to its original position.
- 8. Install the ignition lock cylinder.
- Disengage the parking brake, then connect the positive battery cable.
- 8. Connect the negative battery cable.

Headlight Switch

REMOVAL & INSTALLATION

1986-89 Taurus

- 1. Disconnect the negative battery cable.
- 2. Pull off the headlight switch knob.
- 3. Remove the bezel retaining nut, then remove the bezel.
- 4. Remove the instrument cluster finish panel.
- 5. Remove the two screws retaining the headlight switch, then pull the switch out of the instrument panel, disengage the electrical connector, then remove the switch.



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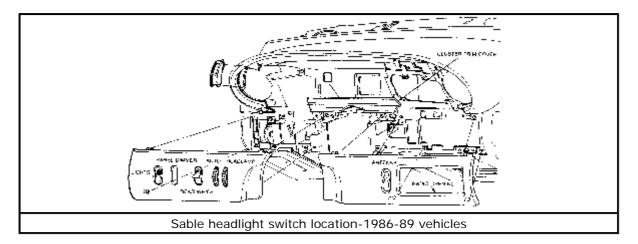
To install:

- 6. Position the switch, engage the electrical connector, then install the switch securing with the two retaining screws.
- 7. Install the instrument cluster finish panel.
- 8. Install the bezel, then secure using the retaining nut.
- 9. Fasten the headlight switch knob.
- 10. Connect the negative battery cable.

1986-89 Sable

1. Disconnect the negative battery cable.

- 2. Remove the lower left-hand finish panel.
- 3. Remove the two screws retaining the headlight switch to the finish panel, then disengage the electrical connector and remove the switch.



Click to enlarge

To install:

- 4. Position the switch, engage the electrical connector, then install the switch using the two retaining screws.
- 5. Install the lower left-hand finish panel.
- 6. Connect the negative battery cable.

1990-95 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Pull off the headlight switch knob, then remove the retaining nut.
- 3. Remove the instrument cluster finish panel as follows:
 - 1. Disconnect the negative battery cable.
 - 2. Apply the parking brake.
 - 3. Remove the ignition lock cylinder.
 - 4. If equipped with a tilt column, tilt the column to the most downward position, then remove the tilt lever.
 - Remove the four bolts and opening cover from under the steering column.
 - Remove the steering column trim shrouds.
 Disengage all electrical connections from the steering column multi-function switch.
 - 7. Remove the two screws retaining the multi-function switch, then remove the switch.
 - 8. Pull the gear shift lever to the full down position.
 - Remove the four cluster opening finish panel retaining screws. Remove the finish panel by pulling it toward the driver to unsnap the snap-in retainers and disconnect the wiring from the switches, clock and warning lights.

4. Remove the two screws retaining the headlight switch to the instrument panel, pull the switch out of the instrument panel, disengage the electrical connector, then remove the switch.

To install:

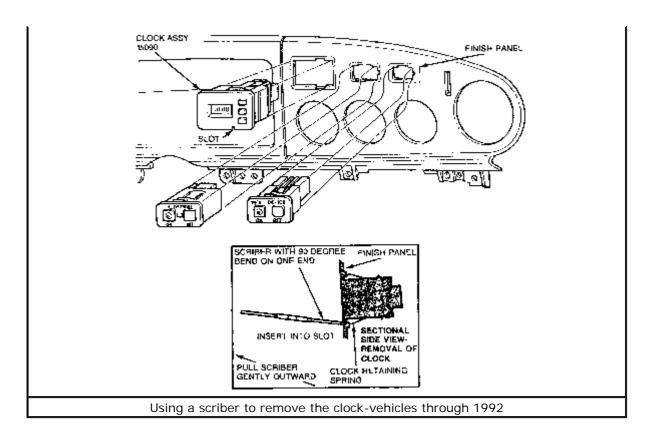
- 5. Position the headlight switch, then engage the electrical connector. Install the switch in the instrument panel, then secure using the two retaining screws.
- 6. Install the cluster finish panel as follows:
 - Engage the electrical wiring to the switches, clock and warning lights, then install the finish panel by snapping it into place.
 - Install the cluster opening finish panel retaining screws.
 - 3. Place the gear shift lever to its original position.
 - Install the multi-function switch by engaging the electrical connectors, then secure using the retaining screws.
 - 5. Install the steering column shrouds.
 - Install the opening cover from under the steering column and secure using the retaining bolts.
 - If removed, install the tilt lever, then return the column to its original position.
 - 8. Install the ignition lock cylinder.
 - Disengage the parking brake, then connect the positive battery cable.
- 7. Install the retaining nut, then connect the headlight switch knob.
- 8. Connect the negative battery cable.

Clock

REMOVAL & INSTALLATION

1986-92 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Using a 90° bent scriber, dental pick or similar hardened tool, insert the bent end of the tool into the slot at the bottom center of the clock.



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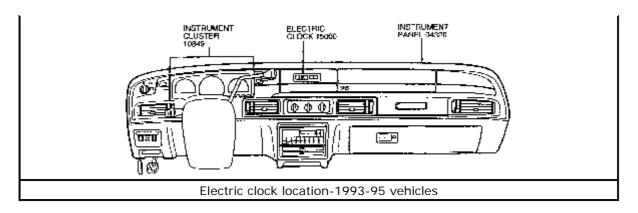
- Gently pull the scriber tool outward until the bottom clock retaining spring releases.
- 4. Grasp the clock and pull it outward to remove.
- 5. Disengage the clock electrical connector.

To install:

- 6. Engage the clock electrical connector, then snap the clock back into position.
- 7. Connect the negative battery cable.

1993-95 Vehicles

- 1. Disconnect the negative battery cable.
- 2. Remove the instrument panel upper finish panel.
- 3. Disengage the clock electrical connector.
- 4. Remove the two retaining screws holding the clock in the instrument panel upper finish panel. There is one screw on each clock mounting tab.
- 5. Remove the clock from the instrument panel upper finish panel.



Click to enlarge

To install:

- 6. Install the clock to the instrument panel upper finish panel and secure using the two retaining screws (one on each side).
- 7. Engage the clock electrical connector.
- 8. Install the instrument panel upper finish panel.
- 9. Connect the negative battery cable.

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LIGHTING

Headlights

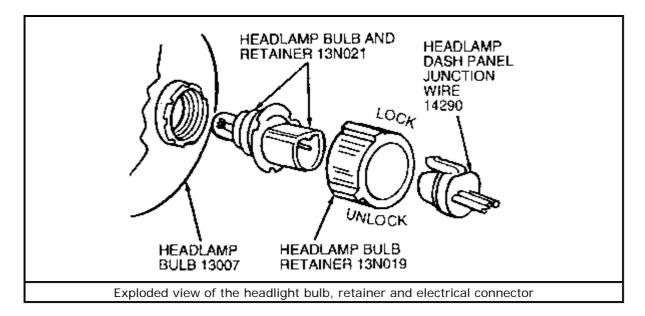
REMOVAL & INSTALLATION

Bulb Replacement

CAUTION

The replaceable Halogen headlamp bulb contains gas under pressure. The bulb may shatter if the glass envelope is scratched or the bulb is dropped. Handle the bulb carefully. Grasp the bulb ONLY by its plastic base. Avoid touching the glass envelope because the oils in your hand may cause the bulb to burst when turned on. Keep the bulb out of the reach of children.

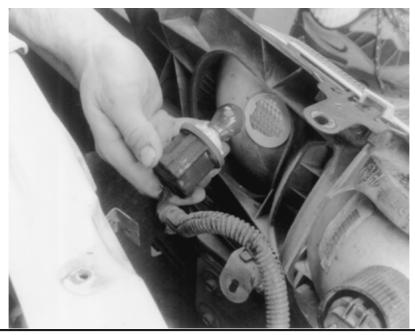
- 1. Disconnect the negative battery cable.
- 2. Check to see that the headlight switch is in the OFF position.



Click to enlarge

- 3. Raise the hood and locate the bulb and retainer installed in the rear of the headlight body.
- 4. Remove the electrical connector from the bulb by grasping the wires firmly and snapping the connector rearward.

LIGHTING Стр. 2 из 29



On some vehicles, such as this early model Taurus, it it possible to remove the headlight bulb and electrical connector as an assembly



After removing the bulb/connector assembly, gently pull the light bulb from the socket for replacement

5. Remove the bulb retaining ring by rotating it counterclockwise (when viewed from the rear) about $^{1}/_{8}$ of a turn, then slide the ring off the plastic base.

Keep the bulb retaining ring, since it will be reused with the new bulb.

Carefully remove the headlight bulb from its socket in the reflector by gently pulling it straight backward out of the socket. DO NOT rotate the bulb during removal.

To install:

7. With the flat side of the plastic base of the bulb facing upward, insert the glass envelope of the bulb into the socket. Turn the base slightly to the left or right, if

LIGHTING Cтр. 3 из 29

necessary to align the grooves in the forward part of the plastic base with the corresponding locating tabs inside the socket. When the grooves are aligned, push the bulb firmly into the socket until the mounting flange on the base contacts the rear face of the socket.

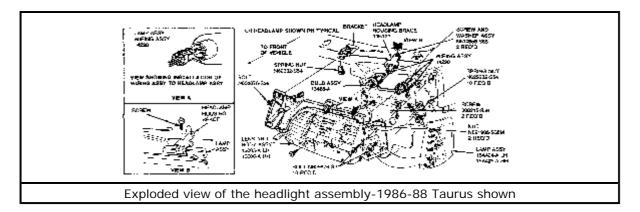
- 8. Slip the bulb retaining ring over the rear of the plastic base against the mounting flange. Lock the ring into the socket by rotating the ring counterclockwise. A stop will be felt when the retaining ring is fully engaged.
- Push the electrical connector into the rear of the plastic until it snaps and locks into position.
- 10. Turn the headlights on and check for proper operation.
- 11. Connect the negative battery cable.

Headlight Assembly

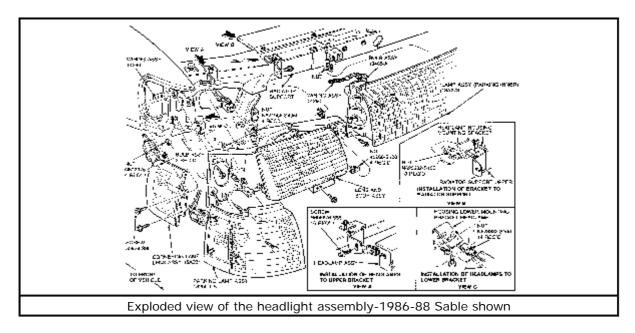
1986-88 VEHICLES

The headlamps on these vehicles do not need replacement when the bulb burns out. Refer to bulb replacement for removal and installation procedures for when the bulb burns out.

- 1. Disconnect the negative battery cable.
- 2. Make sure the headlight switch is in the OFF position.



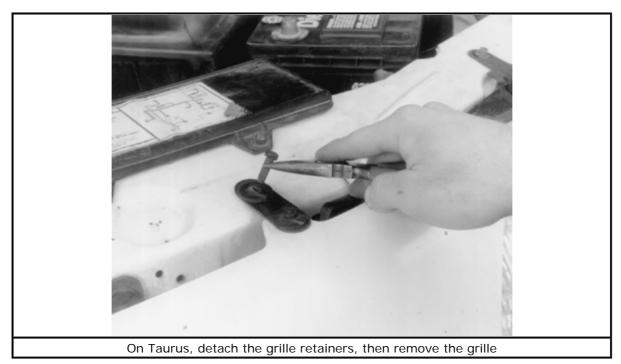
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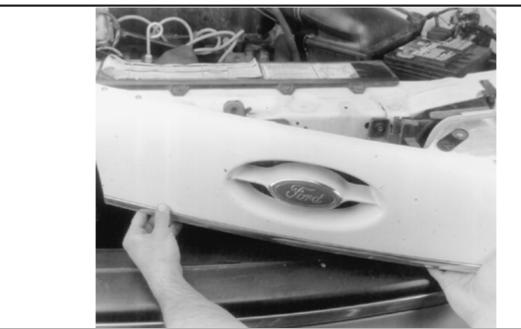


LIGHTING Стр. 4 из 29

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- 3. Remove the electrical connector from the headlight bulb by grasping the wires firmly, then snapping the connector rearward.
- 4. On Taurus, remove the grille. On Sable, remove the lighted grille.

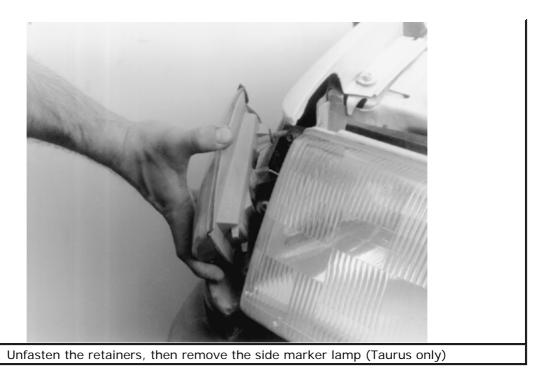




Once the grille is removed, you can access the headlight assembly retaining bolts and screws

5. Remove the lamp just outboard of the headlight; the side marker lamp on the Taurus, or the combination park/turn/side marker lamp on the Sable.

LIGHTING Стр. 5 из 29

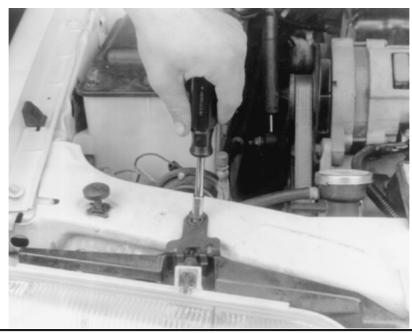


- 6. On the Taurus only, remove the park/turn lamp bulb and connector.
- 7. Remove the two bolts attaching the headlight housing to the fender.

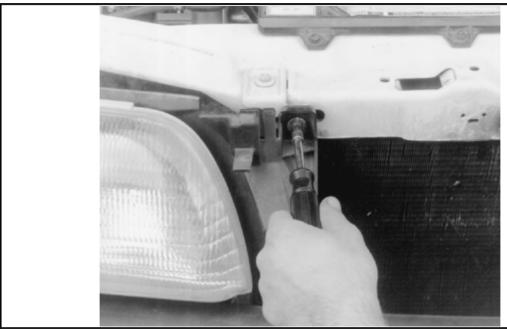


8. Remove the three bolts (Taurus) or four bolts (Sable) attaching the headlight housing to the brackets.

LIGHTING Стр. 6 из 29

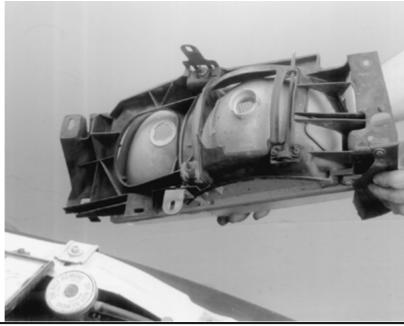


When removing the retaining bolts, be careful not to drop any into the engine compartment



Remove the headlight assembly retaining bolts, then ...

LIGHTING Cтр. 7 из 29



... remove the headlight housing from the vehicle

9. Remove the three screws attaching the lens and body assembly to the headlight housing, then remove the headlight housing.

To install:

- 10. Position the headlight housing, then install the three screws attaching lens and body assembly.
- 11. Depending upon vehicle application, install the three or four bolts attaching the headlight housing to the brackets.
- 12. Install the two bolts attaching the headlight housing to the fender.
- 13. On Taurus only, install the park/turn lamp bulb and connector.
- 14. Install the grille or lighted grille, as applicable.
- 15. Engage the headlight bulb electrical connector.
- 16. Connect the negative battery cable, then turn on the headlights to check for proper operation and aim if necessary.

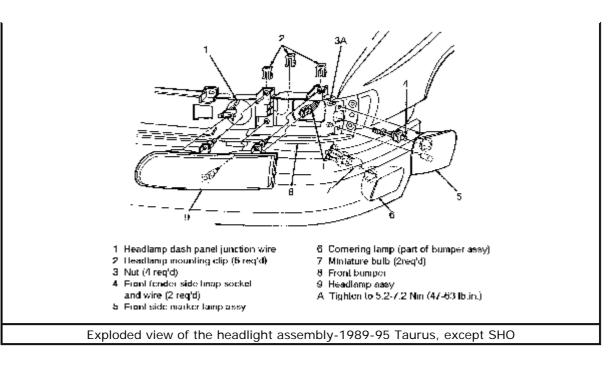
1989-95 VEHICLES

- 1. Disconnect the negative battery cable.
- 2. Make sure the headlight switch and the headlight time delay switch (if equipped) are in the OFF position.

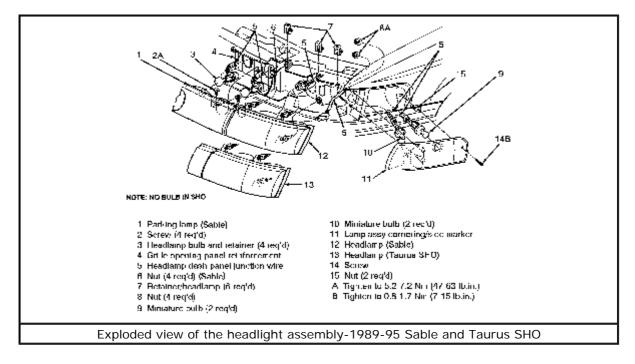
Use snapring pliers to spread the retainer.

- 3. Remove the headlight electrical connector from the headlight bulb and retainer by grasping the wires firmly, then snapping the connector rearward.
- 4. Remove the parking lamp miniature bulb and connector.
- 5. Remove the three retainers holding the headlight to the radiator grille opening panel reinforcement, then remove the headlight.

LIGHTING Стр. 8 из 29



Click to enlarge



Click to enlarge

To install:

- 6. Install the headlight and secure using the three retainers.
- 7. Install the parking lamp miniature bulb and connector.
- 8. Engage the headlight electrical connector by pushing the connector until it snaps into position.
- 9. Connect the negative battery cable, then turn on the headlights to check for proper operation and aim if necessary.

AIMING

LIGHTING Стр. 9 из 29

The headlights must be properly aimed to provide the best, safest road illumination. The lights should be checked for proper aim and adjusted as necessary. Certain state and local authorities have requirements for headlight aiming; these should be checked before adjustment is made.

Headlight adjustment may be temporarily made using a wall, or on the rear of another vehicle. When adjusted, the lights should not glare in oncoming car or truck windshields, nor should they illuminate the passenger compartment of vehicles driving in front of you.

To aim the headlights in these vehicles, you must use Rotunda Aiming Kit 107-00001 with Adapter Kit 107-00011, or equivalent. All adjustments should be made with at least a half tank of gas in the fuel tank, an empty trunk except for the spare tire and jack and the correct tire pressures. The equipment in the aiming kit can be calibrated to accommodate a slight floor slope, but the floor should be reasonably flat. Set up and use the equipment as described in the instructions included in the headlight aiming kit.

Signal and Marker Lights

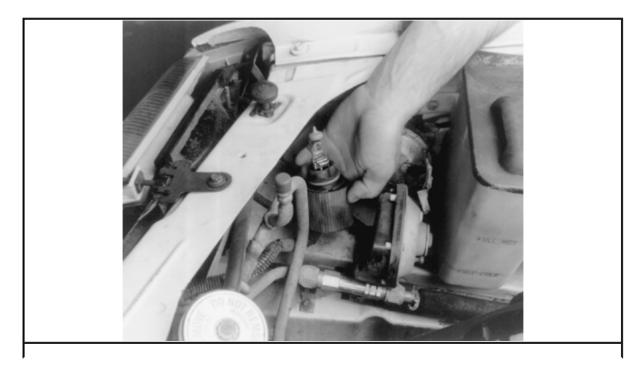
REMOVAL & INSTALLATION

Parking/Front Turn Signal Light Combination

The parking and turn signal lights share the same dual filament bulb. The parking/turn signal lamp assembly is part of the headlight assembly. To remove the parking/turn signal housing, please refer to the headlight assembly removal and installation procedure. The following procedures are for bulb replacement only.

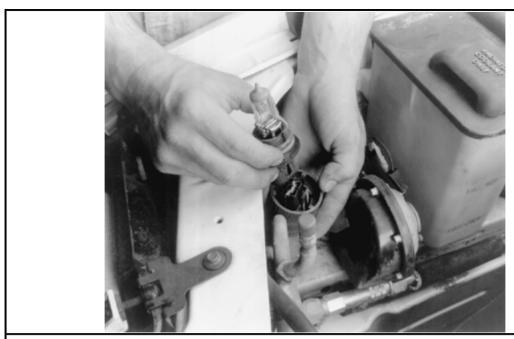
EXCEPT 1986-88 SABLE

- 1. Disconnect the negative battery cable.
- 2. Using the access hole in the radiator support, rotate the bulb socket counterclockwise to disengage it from the light housing, then remove the bulb.



LIGHTING Cтр. 10 из 29

Using the access hole in the radiator support, rotate the bulb socket counterclockwise to disengage it from the light housing then ...



... remove the bulb by pulling it straight out from the socket

To install:

- 3. Using the access hole in the radiator support, rotate the bulb socket clockwise to engage the socket into the housing.
- 4. Connect the negative battery cable.

1986-88 SABLE

- 1. Disconnect the negative battery cable.
- 2. Remove the two screws attaching the parking lamp assembly, then pull it forward.
- 3. Remove the bulb socket by twisting, then remove the bulb.

To install:

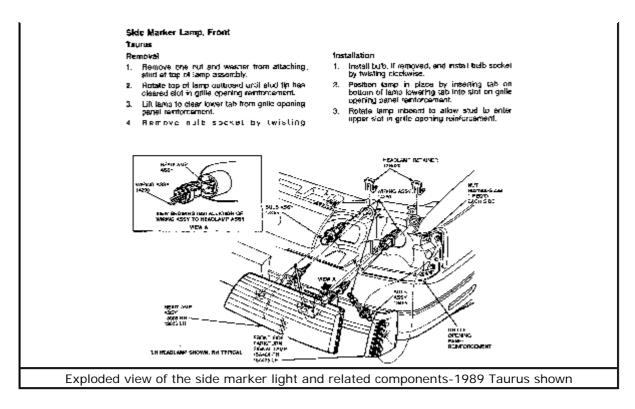
- 4. Install the bulb in the socket, then install the socket in the lamp assembly by twisting.
- 5. Position the parking lamp in place, then install the retaining screws.
- 6. Connect the negative battery cable.

Side Marker Lights

TAURUS

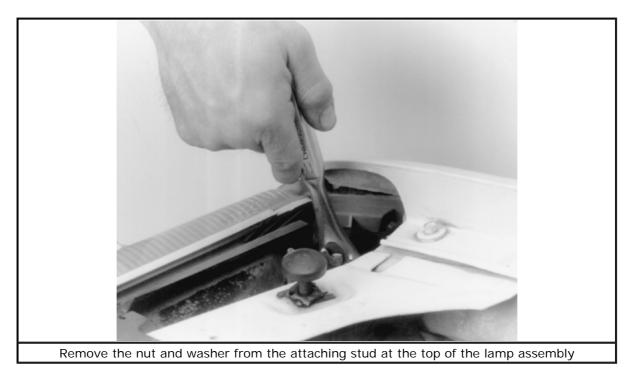
1. Disconnect the negative battery cable.

LIGHTING Стр. 11 из 29



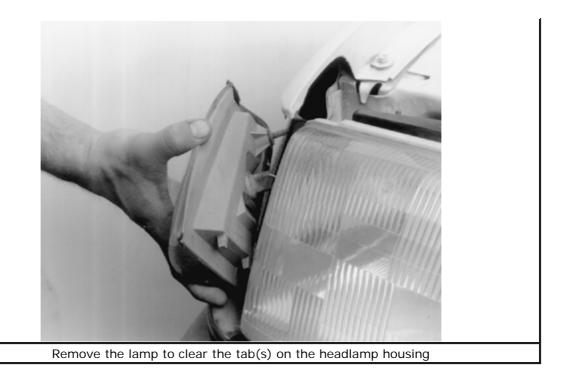
Click to enlarge

2. Remove the nut(s) and washer(s) from the attaching stud at the top of the lamp assembly.

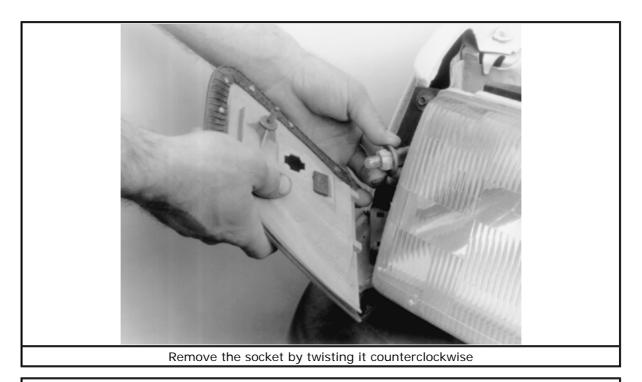


- 3. Rotate the top outboard until the stud tip has cleared the slot in the housing.
- 4. Lift the lamp to clear the two lower tabs (on the headlamp) from the headlamp housing.

LIGHTING Стр. 12 из 29



5. Remove the socket by twisting it counterclockwise, then pull the bulb from the socket.



LIGHTING Cтр. 13 из 29



If the bulb needs to be replaced, remove it by pulling it straight out from the socket

To install:

- 6. Install the bulb into the socket, and install the socket by twisting it clockwise.
- 7. Position the lamp in place by lowering the two tabs on the lamp into the two slots on the headlamp housing.
- 8. Rotate the lamp inboard to allow the stud to enter the upper slot in the housing.
- 9. Install the nut and washer to the attaching stud, and secure them.
- 10. Connect the negative battery cable.

Cornering Lights

1990-95 TAURUS-EXCEPT SHO

- 1. Disconnect the negative battery cable.
- 2. Remove the cornering lamp retaining nuts/screws, then lift the cornering lamp from its mounting.
- 3. Remove the bulb and socket assembly by twisting counterclockwise, then remove the cornering lamp from the vehicle.
- 4. If necessary, remove the miniature bulb from the socket by pulling it out.

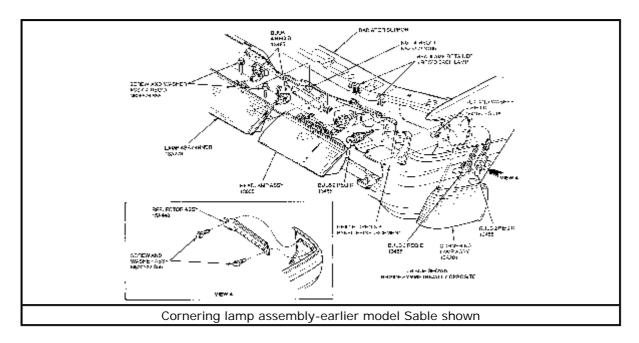
To install:

- 5. If necessary, install a new bulb in the socket.
- 6. Install the bulb and socket assembly into the cornering lamp by twisting clockwise.
- 7. Position the cornering lamp, then secure by installing the retaining screws/nuts.
- 8. Connect the negative battery cable.

SABLE AND TAURUS SHO

LIGHTING Стр. 14 из 29

- 1. Disconnect the negative battery cable.
- 2. Remove the two screws attaching the cornering lamp assembly and lift it out.
- 3. Remove the bulb by twisting it counterclockwise.



Click to enlarge

To install:

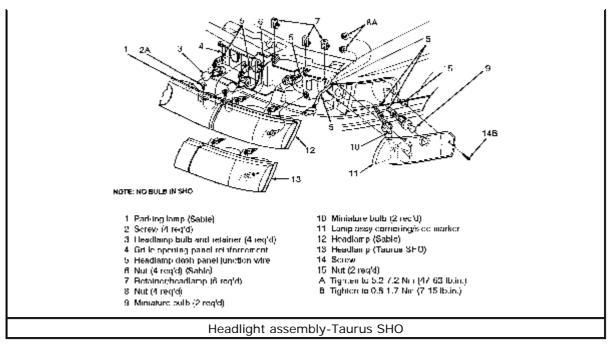
- 4. Install the bulb, if removed, then install the socket by turning it clockwise.
- 5. Position the cornering light back in place, and install the two screws.
- 6. Connect the negative battery cable.

Auxiliary Headlight Assembly

TAURUS SHO

- 1. Disconnect the negative battery cable.
- 2. Remove the headlight assembly.
- 3. Remove the two screws attaching the auxiliary headlight to the headlight assembly.

LIGHTING Cтр. 15 из 29



Click to enlarge

To install:

- 4. Connect the auxiliary headlight assembly using the two attaching screws.
- 5. Install the headlight assembly.
- 6. Connect the battery cable.

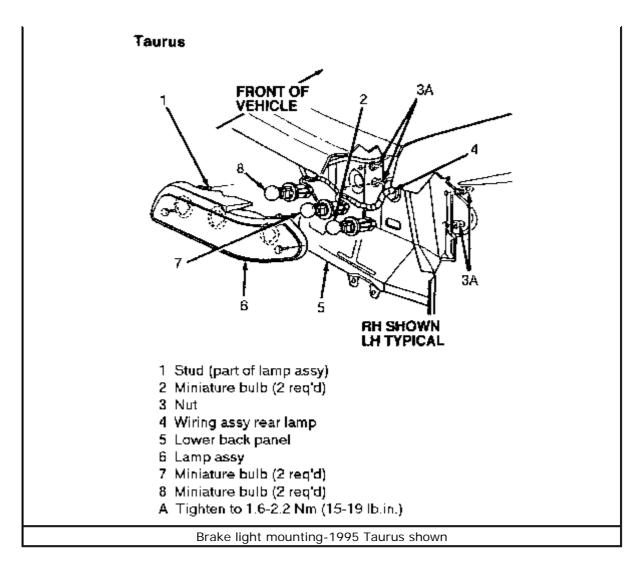
Rear Turn Signal/Brake Lights

SEDAN

Bulbs can be serviced from the inside of the luggage compartment by removing the luggage compartment rear trim panel, if so equipped.

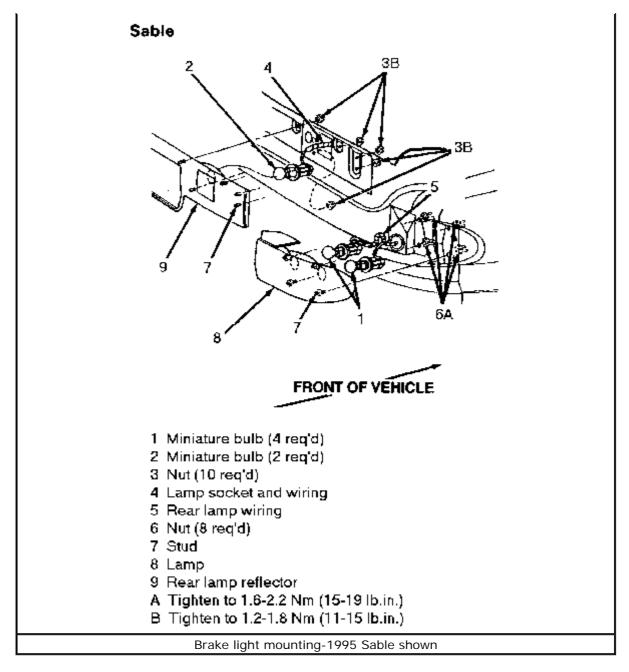
1. Disconnect the negative battery cable.

LIGHTING Стр. 16 из 29



Click to enlarge

LIGHTING Стр. 17 из 29



Click to enlarge

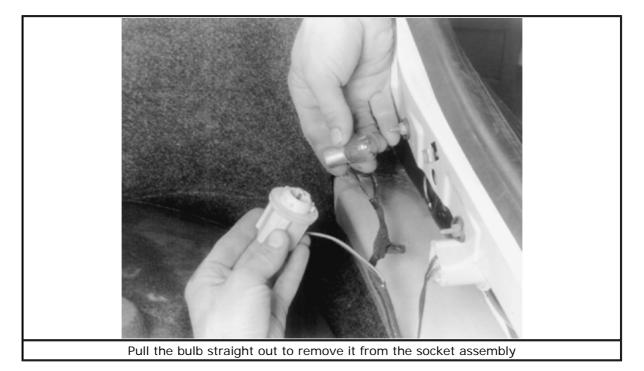
2. From inside the trunk, remove the lower back panel trim cover.

LIGHTING Стр. 18 из 29



To access the rear lights, the lower back panel trim cover must be removed

- 3. Remove the nuts securing the rear lamp to the lower back panel, then pull the rear lamp away from the vehicle.
- 4. Remove the socket(s) from the lamp body and replace the bulb(s), if necessary.



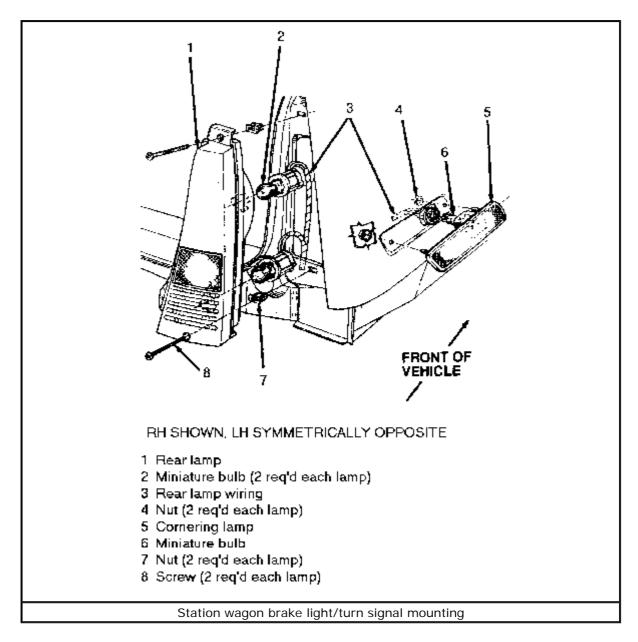
To install:

- 5. Install the bulb, if necessary, then install the socket(s) in the lamp body.
- 6. Install the lamp and use the retaining screws to secure it.
- 7. Install the trim cover, then connect the negative battery cable.

STATION WAGON

LIGHTING Cтр. 19 из 29

- 1. Disconnect the negative battery cable.
- 2. Remove the two screws securing the rear lamp to the quarter panel.
- 3. Remove the lamp socket and wiring from the lamp, then remove the lamp from the vehicle.



Click to enlarge

4. If necessary, replace the bulb.

To install:

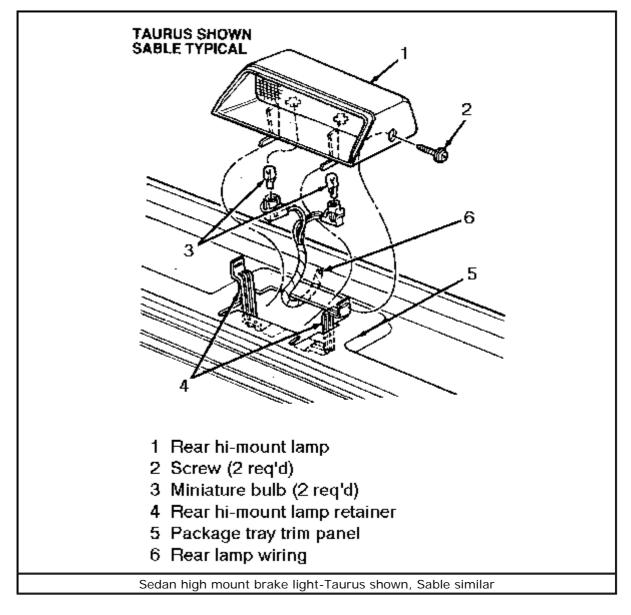
- 5. Install the lamp socket and wiring to the rear lamp.
- 6. Position the rear lamp to the quarter panel, then secure using the two retaining screws.
- 7. Connect the negative battery cable.

High Mount Brake Light

LIGHTING Cтр. 20 из 29

EXCEPT SHO

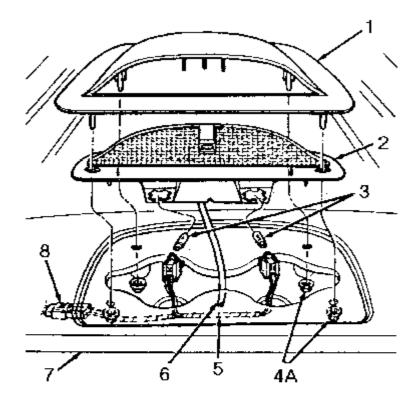
- 1. Disconnect the negative battery cable.
- 2. On the sedan, remove the two covers and screws that retain the lamp assembly to the retainer, then disengage the electrical connector.



Click to enlarge

3. On the wagon, remove the lamp assembly trim cover at the top of the liftgate frame. Remove the two plugs, then remove the four retaining nuts retaining the lamp trim cover.

LIGHTING Стр. 21 из 29



- 1 Rear hi-mount lamp cover
- 2 Rear hi-mount lamp
- 3 Miniature bulb
- 4 Nuts (4 reg'd)
- 5 Rear hi-mount lamp wiring
- 6 Window washer hose
- 7 Liftgate
- 8 Rear lamp extension wiring
- A Tighten to 2-2.8 Nm (18-24 lb.in.)

Station wagon high mount brake light

Click to enlarge

- 4. Remove the lamp assembly from its mounting.
- 5. Installation is the reverse of the removal procedure.

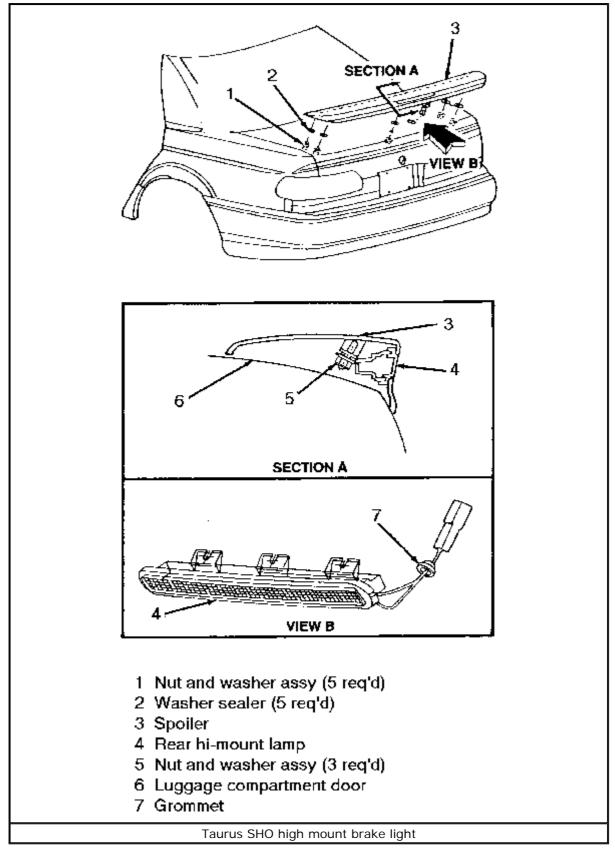
SHO VEHICLES

The Taurus SHO is equipped with a high-mount brake light which is part of the spoiler.

- 1. Disconnect the negative battery cable.
- 2. From inside the luggage compartment, disengage the wiring connector, then remove the five nuts retaining the spoiler to the trunk lid.
- 3. Lower the trunk lid and carefully lift up the spoiler and pull the wiring grommet out of the luggage compartment door, then remove the spoiler from the trunk lid.
- 4. Turn the spoiler over, then lay it on a protective surface to avoid scratching it.

LIGHTING Cтр. 22 из 29

5. Remove the three nuts retaining the rear high-mount brake light to the spoiler, then remove the light from the spoiler.



Click to enlarge

To install:

LIGHTING Cтр. 23 из 29

6. Position the rear-high mount lamp to the spoiler, then install the three retaining nuts and tighten the lamp securely to the spoiler.

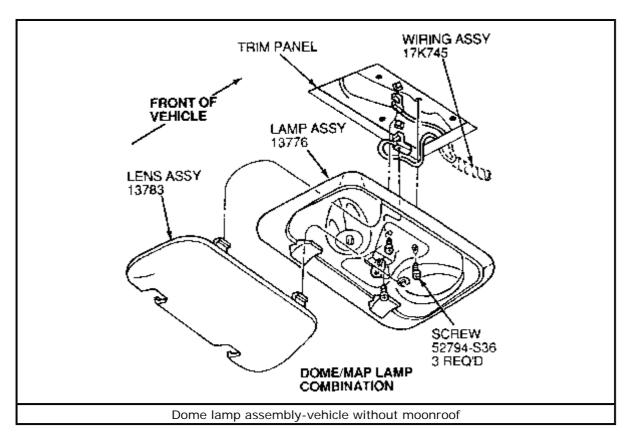
Make sure the sealer washers are on the five studs before setting it on the trunk lid.

- 7. Align the studs on the spoiler to the holes in the luggage compartment door, route the wiring through hole in the trunk lid, then install the grommet.
- 8. Engage the electrical wiring connector.
- 9. Connect the negative battery cable, then depress the brake pedal to make sure the rear hi-mount lamp is functioning properly.

Dome Light

WITHOUT MOONROOF

- 1. Disconnect the negative battery cable.
- 2. Carefully squeeze the lens inward to release the locking tabs.



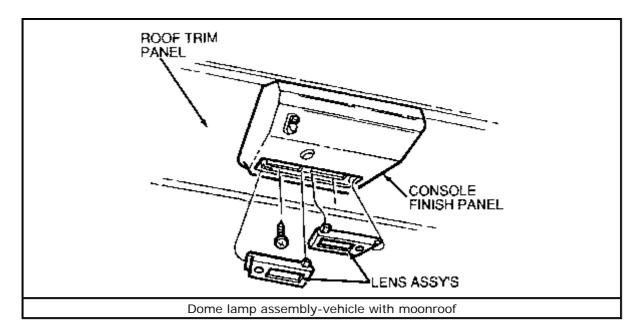
Click to enlarge

- 3. Remove the lens from the lamp body. If necessary, replace the defective bulb.
- 4. Installation is the reverse of the removal procedure.

WITH MOONROOF

- 1. Disconnect the negative battery cable.
- 2. Use a thin bladed tool and carefully pry out and unsnap the lens.
- 3. Replace the defective bulb.

LIGHTING Стр. 24 из 29



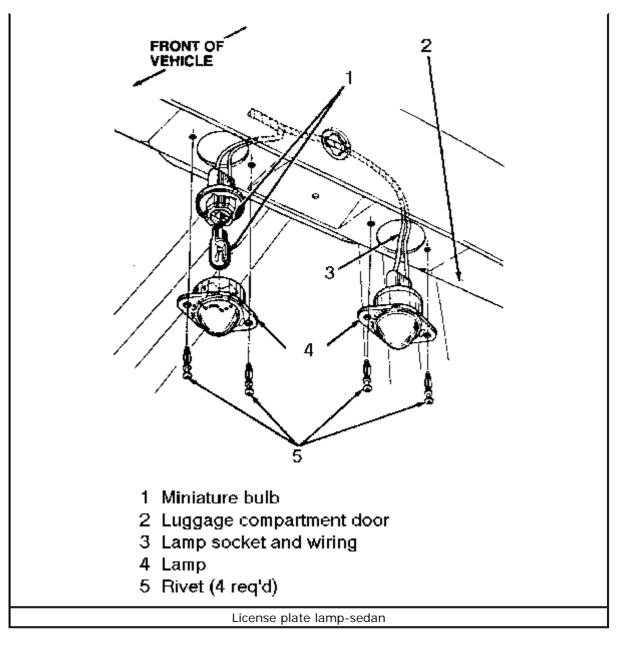
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4. Installation is the reverse of the removal procedure.

License Plate Lights

- 1. Disconnect the negative battery cable.
- 2. Remove the two lamp body plastic retaining rivets.
- 3. Remove the lamp assembly.

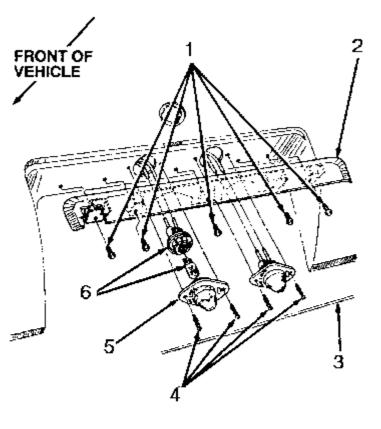
LIGHTING Стр. 25 из 29



Click to enlarge

4. Remove the socket and bulb assembly from the rear of the lamp assembly. If necessary, replace the defective bulb.

LIGHTING Стр. 26 из 29



- 1 Screw (5 req'd)
- 2 Rear license plate lamp shield
- 3 Luggage compartment door
- 4 Rivet (4 req'd)
- 5 Lamp
- 6 Miniature bulb

License plate lamp-station wagon

Click to enlarge

To install:

- 5. Install the socket and bulb assembly to the lamp assembly.
- 6. Install the lamp assembly, then secure using the plastic rivets.
- 7. Connect the negative battery cable.

Fog/Driving Lights

The Taurus SHO is the only vehicle covered by this manual which is equipped with fog lamps.

REMOVAL & INSTALLATION

Fog Lamp Bulb

If you are only replacing the bulb, you don't have to remove the fog lamp

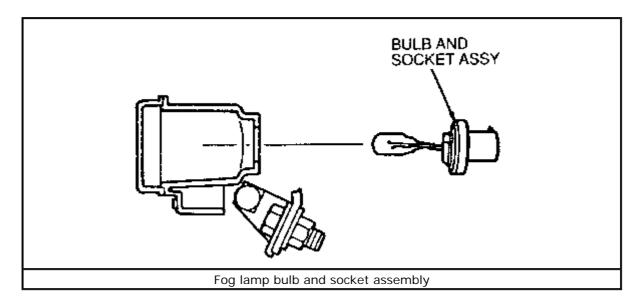
LIGHTING Cтр. 27 из 29

mounting bracket or fog lamp assembly.

- 1. Disconnect the negative battery cable.
- 2. Disengage the electrical wiring connector from the fog lamp miniature bulb.

Do NOT touch the glass part of the fog lamp bulb. Grasp the bulb by its plastic base only.

3. By grasping the bulb and socket by the plastic base only, rotate the miniature bulb and socket, then remove the bulb from the fog lamp.



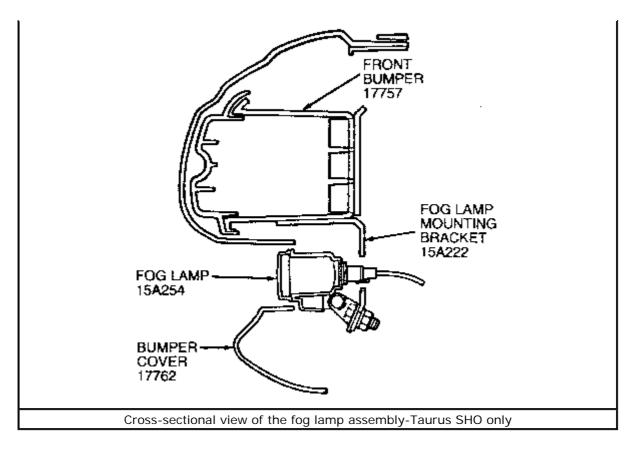
To install:

- 4. Install the bulb to the socket assembly. The socket assembly is indexed, and can only be installed in one way.
- 5. Engage the electrical wiring connector to the fog lamp miniature bulb.
- 6. Connect the negative battery cable.

Fog Lamp Assembly

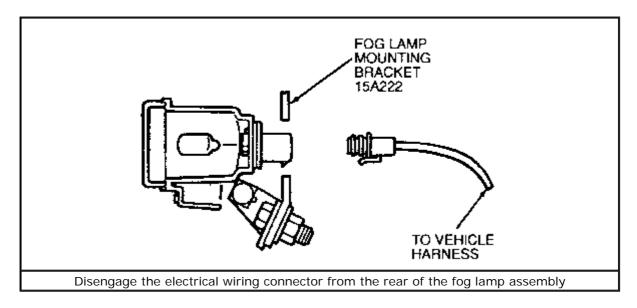
1. Disconnect the negative battery cable.

LIGHTING Cтр. 28 из 29



Click to enlarge

2. Disengage the fog lamp electrical wiring connector.



Click to enlarge

- 3. From under the front bumper cover, remove nut(s) retaining the fog lamp to the mounting bracket.
- 4. Slide the fog lamp out of the fog lamp mounting bracket assembly, then remove the lamp from the vehicle.
- If replacing the fog lamp mounting bracket, remove the screw retaining the mounting bracket to the front bumper, then keep the mounting bracket and screw for the transfer of parts.

LIGHTING Стр. 29 из 29

To install:

6. If removed, position the fog lamp mounting bracket, then secure to the front bumper using the retaining screw.

- 7. Slide the fog lamp assembly into the mounting bracket assembly, then install the nut(s) retaining the fog lamp to the mounting bracket.
- 8. Engage the fog lamp electrical wiring connector.
- 9. Connect the negative battery cable.

TRAILER WIRING Ctp. 1 из 1

TRAILER WIRING

Wiring the car for towing is fairly easy. There are a number of good wiring kits available and these should be used, rather than trying to design your own. All trailers will need brake lights and turn signals as well as tail lights and side marker lights. Most states require extra marker lights for overly wide trailers. Also, most states have recently required back-up lights for trailers, and most trailer manufacturers have been building trailers with back-up lights for several years. Additionally, some Class I, most Class II and just about all Class III trailers will have electric brakes. Add to this number an accessories wire, to operate trailer internal equipment or to charge the trailer's battery, and you can have as many as seven wires in the harness.

Determine the equipment on your trailer and buy the wiring kit necessary. The kit will contain all the wires needed, plus a plug adapter set which includes the female plug, mounted on the bumper or hitch, and the male plug, wired into, or plugged into the trailer harness. When installing the kit, follow the manufacturer's instructions. The color coding of the wires is standard throughout the industry.

One point to note: some domestic vehicles, and most imported vehicles, have separate turn signals. On most vehicles, the brake lights and rear turn signals operate with the same bulb. For those vehicles with separate turn signals, you can purchase an isolation unit so that the brake lights won't blink whenever the turn signals are operated, or, you can go to your local electronics supply house and buy four diodes to wire in series with the brake and turn signal bulbs. Diodes will isolate the brake and turn signals. The choice is yours. The isolation units are simple and quick to install, but far more expensive than the diodes. The diodes, however, require more work to install properly, since they require the cutting of each bulb's wire and soldering in place of the diode.

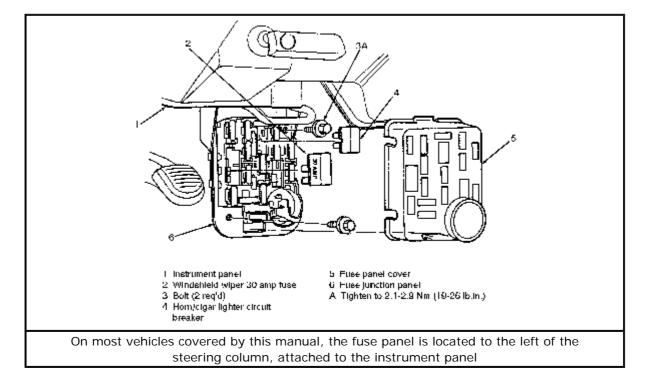
One final point, the best kits are those with a spring loaded cover on the vehicle mounted socket. This cover prevents dirt and moisture from corroding the terminals. Never let the vehicle socket hang loosely; always mount it securely to the bumper or hitch.

CIRCUIT PROTECTION

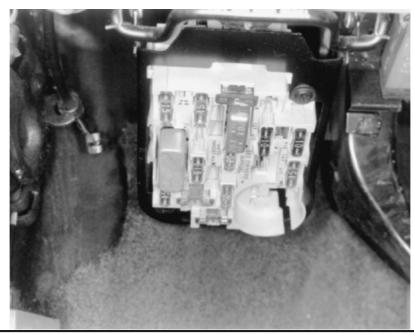
Fuse Panel and Fuses

The fuse panel or block on most vehicles covered by this manual is located to the left of the steering column tube, and is hung from the instrument panel. To gain access the fuses, pull the release bar up with the right hand, pull the fuse panel down with the left hand, then remove the cover.

Fuses are a one-time circuit protection. If a circuit is overloaded or shorts, the fuse will blow thus protecting the circuit. A fuse will continue to blow until the circuit is repaired.



Click to enlarge



Fuse panel/block location-Early model Taurus shown

Each fuse block uses miniature fuses (normally cartridge-type for these vehicles) which are designed for increased circuit protection and greater reliability. The cartridge-type design allows for fingertip removal and replacement.

Although most fuses are interchangeable in size, the amperage values are not. Should you install a fuse with too high a value, damaging current could be allowed to destroy the component you were attempting to protect by using a fuse in the first place. The cartridge-type fuses have a bolt number molded on them and are color coded for easy identification. Be sure to only replace a fuel with the proper amperage rated substitute.

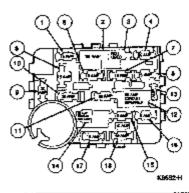
A blown fuse can easily be checked by visual inspection or by continuity checking.

REPLACEMENT

WARNING

When replacing a fuse, NEVER install a replacement fuse with a higher or lower amperage rating than indicated for the circuit to prevent component damage!

To remove a cartridge fuse, grip the fuse and pull it straight out of the fuse junction panel/block. If the fuse cannot be gripped, you can use a non-metallic tool to pull the fuse out of the block. To install the fuse, align the terminals with the fuse panel, then push into position.



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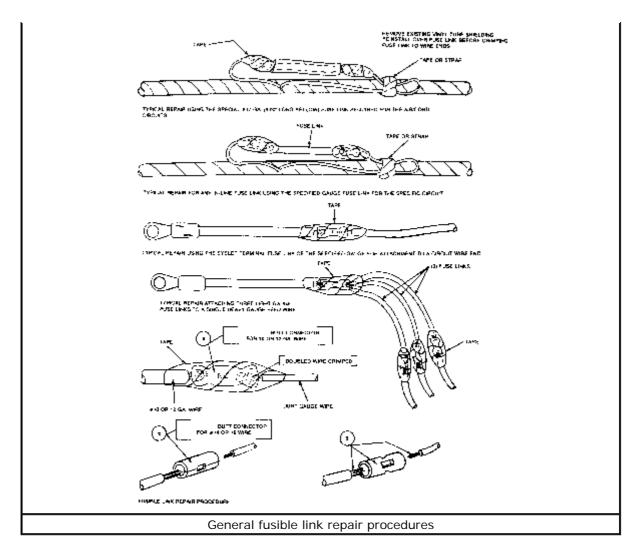
Location of fuses and the circuits they protect-1995 vehicle shown

Click to enlarge

Fusible Links

REPLACEMENT

Fusible links are used to prevent major wire harness damage in the event of a short circuit or an overload condition in the wiring circuits that are normally not fused, due to carrying high amperage loads or because of their locations within the wiring harness. Each fusible link is of a fixed value for a specific electrical load and should a fusible link fail, the cause of the failure must be determined and repaired prior to installing a new fusible link of the same value. Please be advised that the color coding of replacement fusible links may vary from the production color coding that is outlined in the text that follows.



Click to enlarge

Taurus and Sable

- Gray 12 Gauge Wire -located in left side of engine compartment at starter relay; used to protect battery to alternator circuit on all except 3.0L SHO engine.
- Green 14 Gauge Wire -located in left side of engine compartment at starter relay; used to protect battery to alternator circuit if with 3.0L SHO engine.
- Green 14 Gauge Wire -located in left side of engine compartment at starter relay;
 used to protect anti-lock brake system power relay circuit.
- Black 16 Gauge Wire -located on the left shock tower; used to protect the battery feed to headlight switch and fuse panel circuits.
- Black 16 Gauge Wire -located on the left shock tower; used to protect the battery feed to ignition switch and fuse panel circuits.
- Black 16 Gauge Wire -located in left side of engine compartment at starter relay; used to protect rear window defrost circuit on 1986-90 vehicles and 1991 2.5L engine vehicles.
- Brown 18 Gauge Wire -located in left side of engine compartment at starter relay; used to protect rear window defrost circuit on 1991-95 vehicles, except 2.5L engine.
- Brown 18 Gauge Wire -located in right front of engine compartment at alternator output control relay; used to protect the alternator output control relay to heated windshield circuit.

- Blue 20 Gauge Wire -located on the left shock tower; used to protect the ignition coil, ignition module and cooling fan controller circuits.
- Blue 20 Gauge Wire -located in left rear of engine compartment; used to protect ignition switch to anti-lock brake system circuit.

Circuit Breakers

REPLACEMENT

Circuit breakers are used to protect electrical circuits by interrupting the current flow. A circuit breaker conducts current through an arm made of two types of metal bonded together. If the arm starts to carry too much current, it heats up. As one metal expands faster than the other, the arm bends, opening the contacts and interrupting the current flow.

- Station Wagon Rear Window Wiper/Washer -One 4.5 amp circuit breaker located on the instrument panel brace, on the left side of the steering column on Taurus or on the left instrument panel end panel on Sable.
- Windshield Wipers and Washer Pump -One 6 amp circuit breaker located on the fuse panel, on 1988 vehicles.
- Windshield Wipers and Washer Pump -One 8.25 amp circuit breaker located on the fuse panel, on 1989-95 vehicles.
- Cigar Lighters, Horn Relay and Horns -One 20 amp circuit breaker located on the fuse panel.
- Power Windows, Power Locks and Power Seats -One 20 amp circuit breaker located near the starter relay, on 1986-89 vehicles.
- Power Windows, Power Locks and Power Seats -One 20 amp circuit breaker located on the fuse panel, on 1990-92 vehicles.
- Headlights -One 22 amp circuit breaker incorporated in the headlight switch.

Relays

REPLACEMENT

Various relays are used in conjunction with the vehicle's electrical components. If a relay should fail it must be replaced with one of equal value. Replacement is simply a matter of disengaging the electrical connector and sliding the relay from its mounting. Depending on a vehicle's equipment, it may contain several of the following relays.

- Alternator Output Control Relay -located between the right front inner fender and fender splash shield (if equipped with 3.0L or 3.8L engines and a heated windshield.
- Anti-lock Motor Relay -located in lower left front of engine compartment (if equipped with anti-lock brakes).
- Anti-lock Power Relay -located in left rear corner of engine compartment (if equipped with anti-lock brakes).
- Autolight Dual Coil Relay -located behind the center of the instrument panel on the instrument panel brace (if equipped with automatic headlights).
- Fog Light Relay -located behind the center of the instrument panel on the instrument panel brace.

- Horn Relay -located behind the center of the instrument panel on the instrument panel brace.
- LCD Dimming Relay -located behind the center of the instrument panel on the instrument panel brace (if equipped with automatic headlights).
- Low Oil Level Relay -located behind the center of the instrument panel on the instrument panel brace.
- Moonroof Relay -located behind the right side of the instrument panel (if equipped with a moonroof).
- Police Accessory Relay -located behind the center of the instrument panel on police models.
- Starter Relay -located on the left fender apron, in front of the strut tower.
- Window Safety Relay -located behind the right side of the instrument panel (if equipped with power windows).

Computers

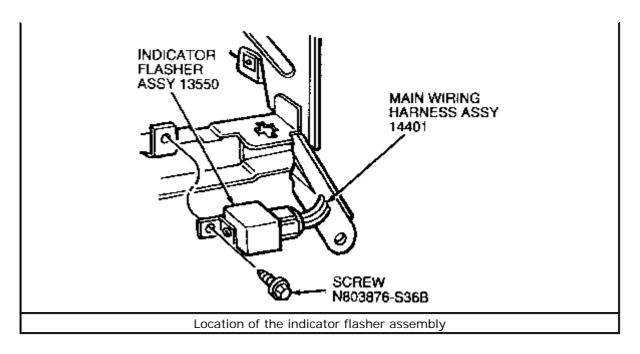
LOCATION

- Electronic Engine Control Module -located on the passenger side of the firewall.
- Anti-lock Brake Control Module -located at the front of the engine compartment next to the passenger side fender, except on Taurus SHO, where it is located at the front of the engine compartment on the driver's side.
- Automatic Temperature Control Module -located behind the center of the instrument panel.
- Heated Windshield Control Module -located behind the left side of the instrument panel, to the right of the steering column.
- Integrated Control Module -located at the front of the engine compartment, on the upper radiator support.
- Air Bag Diagnostic Module -located behind the right side of the instrument panel, above the glove box.

Flashers

REPLACEMENT

An electronic combination turn signal and emergency warning flasher is attached to the lower left instrument panel reinforcement above the fuse panel.



Click to enlarge

The turn signal unit is located on the LH side of the instrument panel. The combination turn signal and hazard flasher can be removed by pressing the plastic retaining clip and pulling straight rearward. One phillips® head or regular screw has to be removed from the retaining bracket.

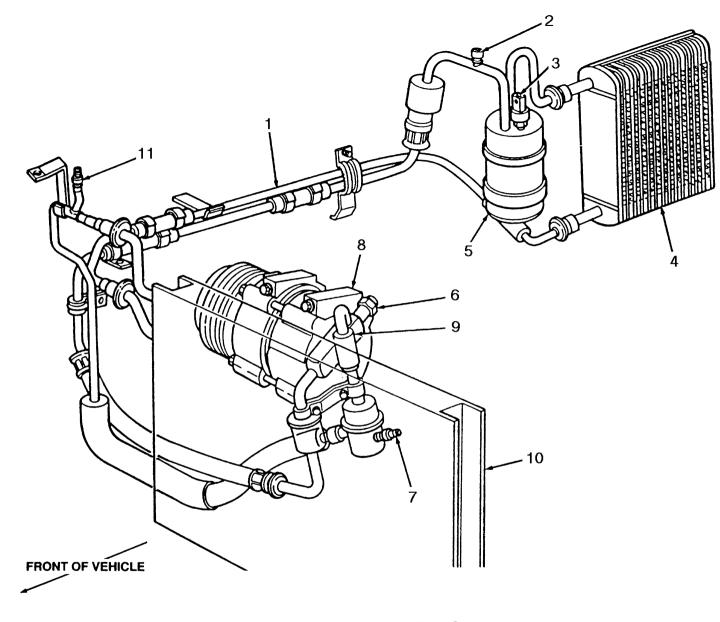
WIRING DIAGRAMS Cтр. 1 из 2

WIRING DIAGRAMS

4-cylinder engine control wiring diagram-1986 vehicles	Niew Image
6-cylinder engine control wiring diagram-1986 vehicles	View Image
Body wiring diagram-1986 vehicles	View Image
Body wiring diagram (continued)-1986 vehicles	Niew Image
Instrument cluster wiring diagram-1986 vehicles	Niew Image
4-cylinder engine control wiring diagram-1987 vehicles	Niew Image
6-cylinder engine control wiring diagram-1987 vehicles	Niew Image
Body wiring diagram-1987 vehicles	Niew Image
Body wiring diagram (continued)-1987 vehicles	Niew Image
Instrument cluster wiring diagram-1987 vehicles	Niew Image
2.5L engine control wiring diagram-1988 vehicles	Niew Image
3.0L and 3.8L engine control wiring diagram-1988 vehicles	Niew Image
Body wiring diagram-1988 vehicles	Niew Image
Body wiring diagram (continued)-1988 vehicles	Niew Image
Instrument cluster wiring diagram-1988 vehicles	Niew Image
Starting and charging system wiring diagram-1988 vehicles	Niew Image
2, engine control wiring diagram-1989-90 vehicles	Niew Image
3.0L engine control wiring diagram-1989-90 vehicles	Niew Image
3.8L engine control wiring diagram-1989-90 vehicles	Niew Image
3.0L SHO engine control wiring diagram-1989-90 vehicles	Niew Image
Body wiring diagram-1989-90 vehicles	Niew Image
Starting and charging system wiring diagram-1989-90 vehicles	Niew Image
2, engine control wiring diagram-1991 vehicles	View Image

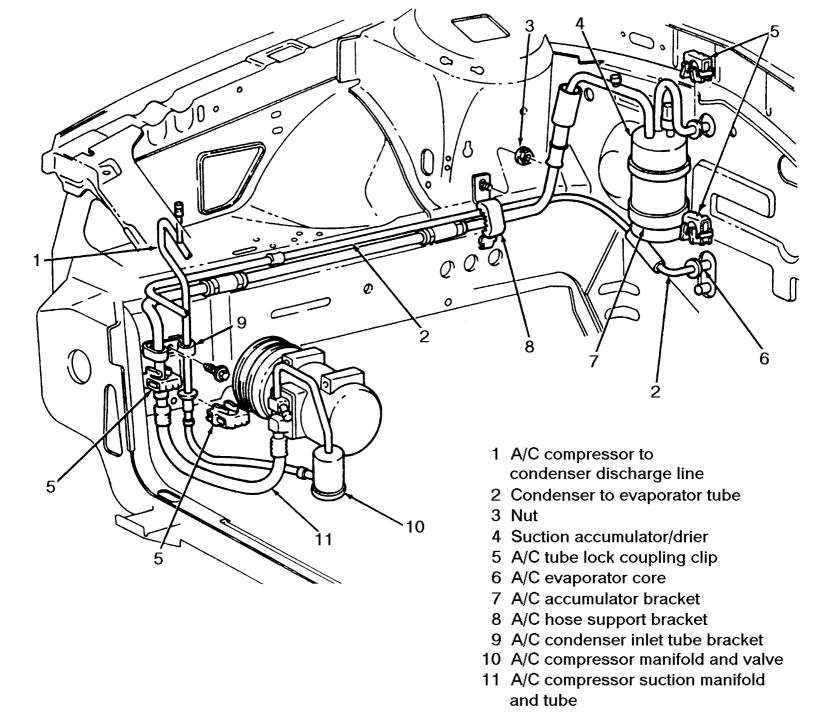
WIRING DIAGRAMS Cтр. 2 из 2

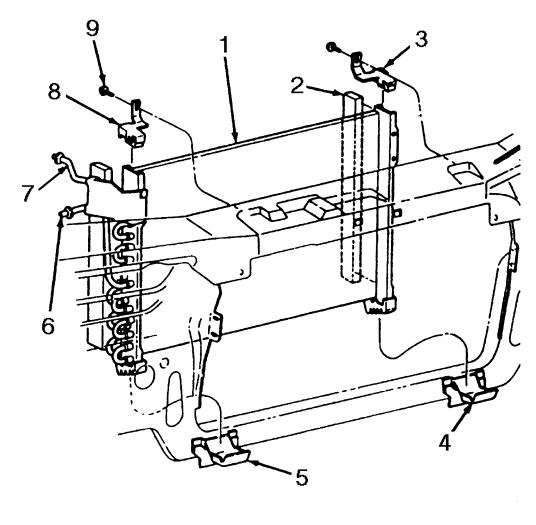
3.0L engine control wiring diagram-1991 vehicles	Niew Image
3.8L engine control wiring diagram-1991 vehicles	View Image
3.0L SHO engine control wiring diagram-1991 vehicles	Niew Image
Body wiring diagram-1991 vehicles	View Image
Starting and charging system wiring diagram-1991 vehicles	View Image
3.0L engine control wiring diagram-1992 vehicles	Niew Image
3.8L engine control wiring diagram-1992 vehicles	Niew Image
3.0L SHO engine control wiring diagram-1992 vehicles	Niew Image
Body wiring diagram-1992 vehicles	Niew Image
Body wiring diagram (continued)-1992 vehicles	Niew Image
Starting, charging and windshield wiper/washer system wiring diagram-1992 vehicles	View Image
3.0L engine control wiring diagram-1993 vehicles	Niew Image
3.0L flexible fuel engine control wiring diagram-1993 vehicles	Niew Image
3.8L engine control wiring diagram-1993 vehicles	Niew Image
3.0L SHO engine control wiring diagram-1993 vehicles	Niew Image
3.2L SHO engine control wiring diagram-1993 vehicles	Niew Image
Starting, charging and windshield wiper/washer system wiring diagram-1993 vehicles	Niew Image
3.0L engine control wiring diagram-1994-95 vehicles	Niew Image
3.0L flexible fuel engine control wiring diagram-1994-95 vehicles	Niew Image
3.8L engine control wiring diagram-1994-95 vehicles	View Image
3.0L SHO engine control wiring diagram-1994-95 vehicles	View Image
3.2L SHO engine control wiring diagram-1994-95 vehicles	View Image
Starting, charging and windshield wiper/washer system wiring diagram-1994-95 vehicles	View Image



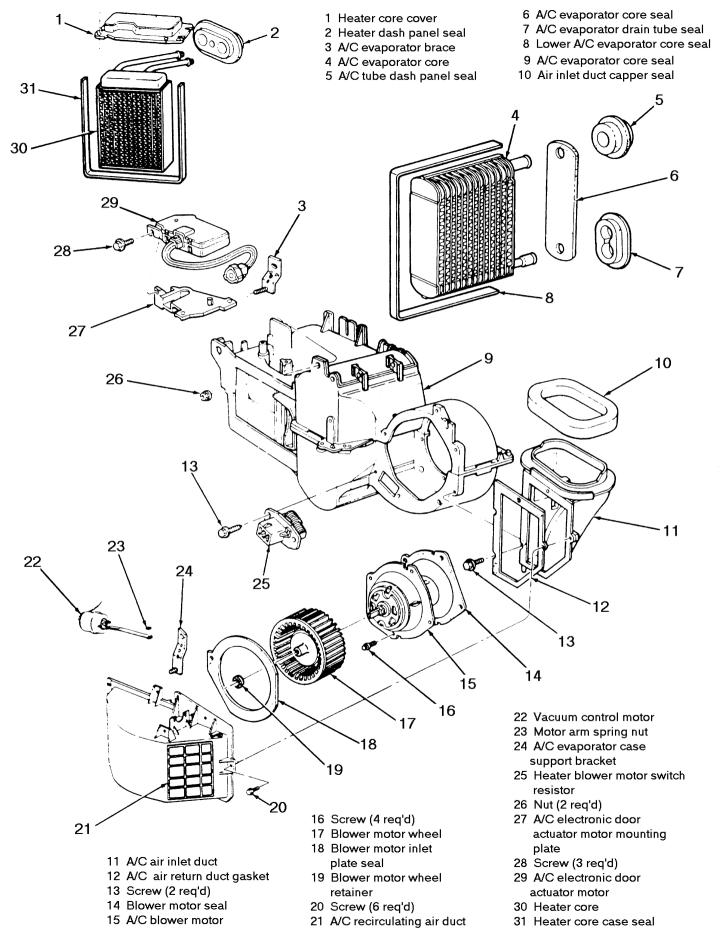
- 1 Condenser to evaporator tube
- 2 Low side service valve body
- 3 A/C cycling switch
- 4 A/C evaporator core
- 5 Suction accumulator/drier

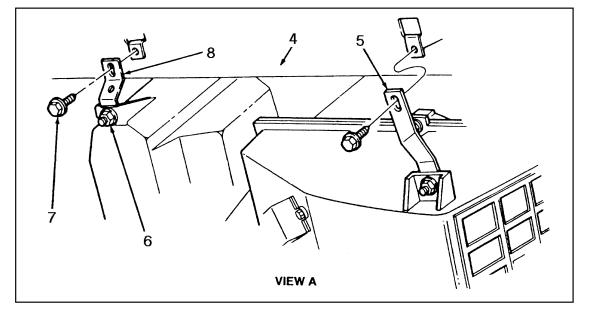
- 6 A/C compressor pressure relief valve
- 7 A/C pressure cut-off switch
- 8 A/C compressor
- 9 A/C manifold and tube
- 10 A/C condenser core
- 11 High side service valve body

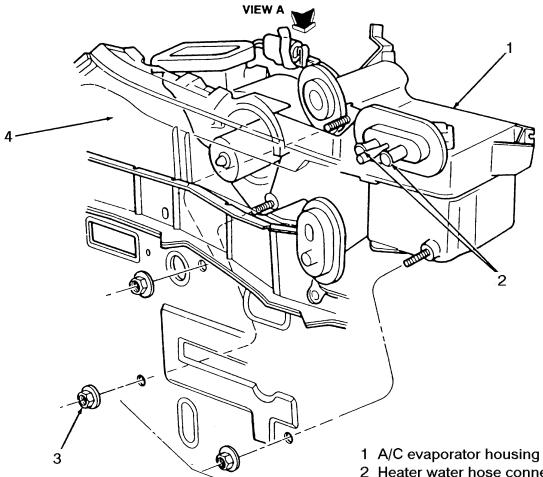




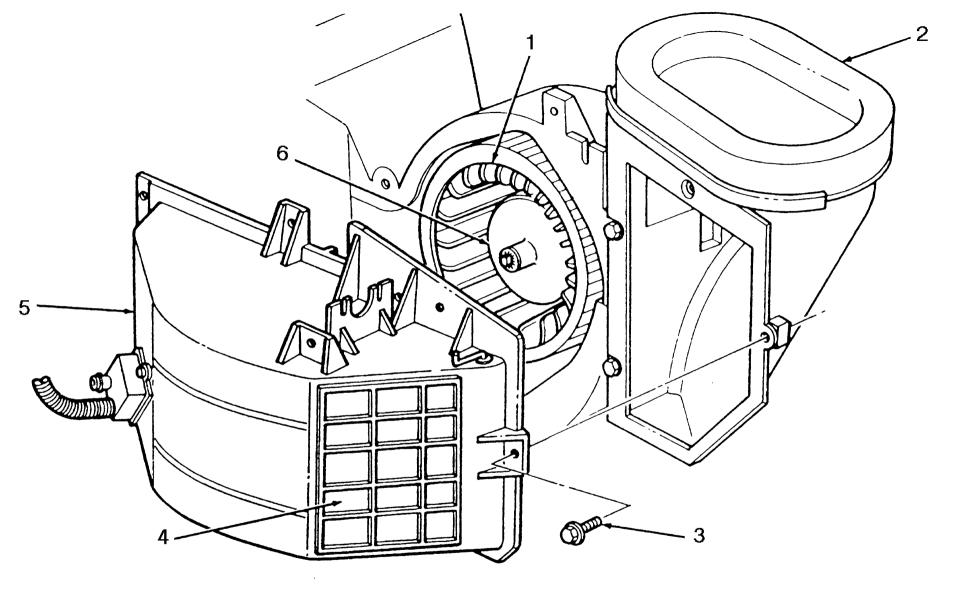
- 1 A/C condenser core
- 2 A/C condenser seal (2 req'd)
- 3 A/C condenser mounting bracket (upper LH)
- 4 A/C condenser mounting bracket (lower LH)
- 5 A/C condenser mounting bracket (lower RH)
- 6 To A/C evaporator core orifice and A/C evaporator core
- 7 From A/C manifold and tube
- 8 A/C condenser mounting bracket (upper RH)
- 9 Screw and washer assy (1 req'd each bracket assy)





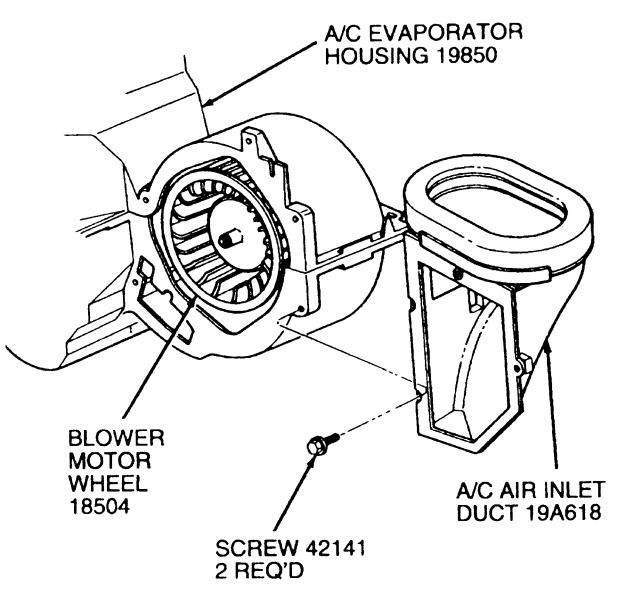


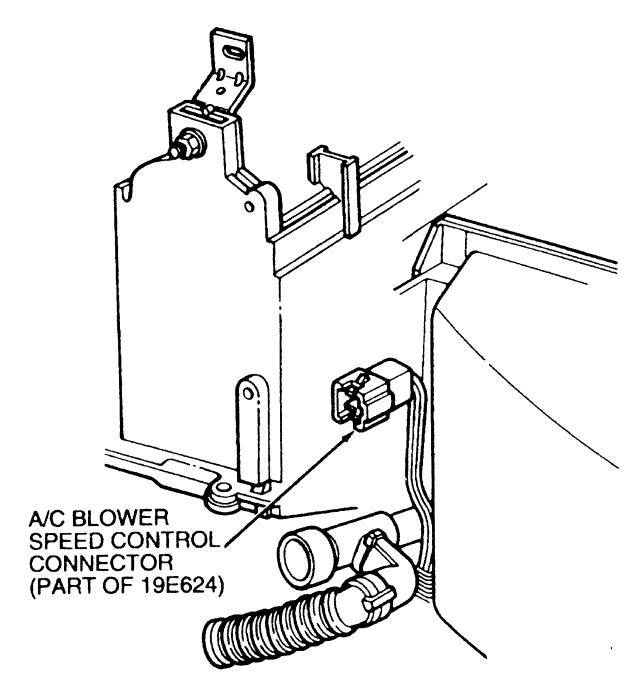
- 2 Heater water hose connection locations
- 3 Nut (3 req'd)
- 4 Dash panel
- 5 A/C evaporator case support bracket
- 6 Nut (2 req'd)
- 7 Screw and washer assy (2 req'd)
- 8 A/C evaporator brace

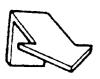


- 1 Blower motor wheel
- 2 A/C air inlet duct
- 3 Screw (6 req'd)

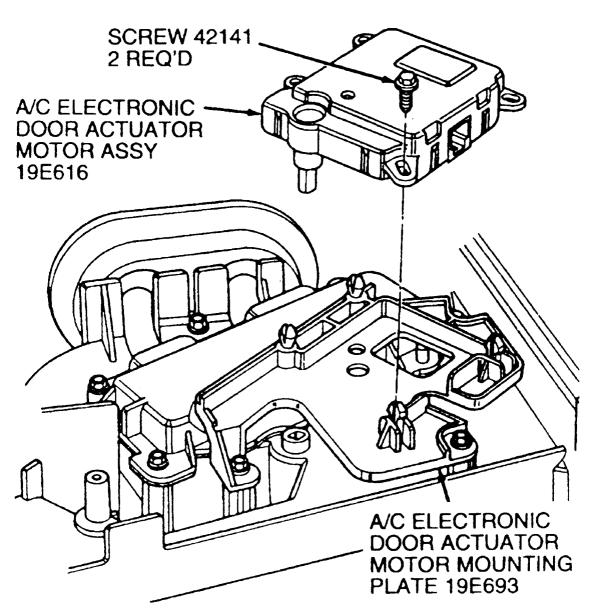
- 4 Heater and A/C air inlet duct door
- 5 A/C recirculating air dust
- 6 Heater blower motor

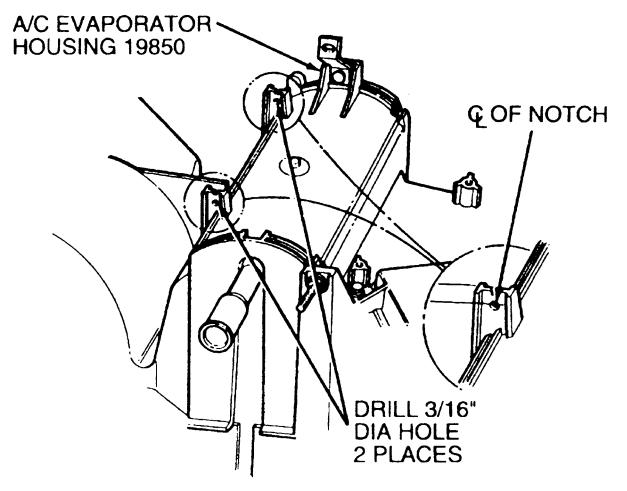


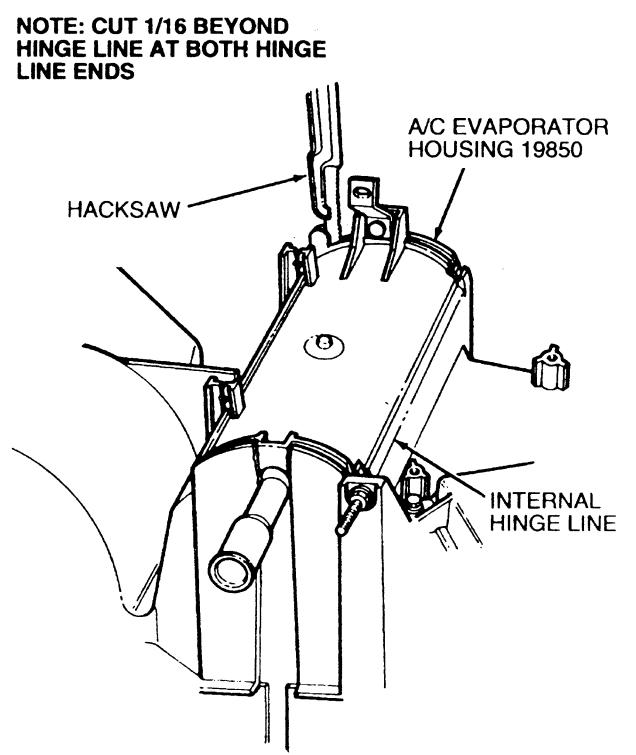


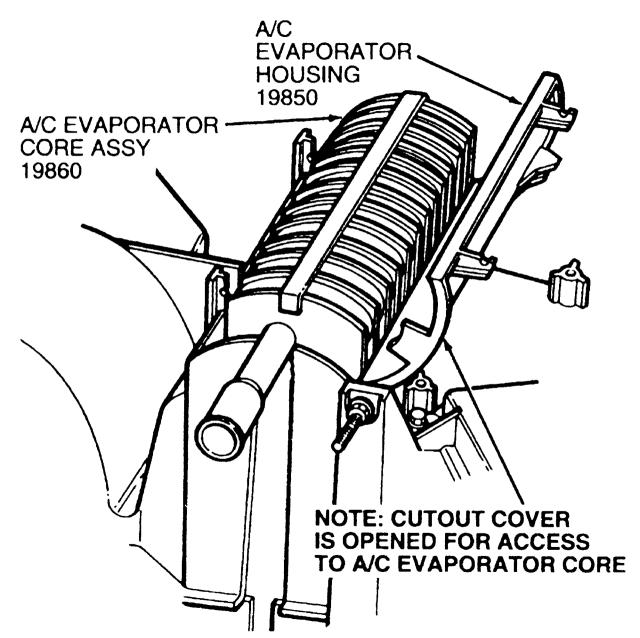


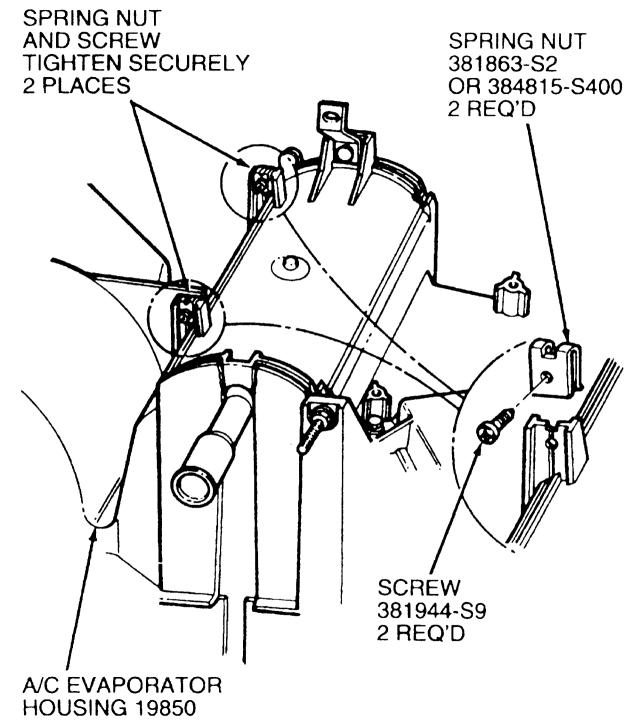
TO REMOVE, DISENGAGE ACTUATOR FROM BRACKET. LIFT UPWARD 1/2 INCH, THEN TOWARD PASSENGER COMPARTMENT.

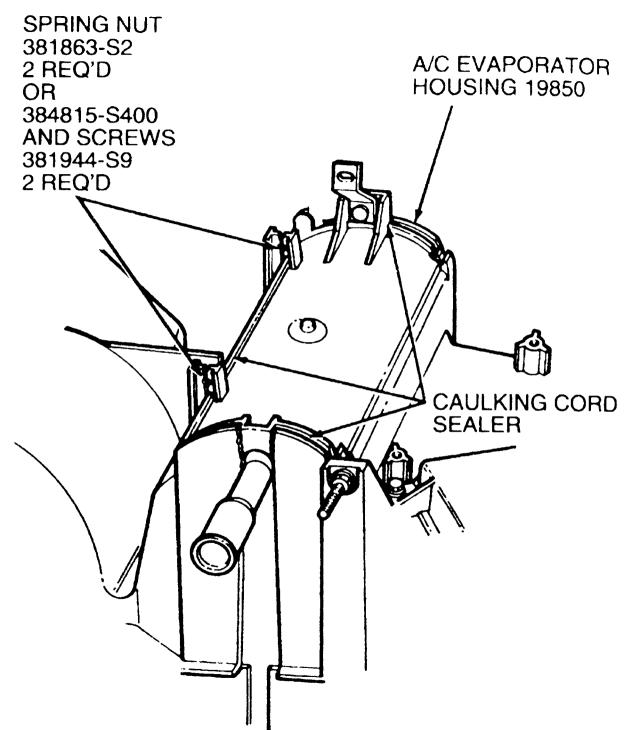


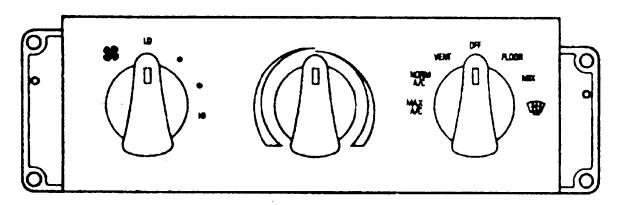




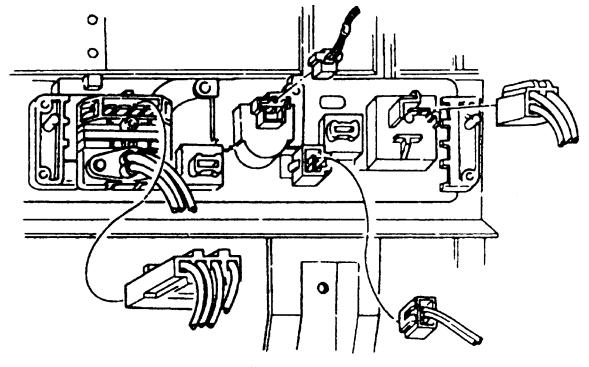




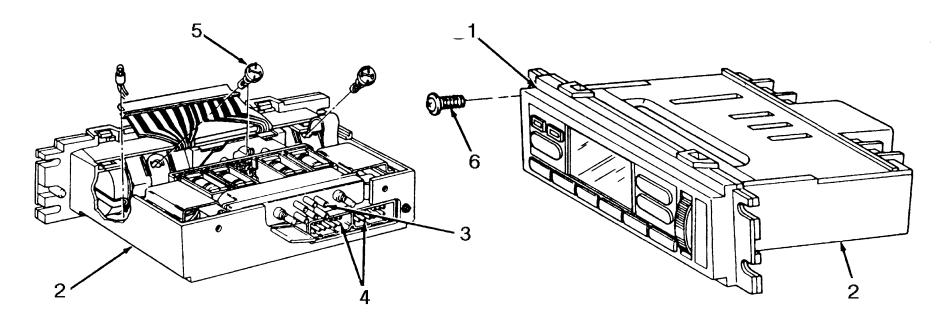




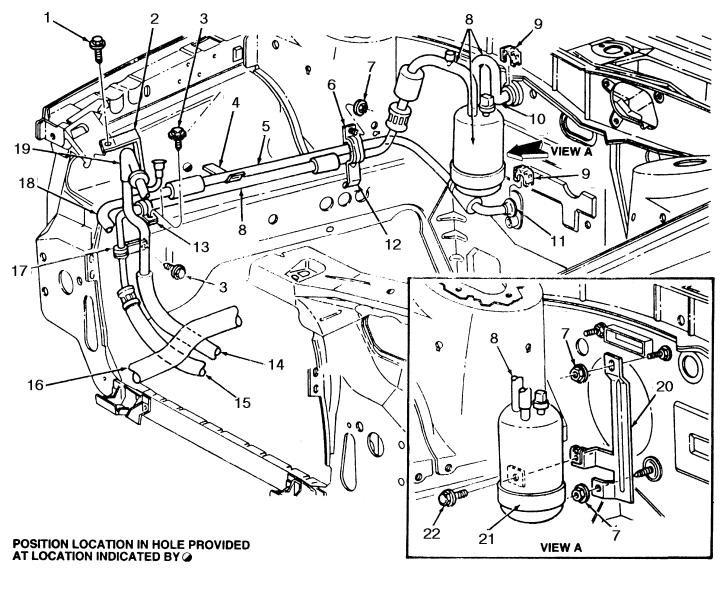
FRONT VIEW



REAR VIEW



- 1 Bezel
- 2 EATC air conditioner control
- 3 Vacuum control valve
- 4 Electrical connections
- 5 Bulb
- 6 Screw (4 req'd)

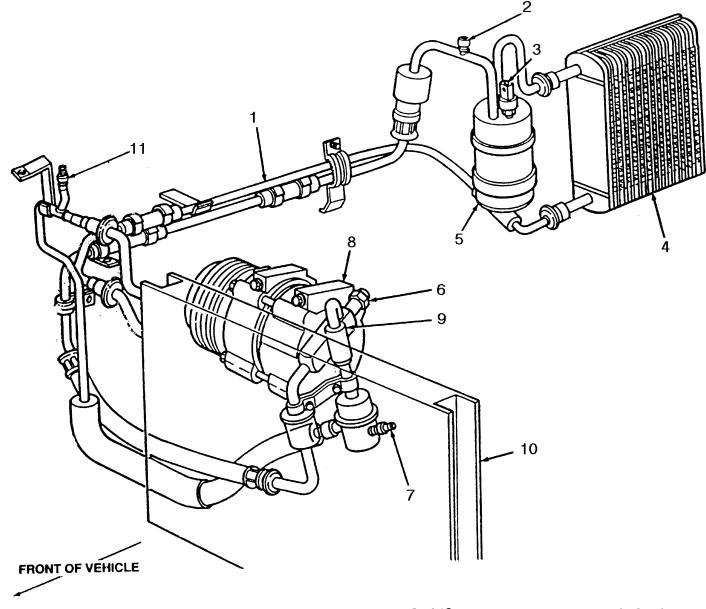


- 1 Screw
- 2 A/C condenser inlet tube bracket
- 3 Screw (2 req'd)
- 4 Clip
- 5 Condenser to evaporator tube
- 6 Screw and retainer assy
- 7 Nut and washer assy (3 req'd)
- 8 Suction accumulator/drier
- 9 A/C tube lock coupling clip10 From A/C evaporator core
- 11 To A/C evaporator core

- 12 A/C hose support bracket
- 14 From A/C compressor
- 15 To A/C compressor16 Lower radiator hose
- 17 Clip

13 Clip

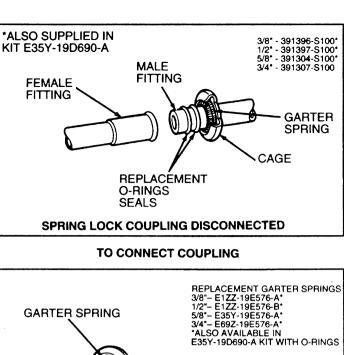
- 18 From A/C condenser core
- 19 To A/C condenser core
- 20 A/C accumulator bracket
- 21 Part of A/C accumulator bracket
- 22 Screw (part of A/C accumulator bracket)



- 1 A/C condenser inlet tube bracket
- 2 Low side service valve body
- 3 A/C cycling switch
- 4 A/C evaporator switch

5 Suction accumulator/drier

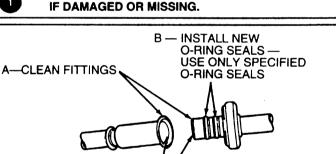
- 6 A/C compressor pressue relief valve
- 7 A/C pressure cut-off switch
- 8 A/C compressor
- 9 A/C condenser core
- 10 A/C manifold and tube11 High side service valve body



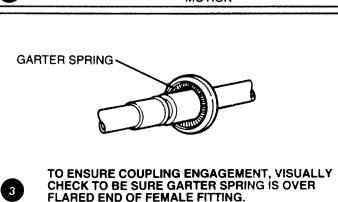


CHECK FOR MISSING OR DAMAGED GARTER SPRING-REMOVE DAMAGED SPRING WITH

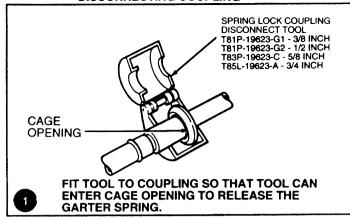
SMALL HOOKED WIRE—INSTALL NEW SPRING

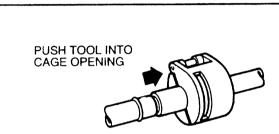


 LUBRICATE WITH ASSEMBLE FITTING **CLEAN REFRIGERANT** TOGETHER BY PUSHING OIL WITH A SLIGHT TWISTING MOTION

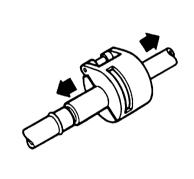


TO DISCONNECT COUPLING CAUTION — DISCHARGE SYSTEM BEFORE DISCONNECTING COUPLING

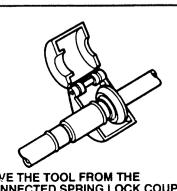






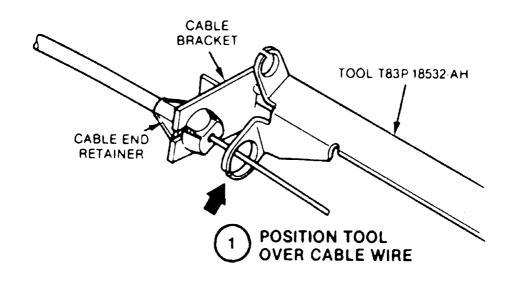


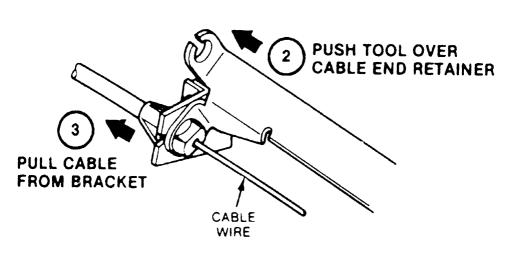




REMOVE THE TOOL FROM THE 4 DISCONNECTED SPRING LOCK COUPLING.

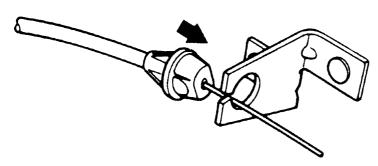
REMOVAL

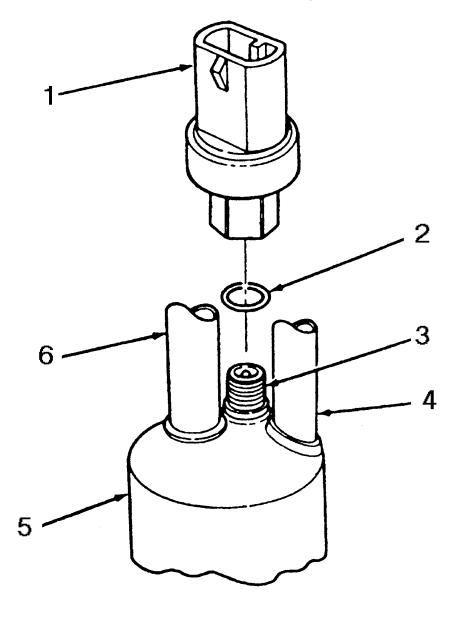




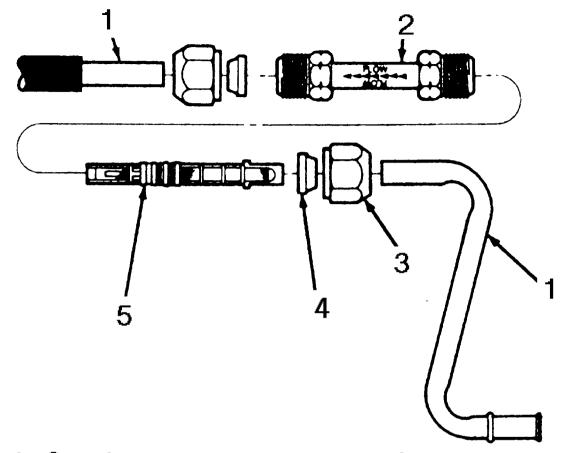
INSTALLATION

PUSH CABLE END RETAINER INTO BRACKET UNTIL LATCHED WITH BRACKET

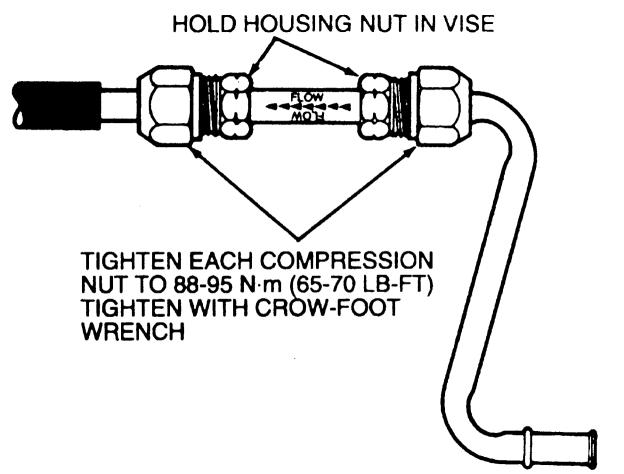


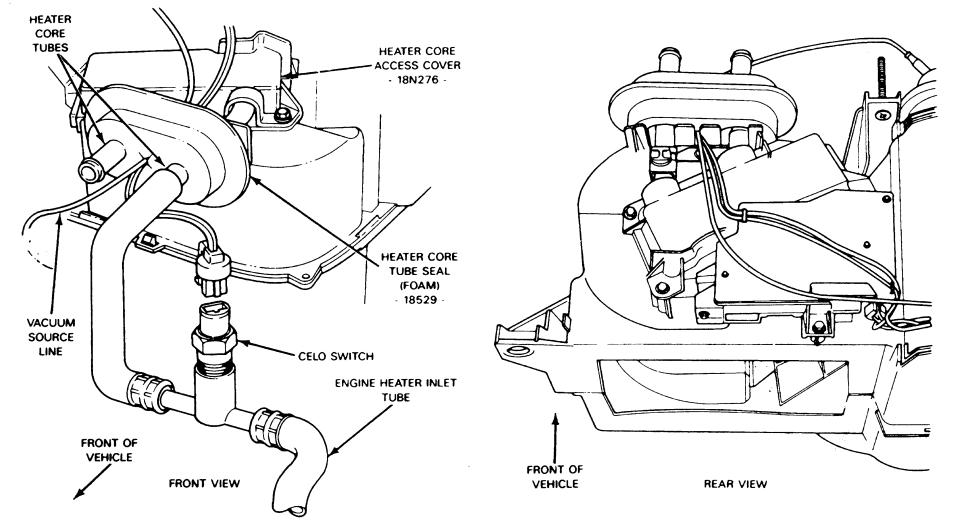


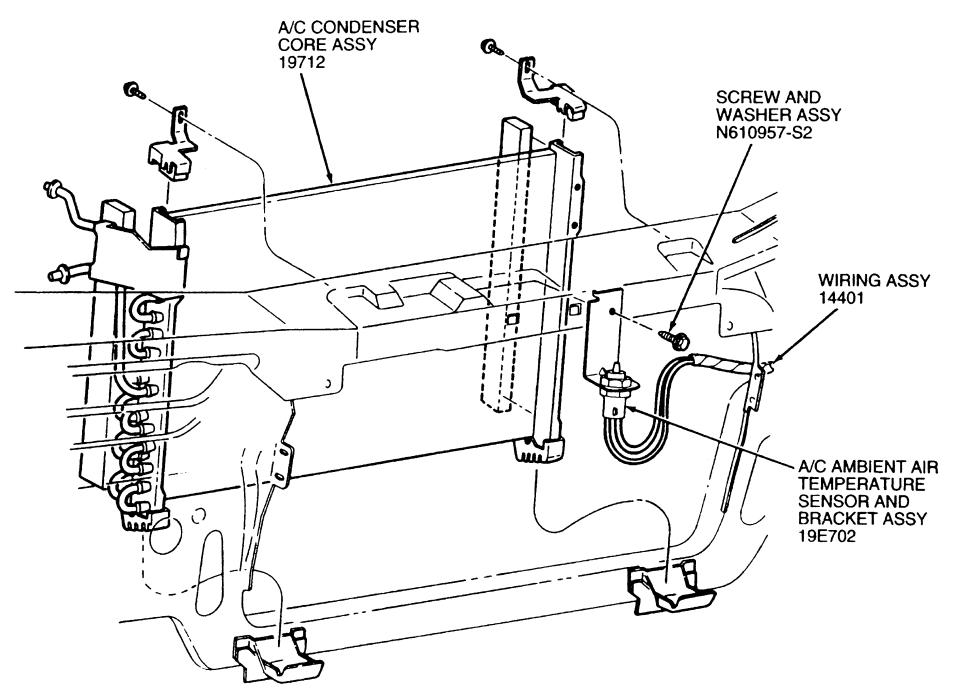
- 1 A/C cycling switch
- 2 O-ring seal
- 3 A/C cyclic switch fitting (part of suction accumulator/drier)
- 4 Outlet to A/C compressor (part of suction accumulator/drier)
- 5 Suction accumulator/drier
- 6 Inlet from A/C evaporator core (part of suction accumulator/drier)

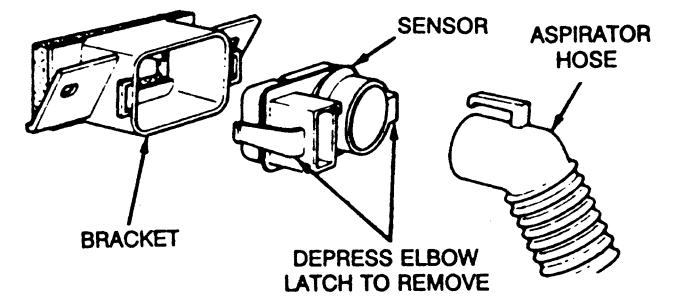


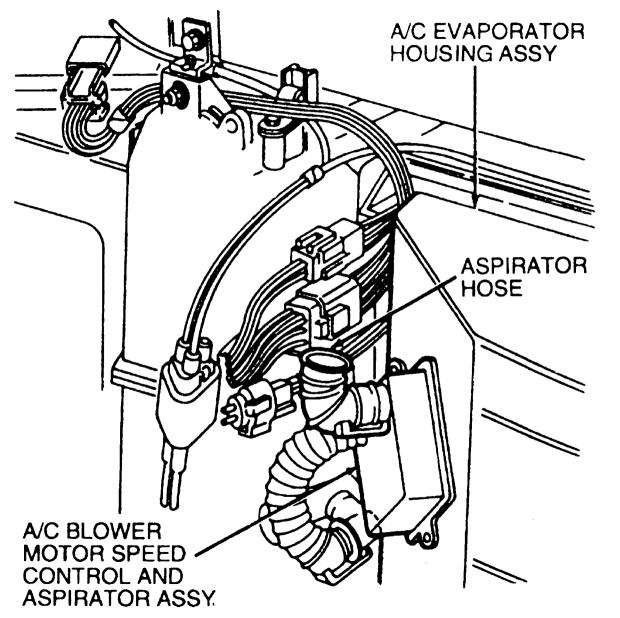
- 1 Condenser to evaporator tube
- 2 A/C evaporator core orifice housing
- 3 Compression nut
- 4 Brass compression ring
- 5 A/C evaporator core orifice

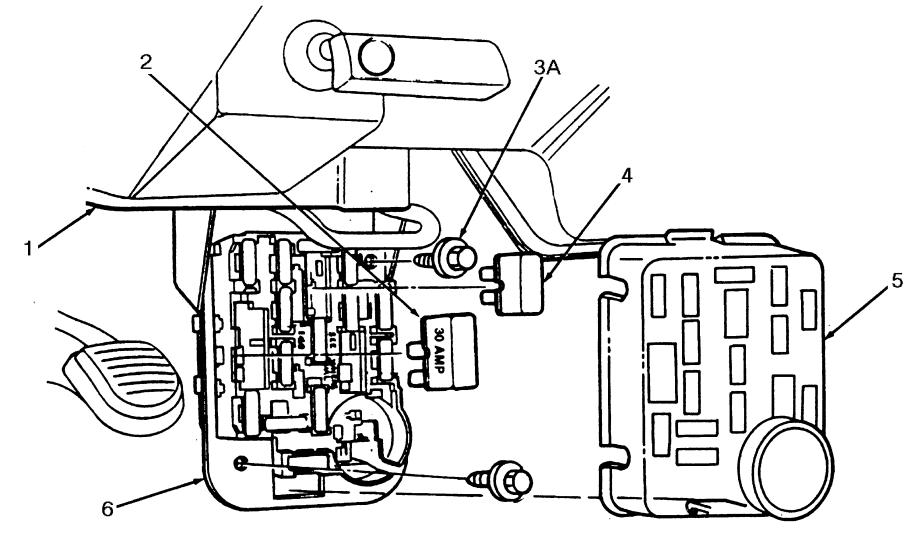






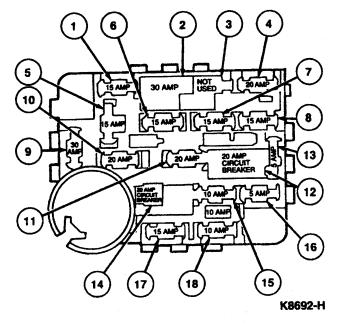




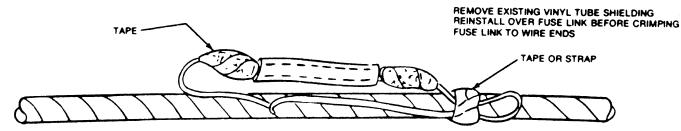


- 1 Instrument panel
- 2 Windshield wiper 30 amp fuse
- 3 Bolt (2 req'd)
- 4 Horn/cigar lighter circuit breaker

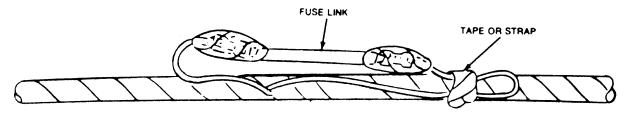
- 5 Fuse panel cover
- 6 Fuse junction panel
- A Tighten to 2.1-2.9 Nm (19-26 lb.in.)



Cavity Number	Fuse Rating	Circuit Protected
1	15 Amp	High-Mount Stoplights, Stoplights, Front and Rear Turn Signals, Instrument Panel Turn Indicator Lamps
2	30 Amp	Windshield Wiper Motor, Intermittent Wiper Module, Windshield Washer Motor
3	-	Not Used
4	20 Amp	Front Park, Side Marker and Tail Lamps, "Headlamps On" Warning Buzzer/Chime, Front Laser Lamp (Sable)
5	15 Amp	Electronic Cluster, Rear Window Defroster Switch, Electronic Flasher, Backup Lamps, Heated Oxygen Sensor (HO2S), Illuminated Entry Actuator / Electronic Door Lock Control Processor, Brake Interlock Solenoid
6	15 Amp	Rear Window Wiper and Washer Motors (Wagons), Diagnostic Warning Lamp Module, Warning Chime, Headlamp Switch Illumination (Sable), Clock Illumination, Radio Illumination, EATC Control Illumination, Power Window Relay, Speed Control Amplifier
7	15 Amp	Air Bag Diagnostic Monitor
8	15 Amp	Clock, Radio Memory, Glove Compartment Lamp, Luggage Compartment Lamp, Instrument Panel Courtesy Lamps, Interior Lamps, Illuminated/Entry Actuator Electronic Door Lock Control Processor, Power Mirrors
9	30 Amp	Blower Motor
10	20 Amp	Flash-to-Pass, High Beam Headlamps and Indicator Lamp
11	20 Amp	Radio, Premium Sound Amplifier, Power Antenna Motor, Redundant Radio Switch
12	20 Amp Circuit Breaker	Cigar Lighters, Horn Relay, Horns
13	5 Amp	Cluster Illumination, Radio Display, Ash Receptacle Illumination, EATC Control Display, Rear Window Defroster Switch Illumination, Rear Wiper Switch Illumination, Headlamp Switch Illumination, Clock Display, Transmission Range Indicator Illumination
14	20 Amp Circuit Breaker	Power Windows, Power Moon Roof
15	10 Amp	License Plate Lamps, Side Marker and Tail Lamps
16	5 Amp	Electronic Cluster, EATC Control
17	15 Amp	EATC Compressor Clutch, Blend Door Actuator, A/C Compressor Clutch
18	10 Amp	Autolamp Module, Cluster Warning Lamps, Low Oil Level Relay, Buzzer / Chime



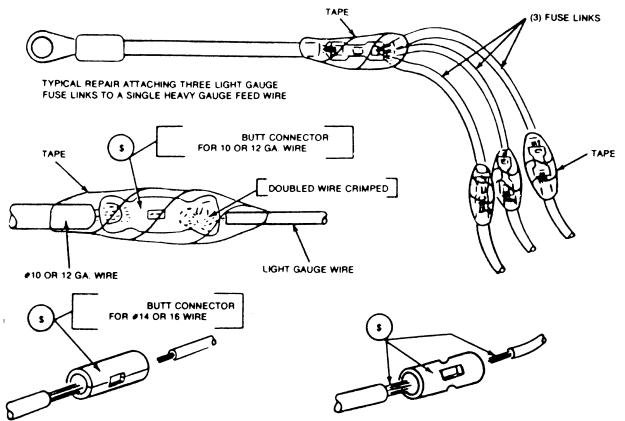
TYPICAL REPAIR USING THE SPECIAL #17 GA. (9.00° LONG-YELLOW) FUSE LINK REQUIRED FOR THE AIR/COND. CIRCUITS



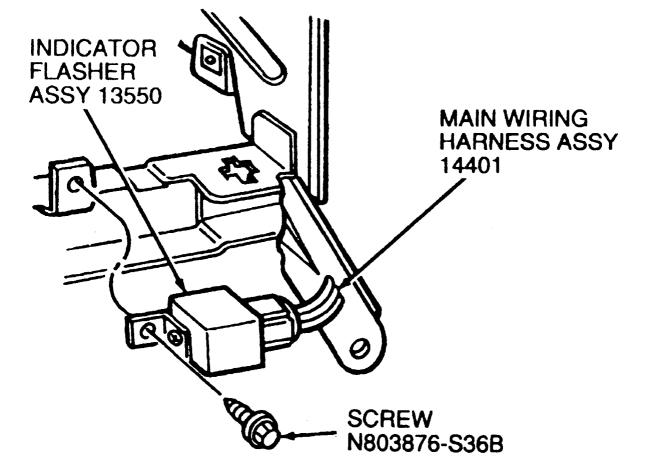
TYPICAL REPAIR FOR ANY IN-LINE FUSE LINK USING THE SPECIFIED GAUGE FUSE LINK FOR THE SPECIFIC CIRCUIT

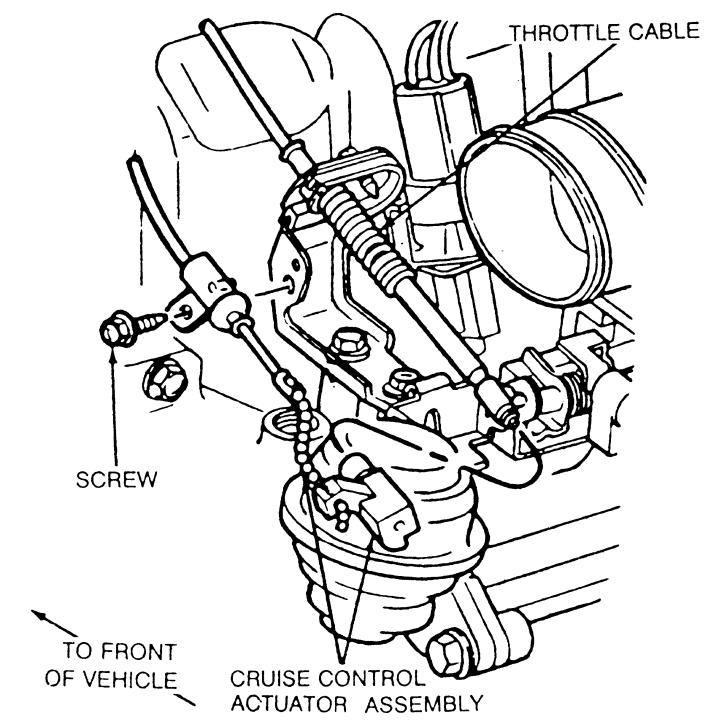


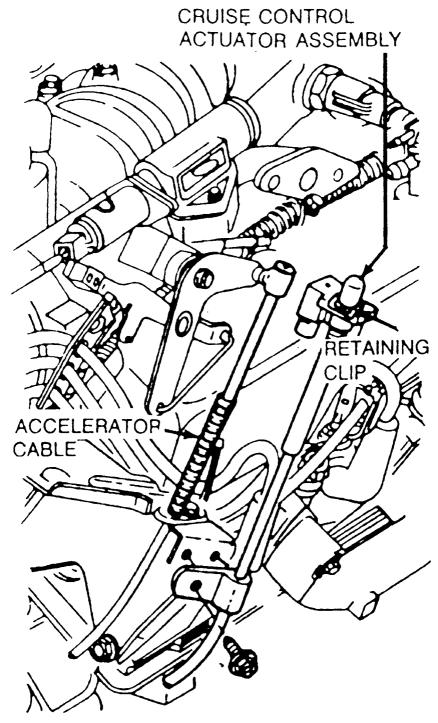
TYPICAL REPAIR USING THE EYELET TERMINAL FUSE LINK OF THE SPECIFIED GAUGE FOR ATTACHMENT TO A CIRCUIT WIRE END

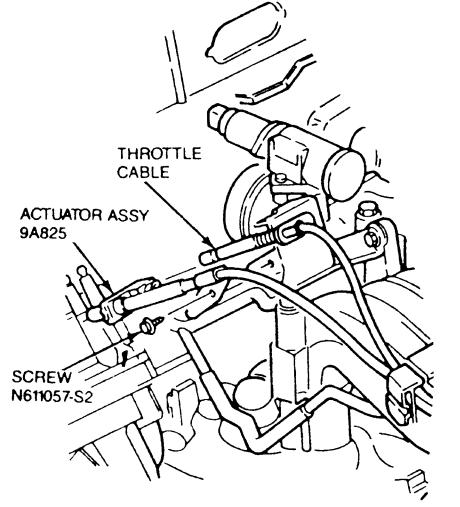


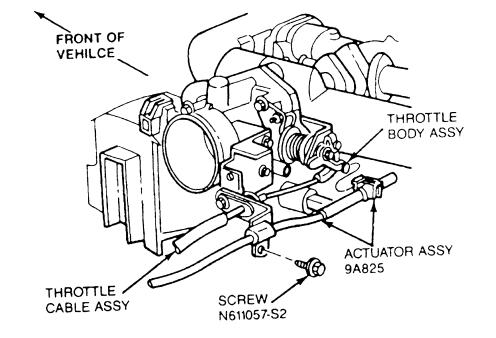
FUSIBLE LINK REPAIR PROCEDURE

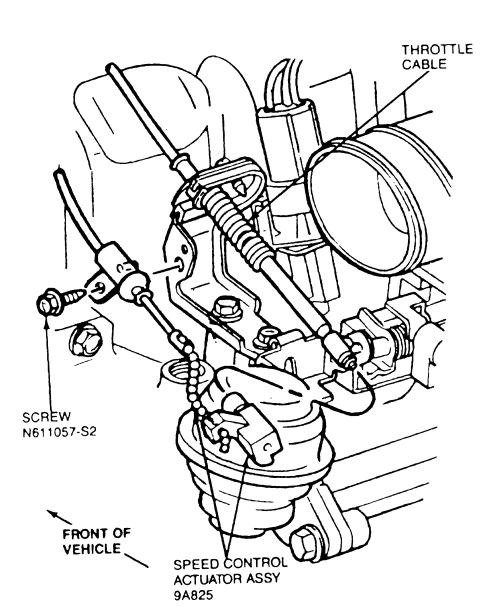


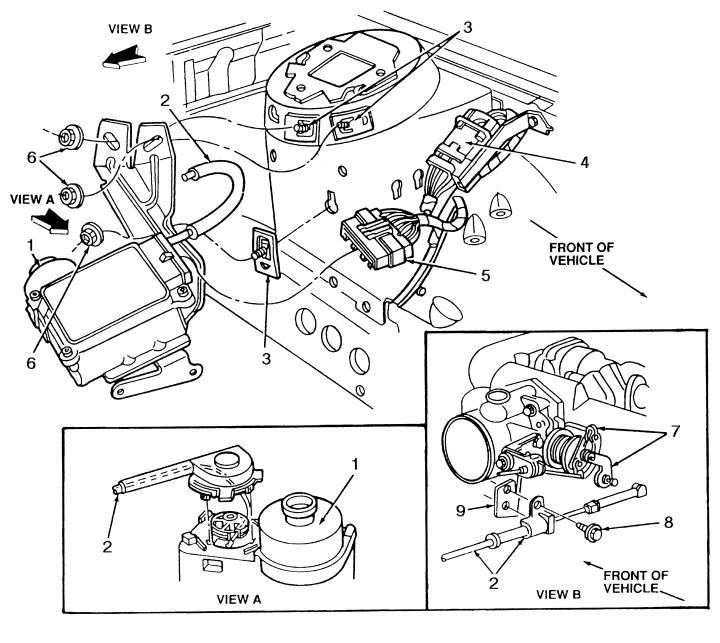








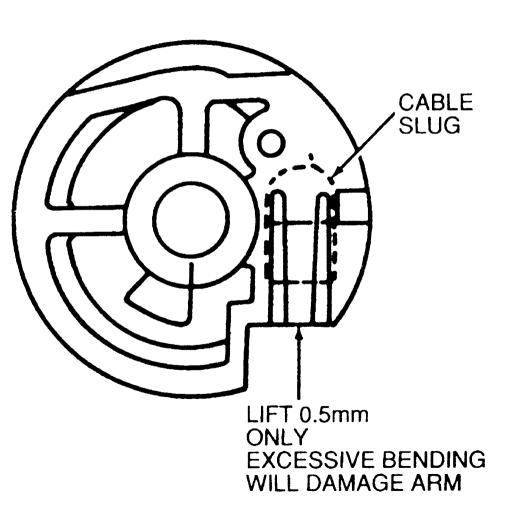


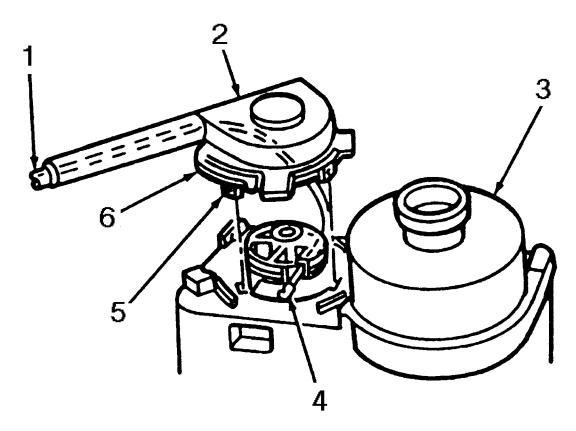


- 1 Speed control servo
- 2 Actuator assy
- 3 Bolt and retainer (3 req'd)
- 4 Wiring assy

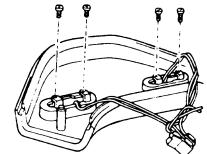
- 5 Wiring assy
- 6 Nut (3 req'd)
- 7 Throttle control assy
- 8 Screw9 Accelerator shaft bracket

PULLEY WITH PLASTIC LOCKING ARM

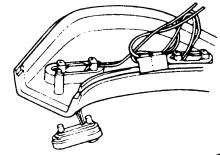




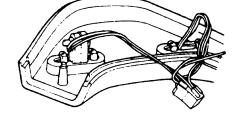
- 1 Actuator assy
- 2 Actuator cable cap
- 3 Speed control servo
- 4 Cable ball slug
- 5 Cap locking tabs
- 6 Locking arm



TO REMOVE SWITCH
ASSY, REMOVE SCREWS
AND PUSH ON
BACK OF SWITCH

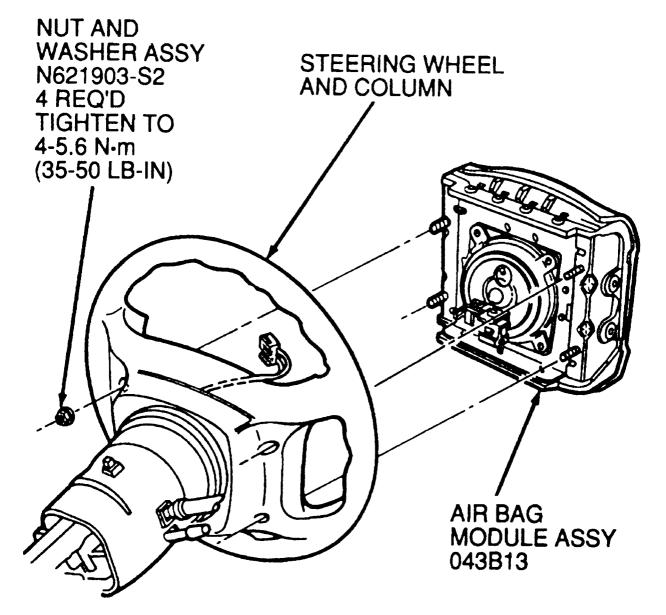


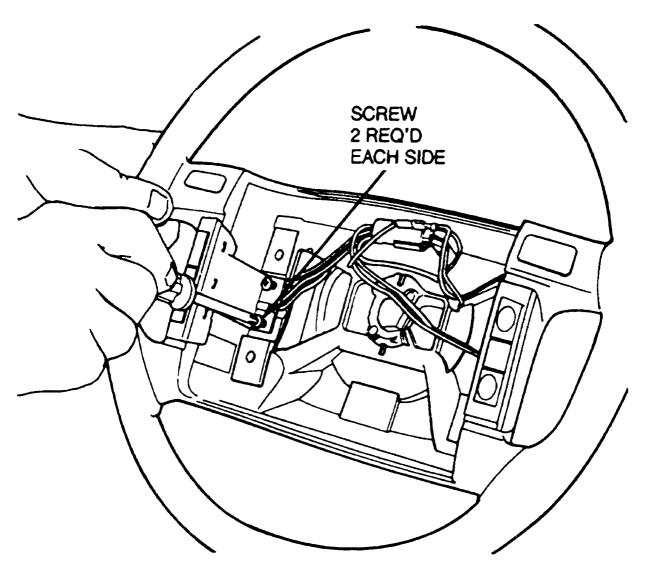


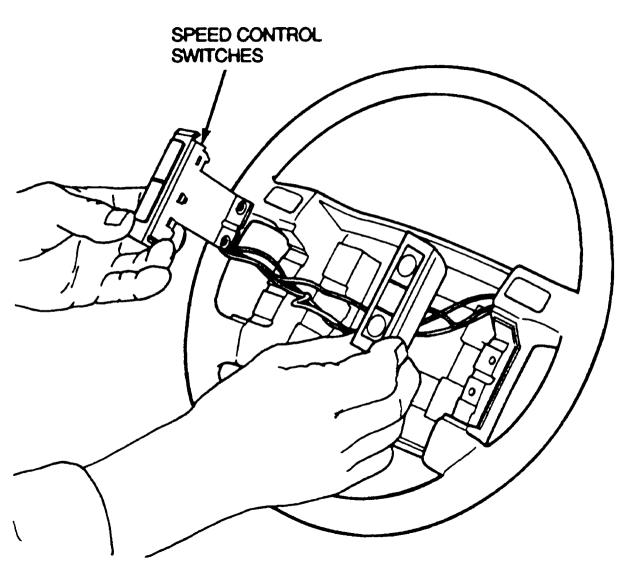


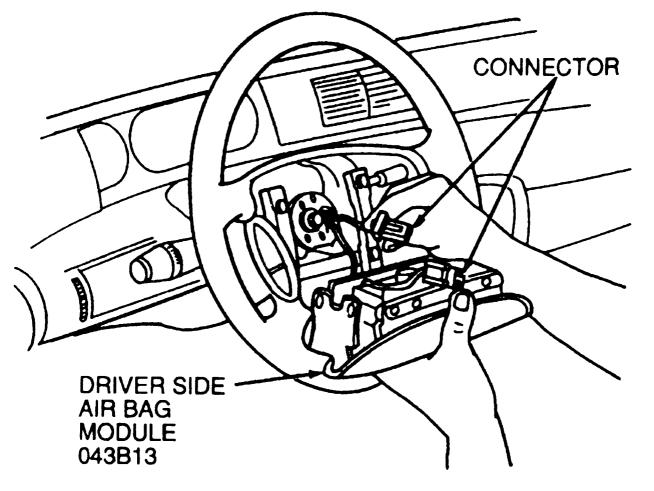
3 INSERT END OF SWITCH INTO HOLE AND REMOVE SWITCH.

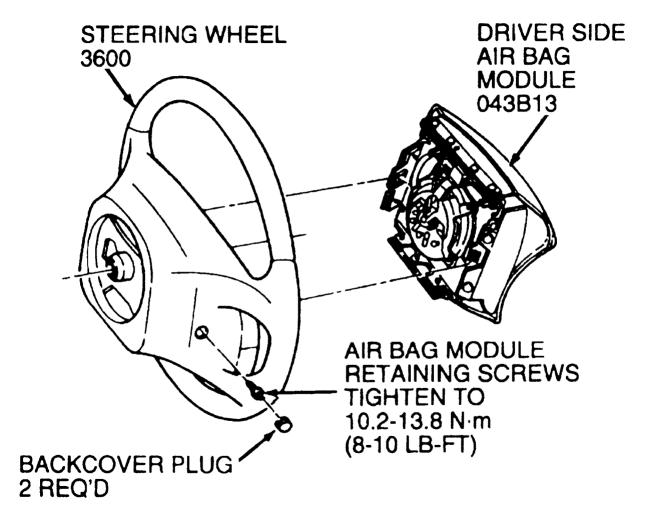
TO INSTALL SWITCH ASSY, REVERSE PROCEDURE

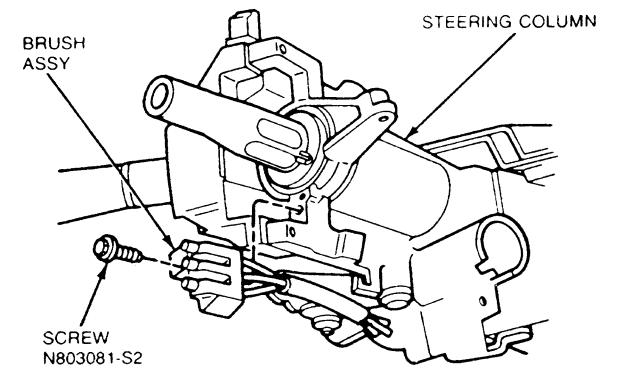


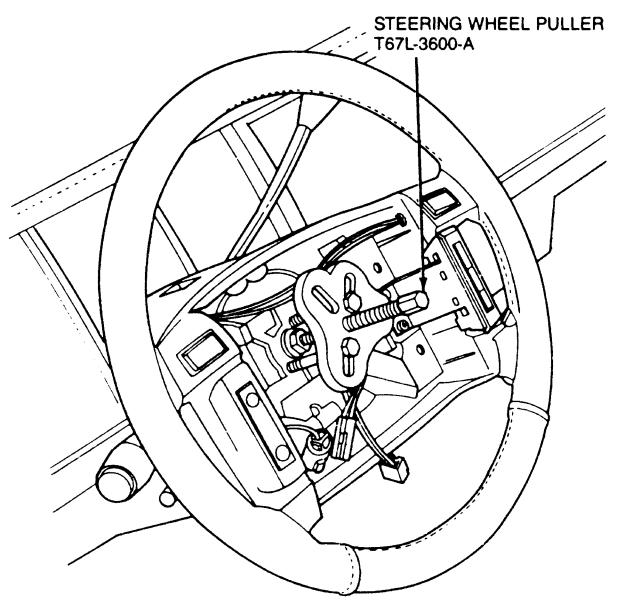


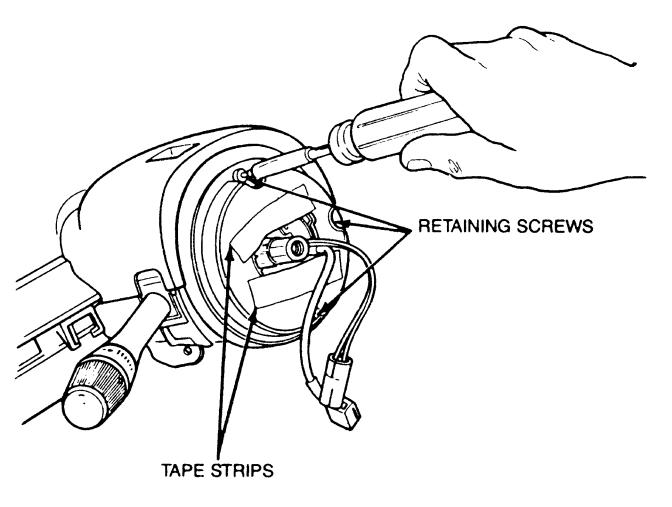


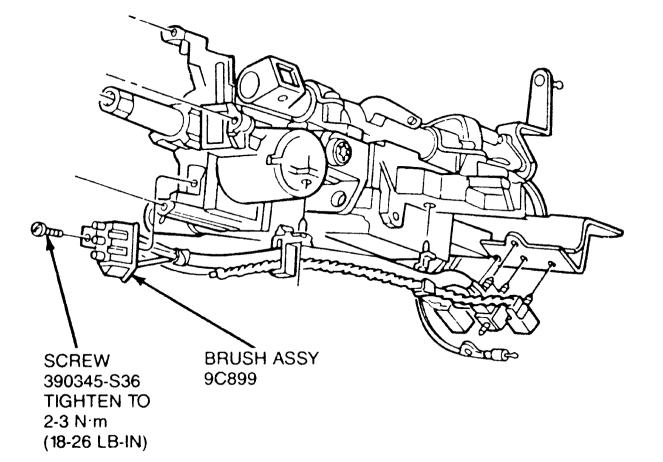


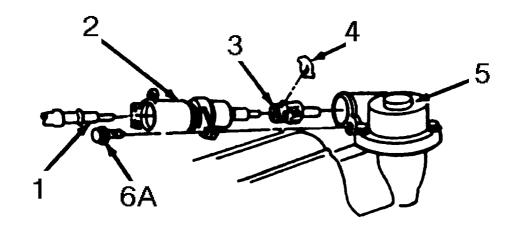




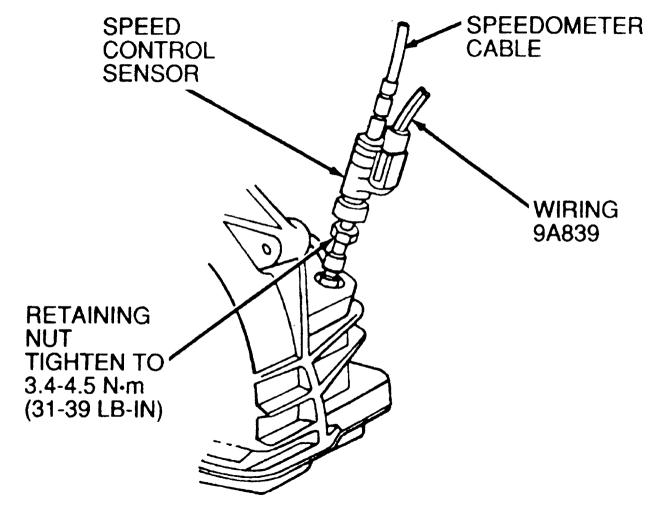


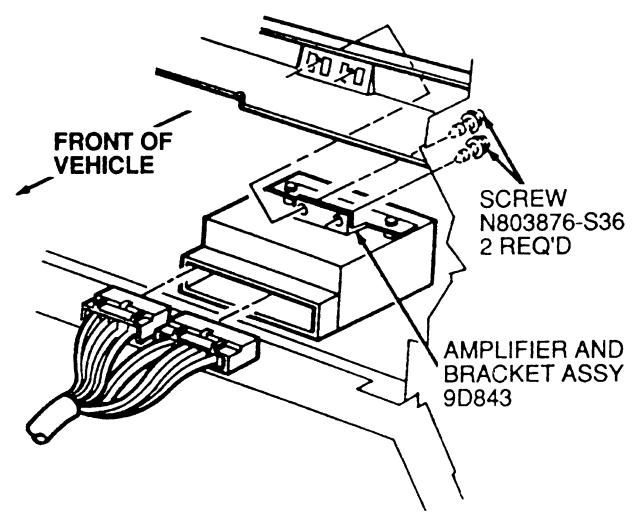


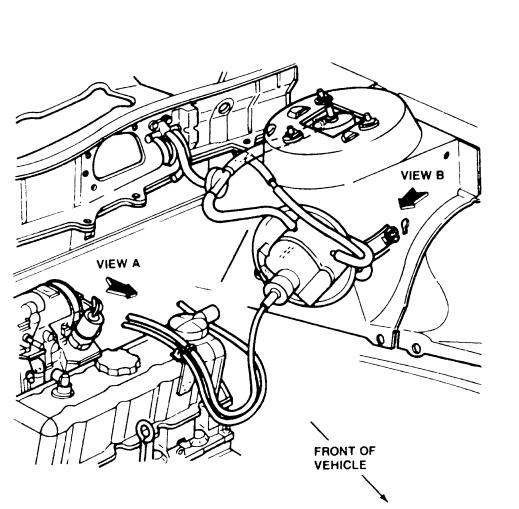


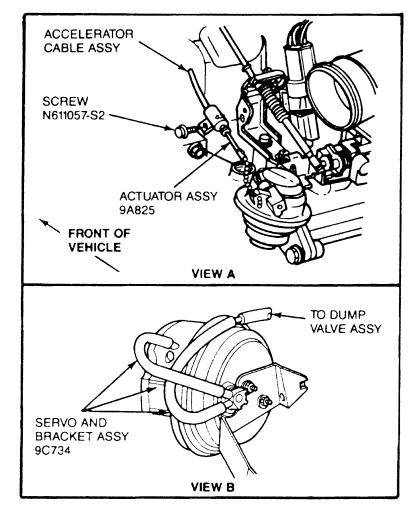


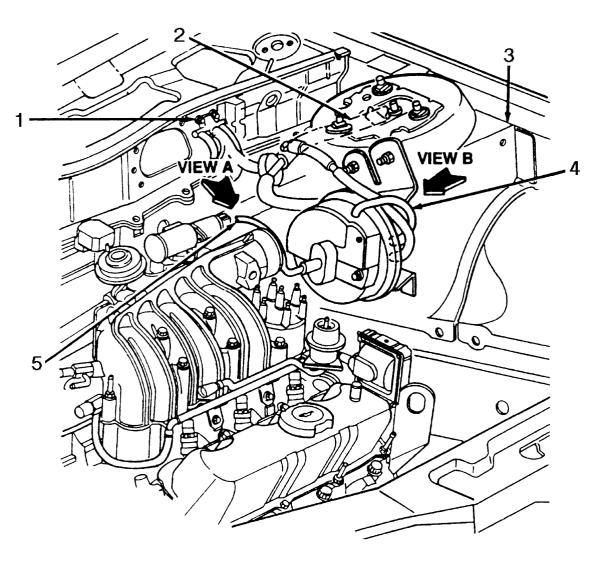
- Speed control cable and vehicle speed sensor
- 2 Vehicle speed sensor
- 3 Speedometer driven gear
- 4 Speedometer driven gear retainer
- 5 Speedometer cover
- 6 Bolt
- A Tighten to 3.4-4.5 Nm (31-39 lb.in.)

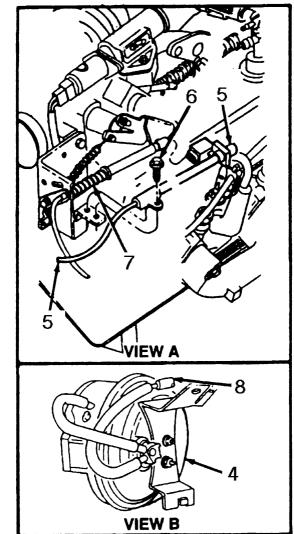






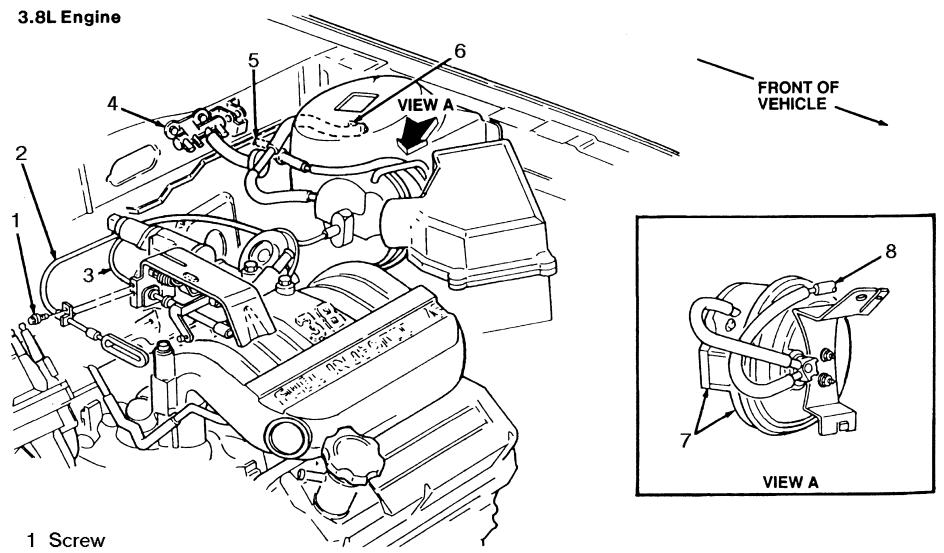






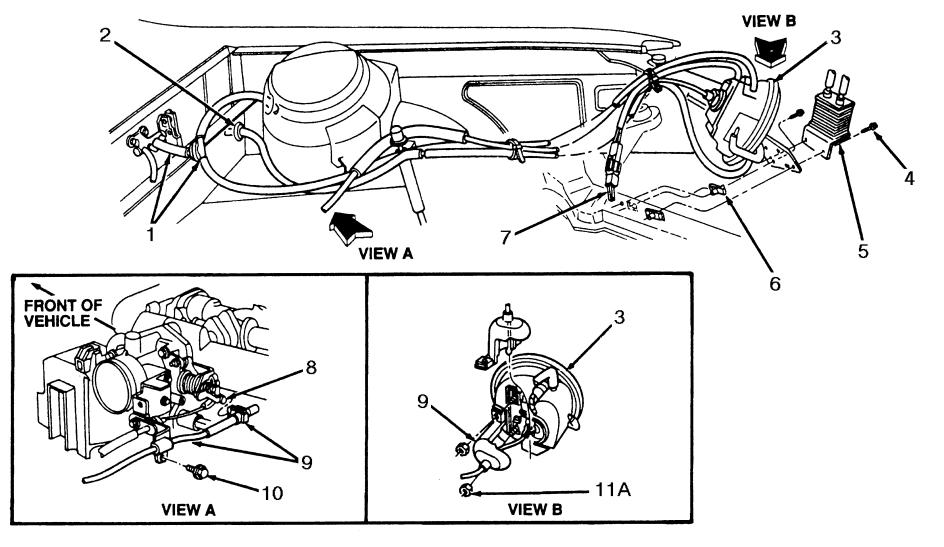
- 1 Vacuum distribution block
- 2 Check valve to speed control vacuum reservoir hose (bulk hose)
- 3 Driver's side shock tower (part of unibody)

- 4 Speed control servo
- 5 Speed control actuator
- 6 Screw
- 7 Accelerator cable
- 8 Speed control dump valve hose (bulk hose)



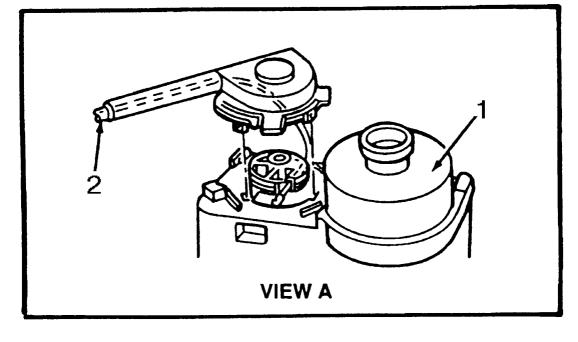
- 2 Speed control actuator
- 3 Accelerator cable
- 4 Vacuum outlet manifold
- 5 Speed control dump valve hose (bulk hose)

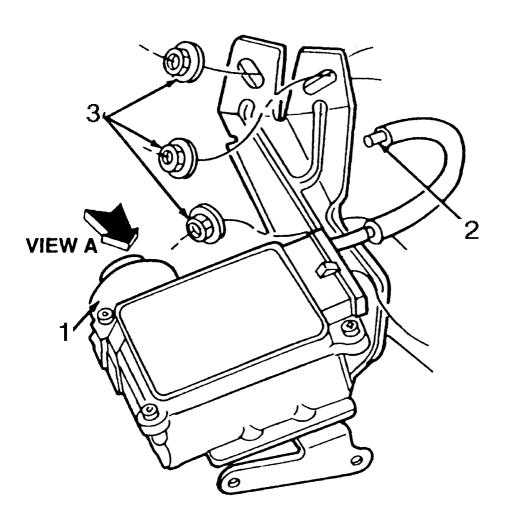
- 6 Vacuum reservoir assy hose
- 7 Speed control servo
- 8 Speed control dump valve hose (bulk hose)



- Vacuum manifold
- 2 To speed control metering (dump) valve
- 3 Speed control servo
- 4 Bolt (2 req'd)
- 5 Power steering oil cooler
- 6 U-nut (2 req'd)

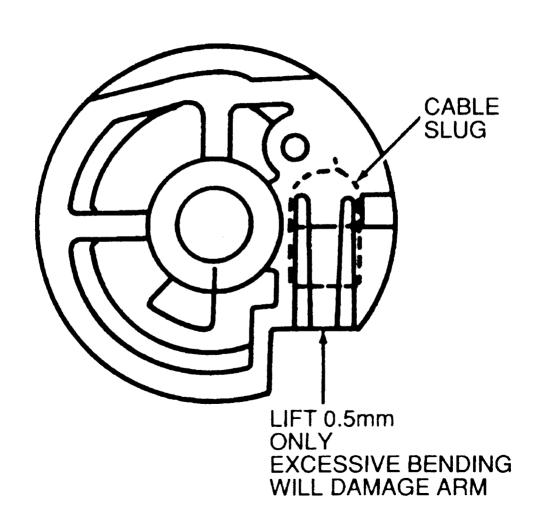
- 7 Wiring assy
- 8 Attachment point for speed control actuator
- 9 Speed control actuator
- 10 Screw
- 11A Nut (2 req'd)
 - A Tighten to 9.5-12 Nm (7-8 lb.ft.)

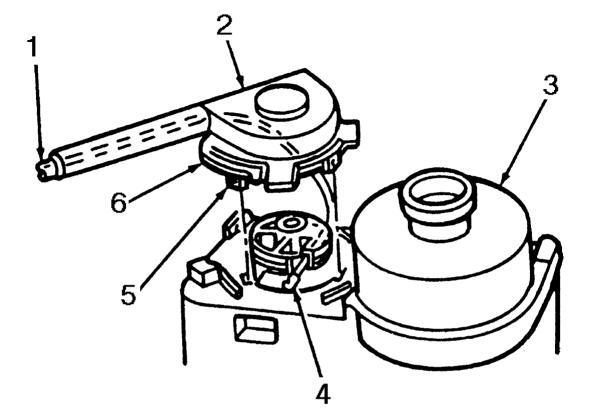




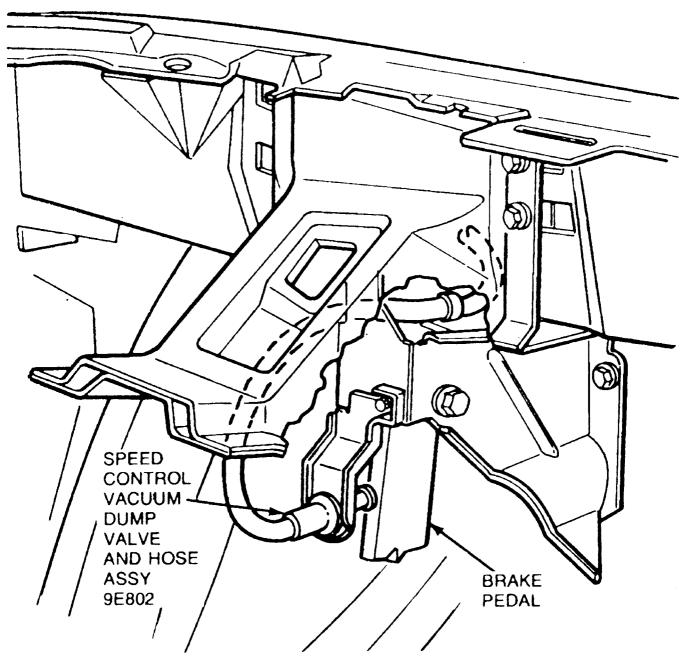
- 1 Speed control servo
- 2 Actuator assy
- 3 Nut (3 req'd)

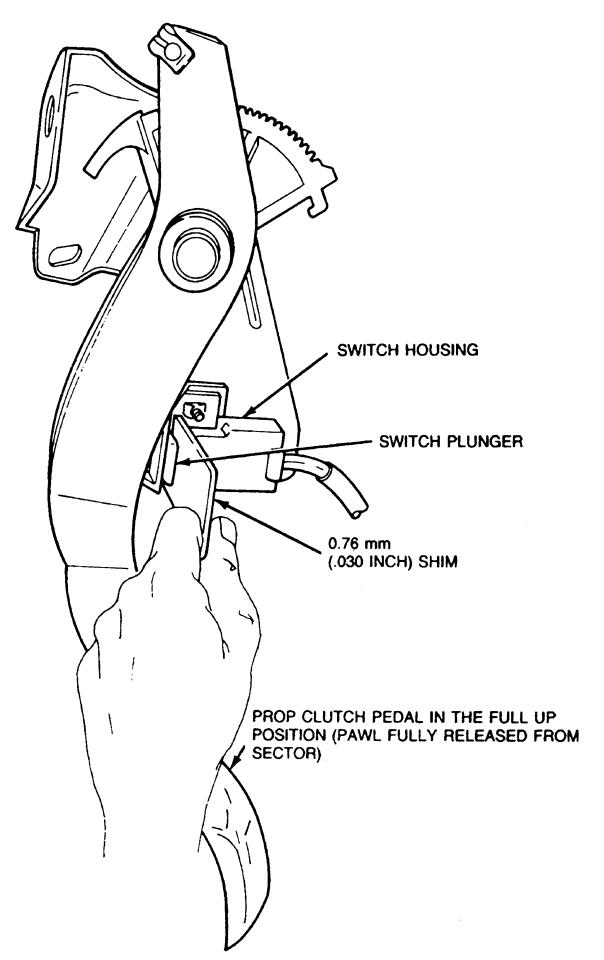
PULLEY WITH PLASTIC LOCKING ARM

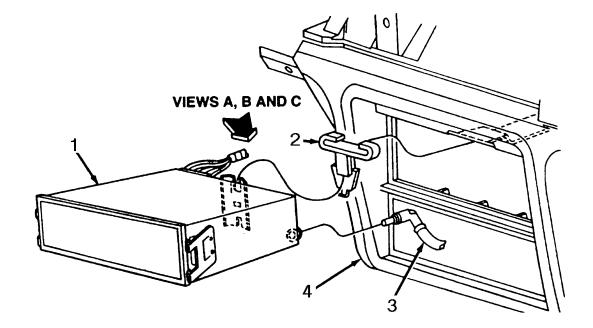


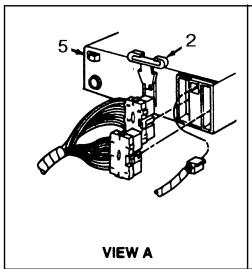


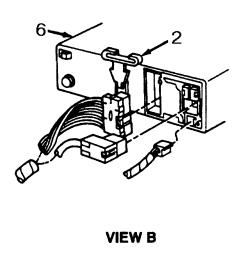
- Actuator assy
- 2 Actuator cable cap
- 3 Speed control servo
- 4 Cable ball slug
- 5 Cap locking tabs
- 6 Locking arm

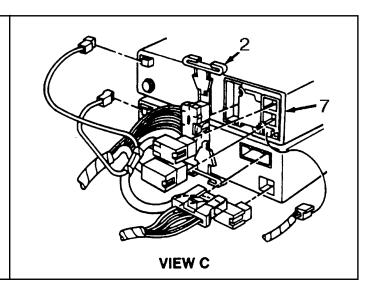






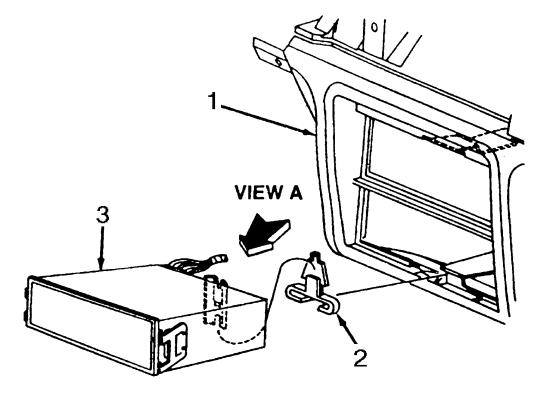


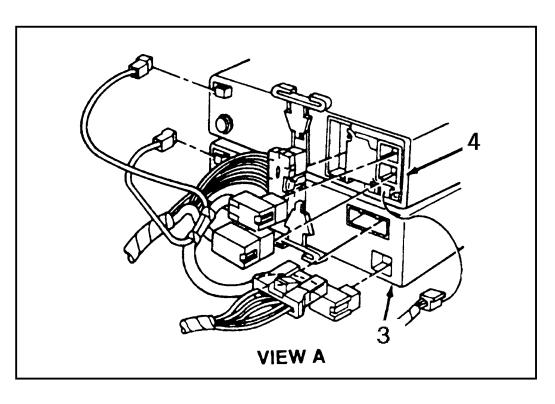




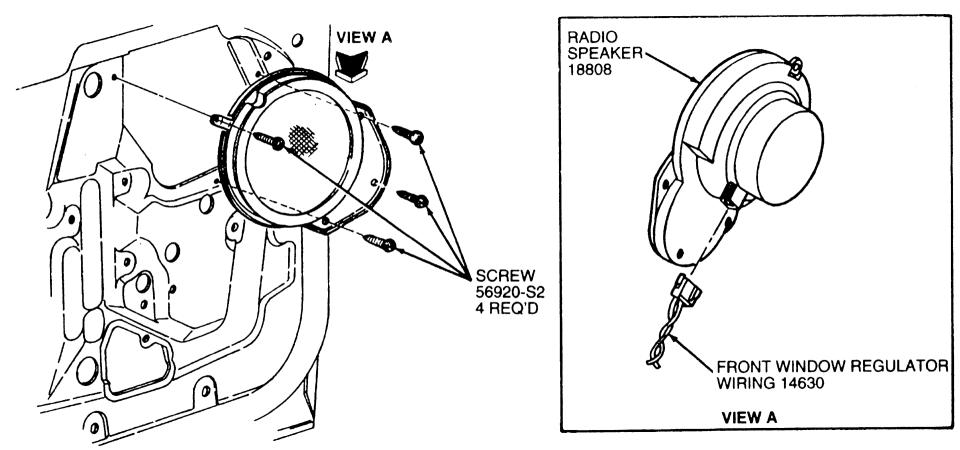
- 1 ESR radio chassis, ESC radio chassis or PAC radio chassis
- 2 Radio chassis support
- 3 Radio antenna lead in cable

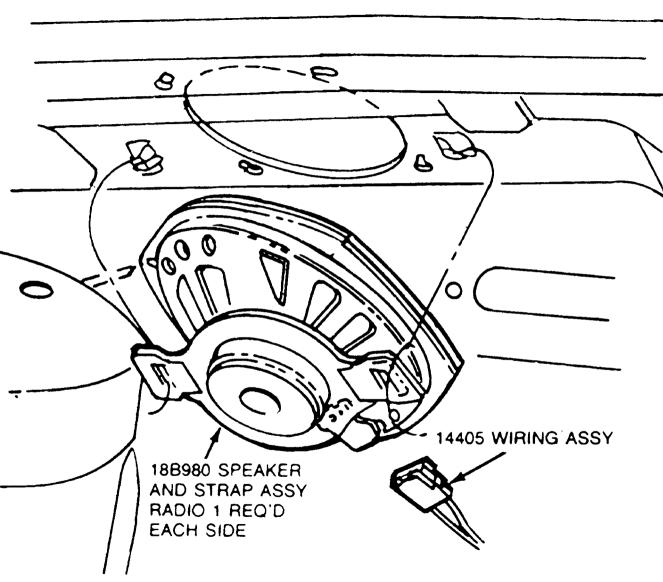
- 4 Instrument panel
- 5 ESR radio chassis
- 6 ESC radio chassis
- 7 PAC radio chassis

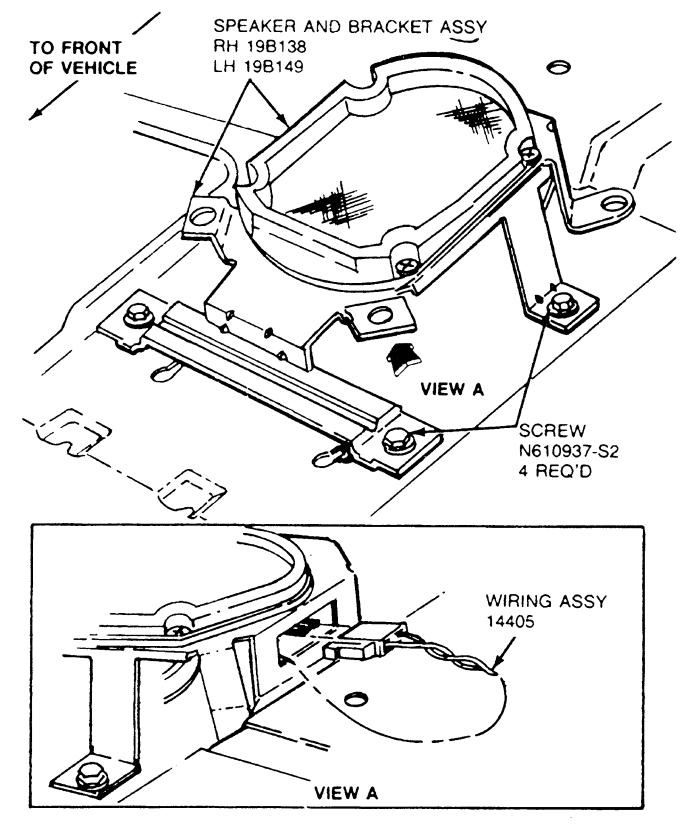




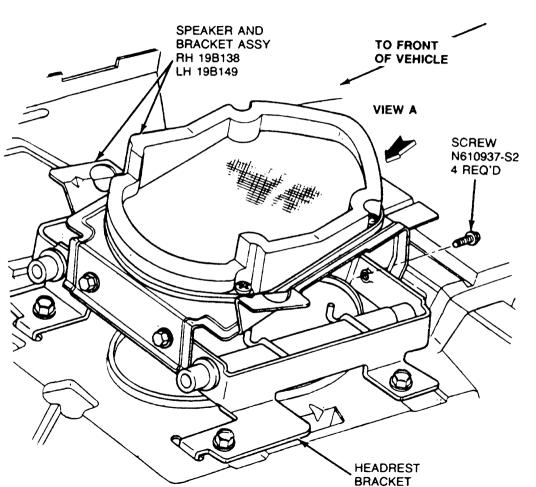
- 1 Instrument panel
- 2 Radio chassis support
- 3 Digital audio compact disc player
- 4 PAC radio chassis

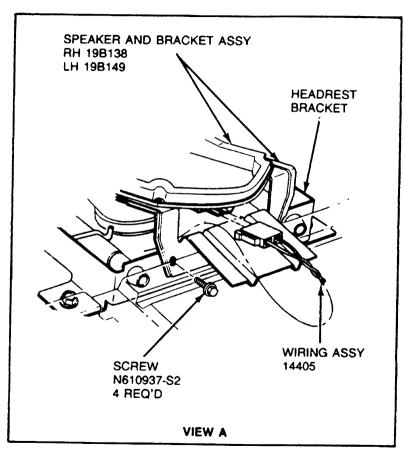


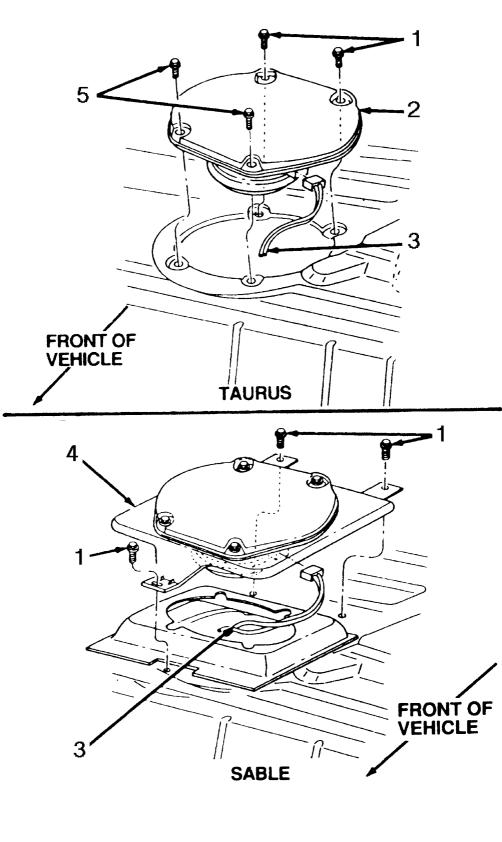




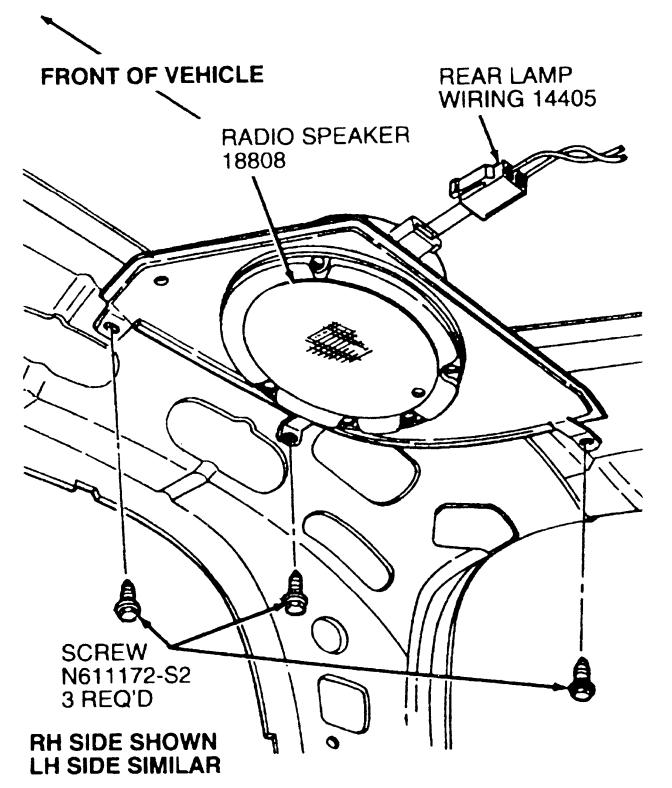
Sable

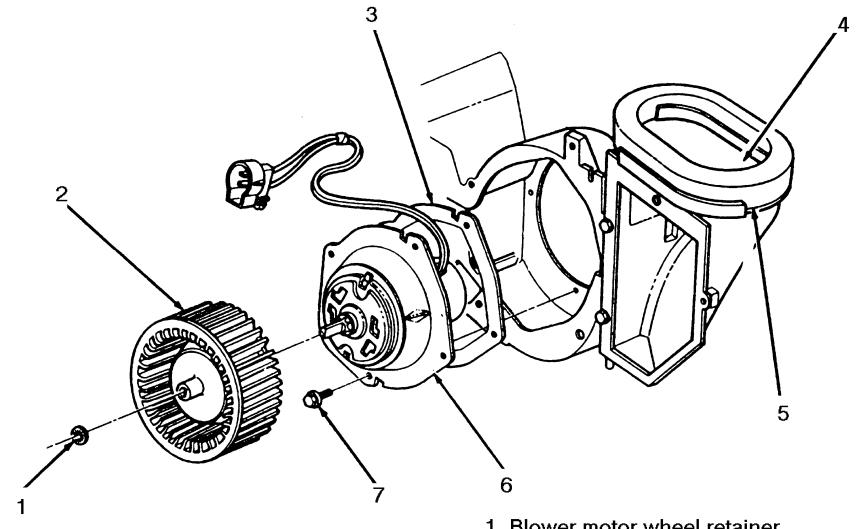




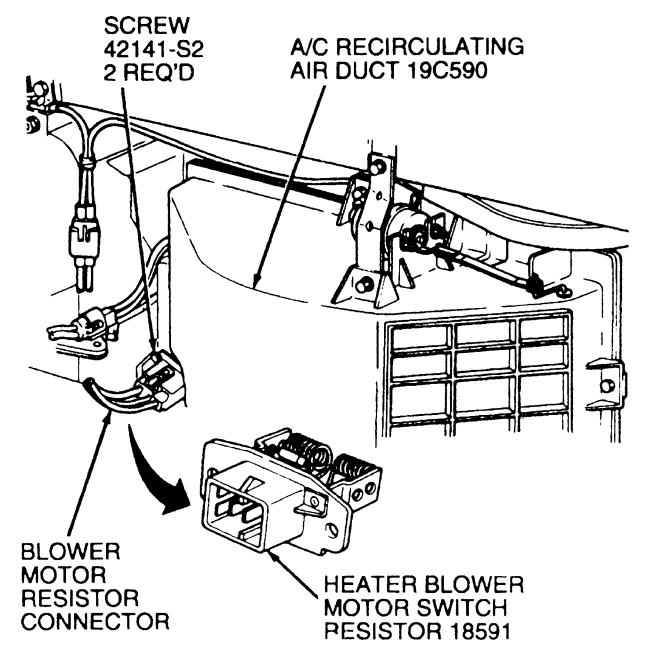


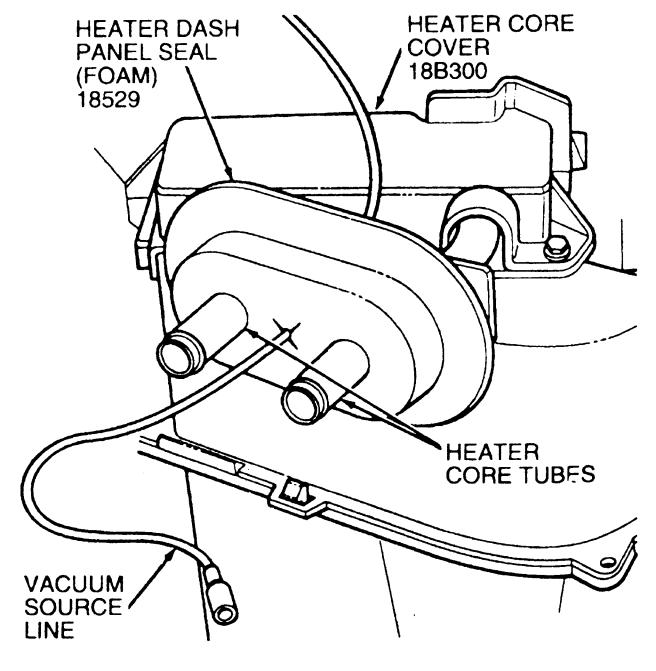
- 1 Screw
- 2 Radio speaker
- 3 Radio amplifier wiring
- 4 Radio speaker mounting bracket

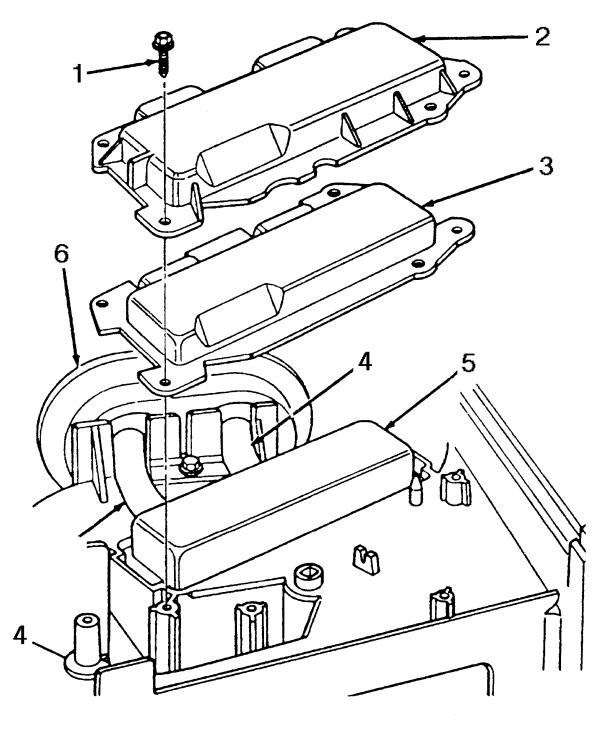




- Blower motor wheel retainer
- 2 Blower motor wheel
- 3 Blower motor seal
- 4 Air inlet duct capper seal
- 5 A/C air inlet duct
- 6 Heater blower motor
- 7 Screw (4 req'd)

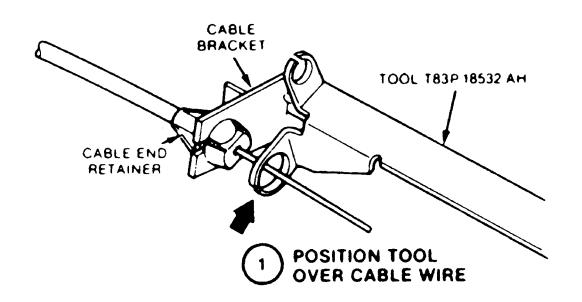


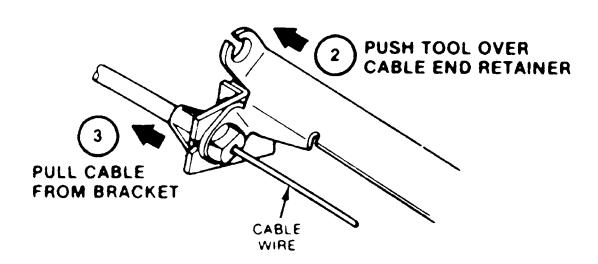




- 1 Screw (4 req'd)
- 2 Heater core cover
- 3 Heater core cover seal
- 4 Heater core tubes
- 5 Heater core
- 6 Heater dash panel seal

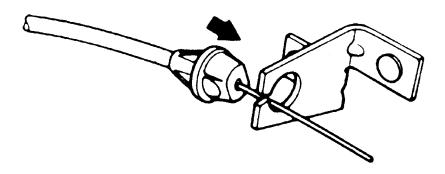
REMOVAL

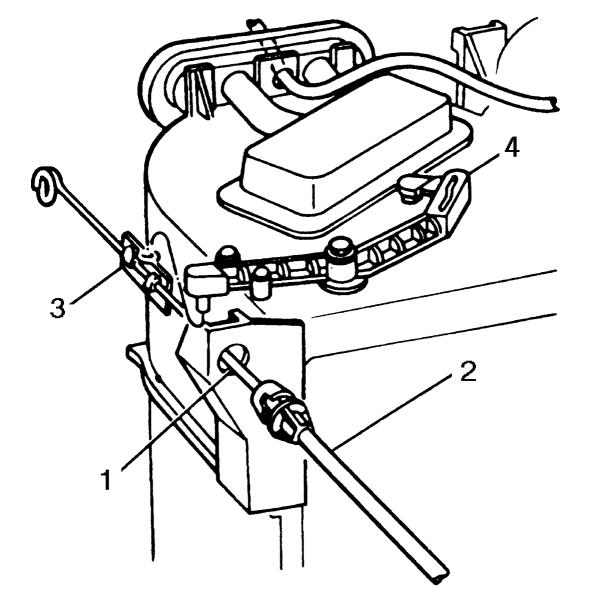




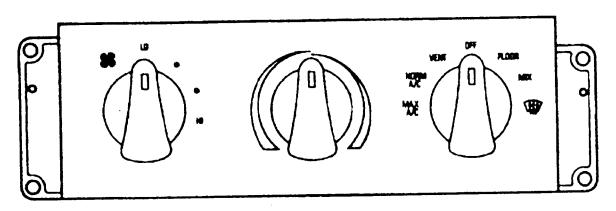
INSTALLATION

PUSH CABLE END RETAINER INTO BRACKET UNTIL LATCHED WITH BRACKET

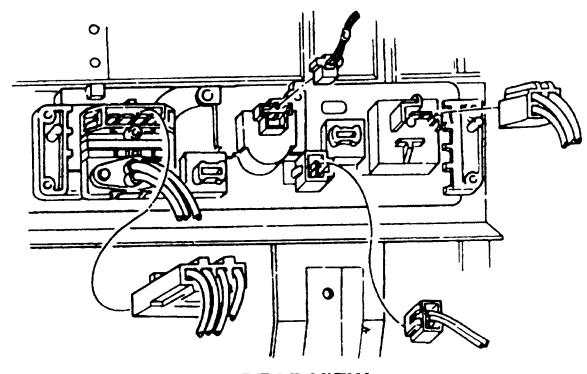




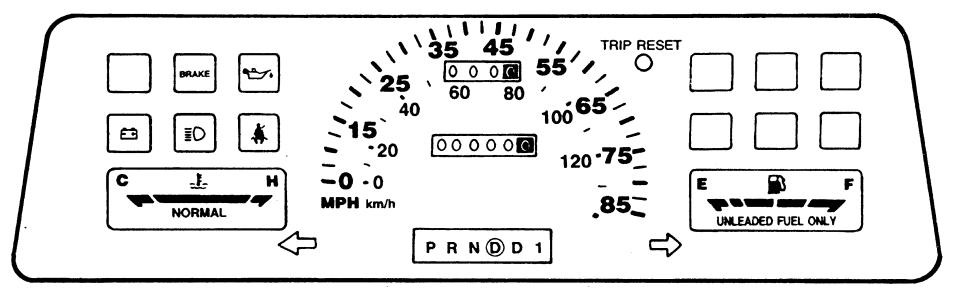
- 1 Control cable
- 2 Control cable assembly
- 3 Self adjusting clip
- 4 Temperature blend door crank arm

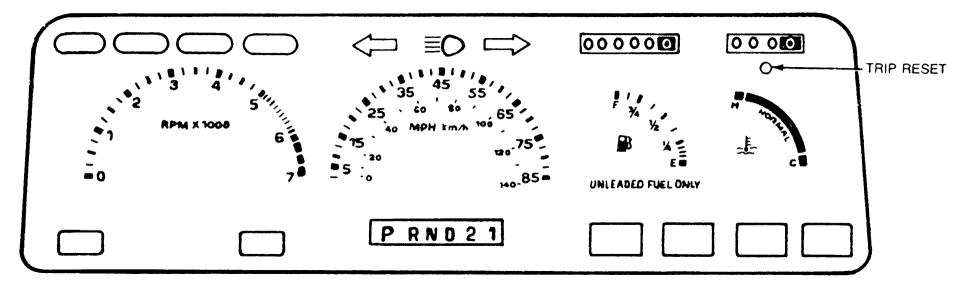


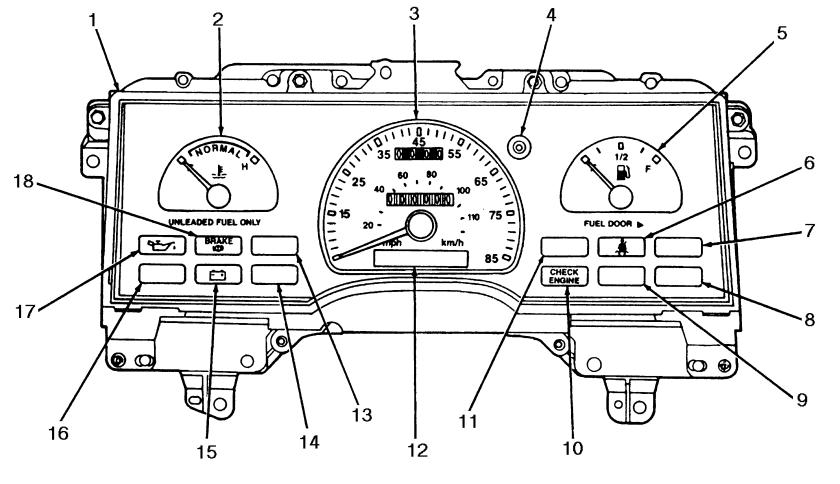
FRONT VIEW



REAR VIEW

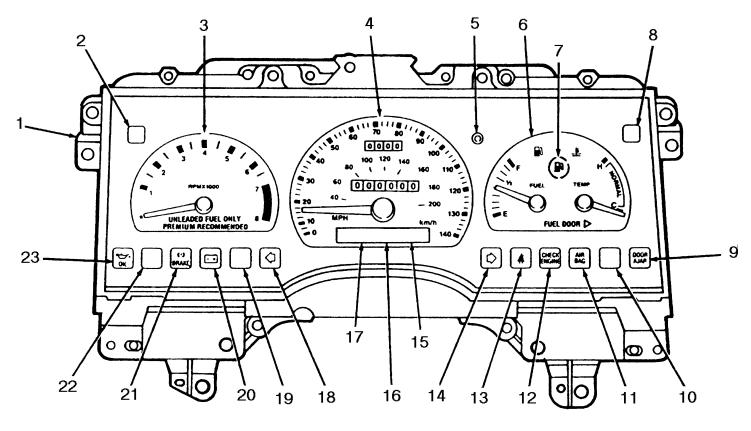






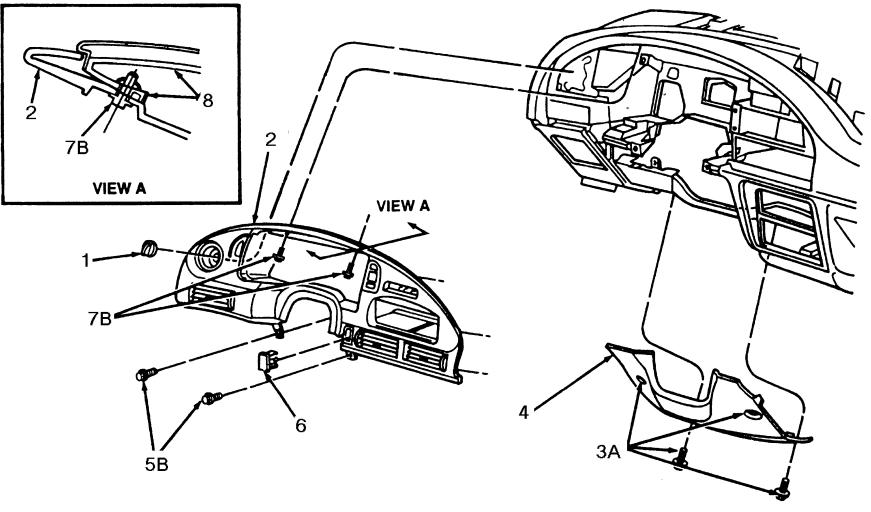
- Instrument cluster
- 2 Engine coolant temperature gauge
- 3 Speedometer
- 4 Odometer reset shaft
- 5 Fuel gauge
- 6 Safety belt indicator
- 7 Liftgate ajar indicator (wagon only)
- 8 Air bag readiness indicator lamp
- 9 Malfunction indicator lamp (MIL)

- 10 RH turn signal indicator
- 11 Transmission range indicator (automatic transaxle only)
- 12 LH turn signal indicator
- 13 High beam indicator
- 14 Charging system indicator
- 15 Anti-lock indicator (optional)
- 16 Low oil pressure indicator
- 17 Brake system indicator



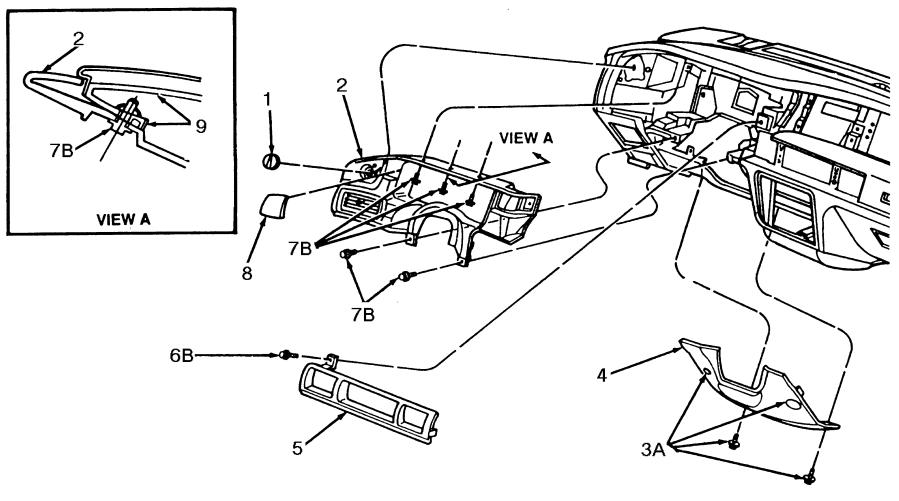
- 1 Instrument cluster
- 2 Low washer fluid indicator
- 3 Tachometer
- 4 Speedometer
- 5 Odometer reset shaft
- 6 Fuel gauge
- 7 Low fuel indicator
- 8 Lamp out indicator
- 9 Door ajar indicator10 Low oil indicator
- 11 Air bag readiness indicator
- 12 Malfunction indicator lamp
- 13 Safety belt indicator

- 14 RH turn signal indicator
- 15 Transmission range indicator (Automatic transaxle non-floor shift only)
- 16 Transmission control indicator only (Taurus SHO only)
- 17 Engine coolant level indicator (Taurus SHO only)
- 18 LH turn signal indicator19 High beam indicator
- 20 Charging system (Amp) indicator
- 21 Brake warning indicator
- 22 Anti-lock indicator
- 23 Low oil pressure indicator



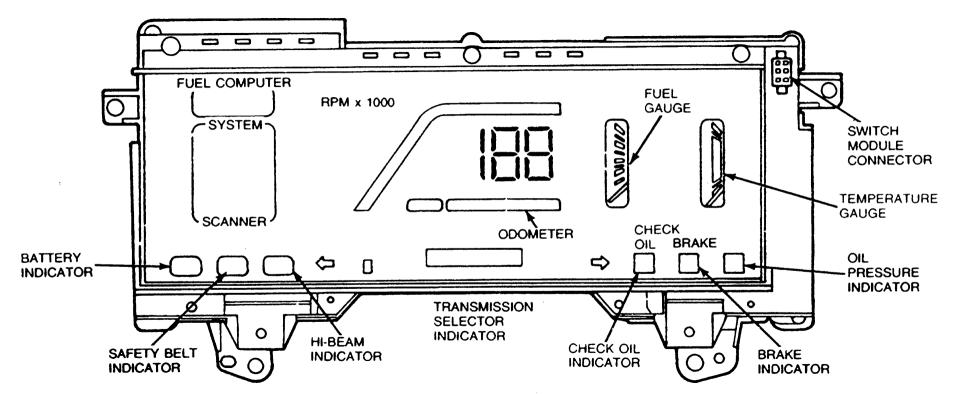
- 1 Lamp switch knob assy
- 2 Instrument panel finish panel
- 3 Screw (4 req'd)
- 4 Steering column opening cover assy
- 5 Lower instrument panel cluster screws (2 req'd)
- 6 Instrument panel control opening cover assy

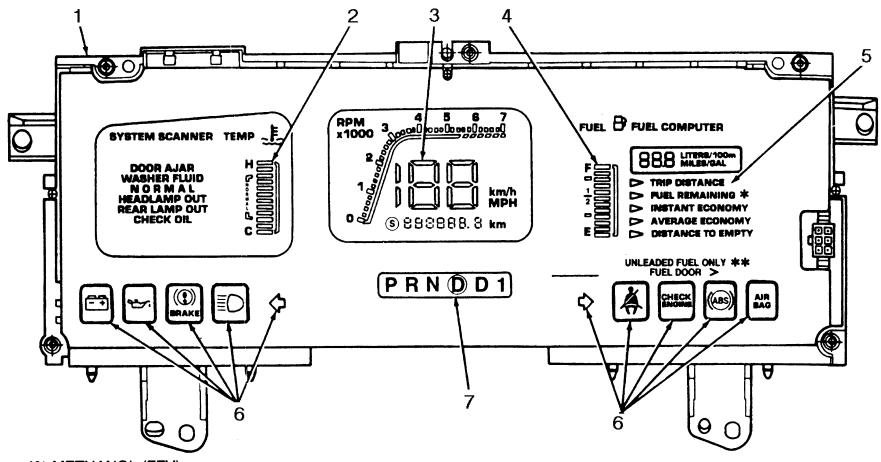
- 7 Upper instrument panel cluster screws (2 req'd)
- 8 Instrument panel cover and pad assy
- A Tighten to 9-14 Nm (80-124 lb.in.)
- B Tighten to 2-3 Nm (18-27 lb.in.)



- 1 Lamp switch knob assy
- 2 Instrument panel cluster assy
- 3 Screw (4 req'd)
- 4 Steering column opening cover assy
- 5 Instrument panel upper center finish panel assy
- 6 Instrument panel upper center finish panel screw

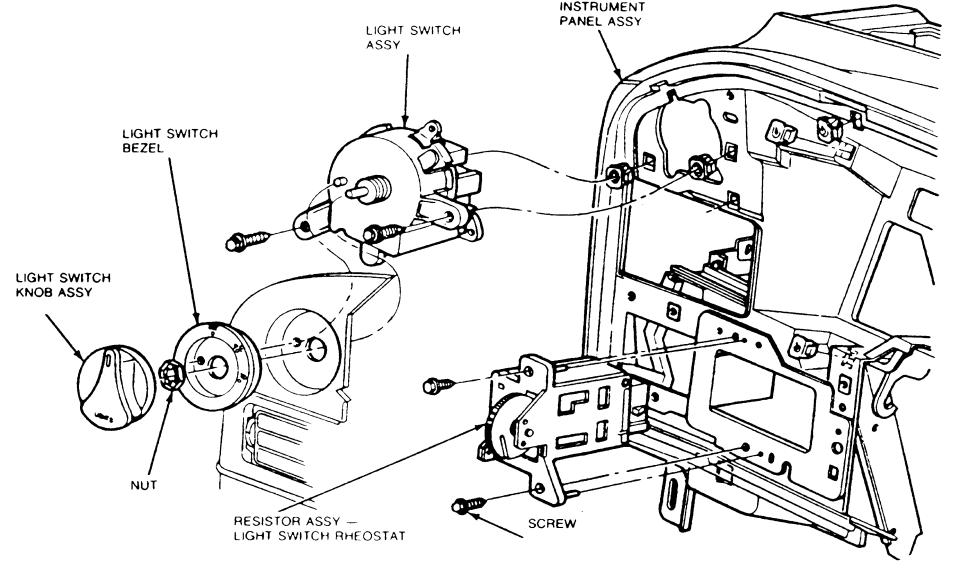
- 7 Instrument panel cluster assy screws (5 req'd)
- 8 Instrument panel control
- 9 Instrument panel cover and pad assy
- A Tighten to 9-14 Nm (80-124 lb.in.)
- B Tighten to 2-3 Nm (18-27 lb.in.)

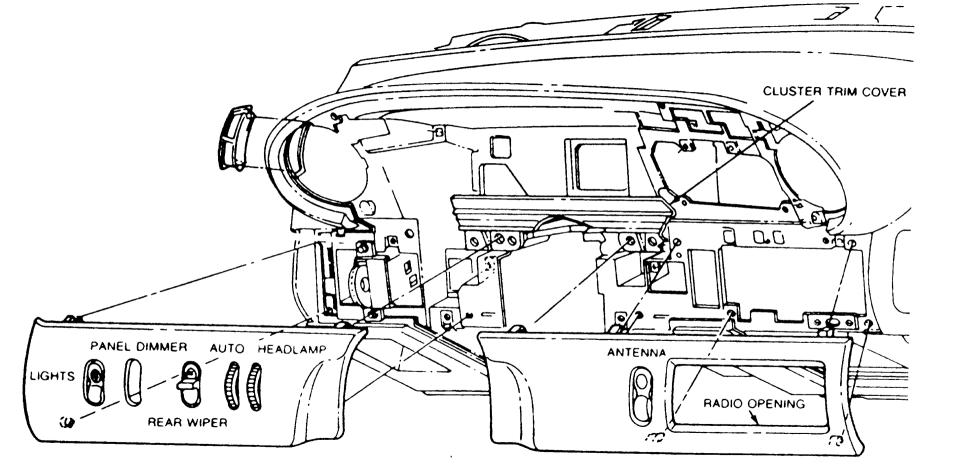


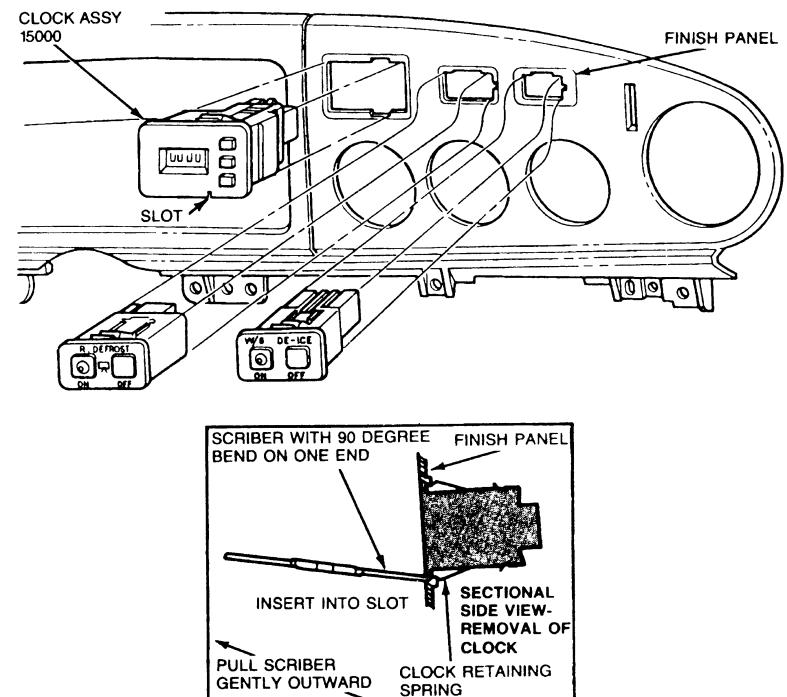


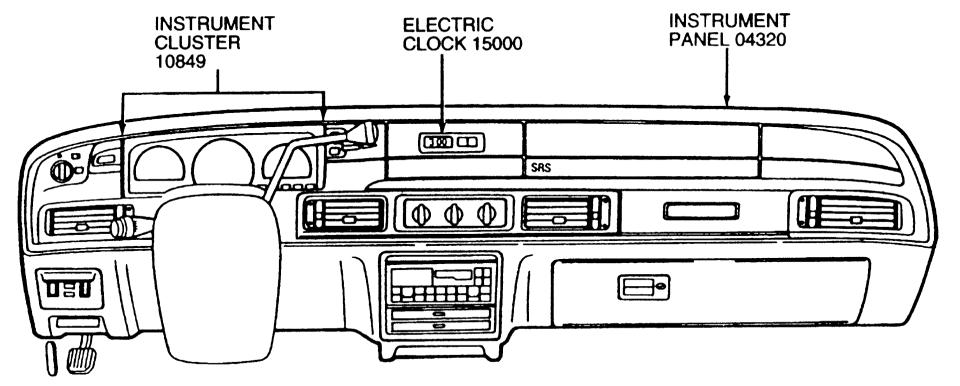
*% METHANOL (FFV)
**METHANOL FUEL OR UNLEADED GASOLINE ONLY (FFV)

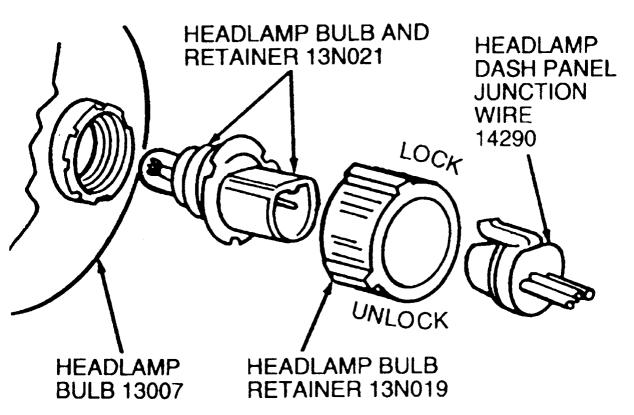
- Instrument cluster
- 2 Coolant temperature gauge
- 3 Speedometer/Odometer/Tachometer
- 4 Fuel gauge
- 5 Message center
- 6 Warning indicators
- 7 Transmission control selector indicator

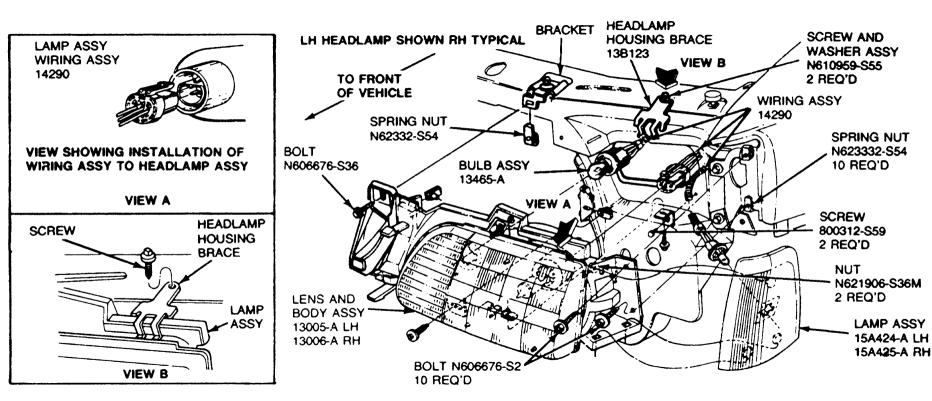


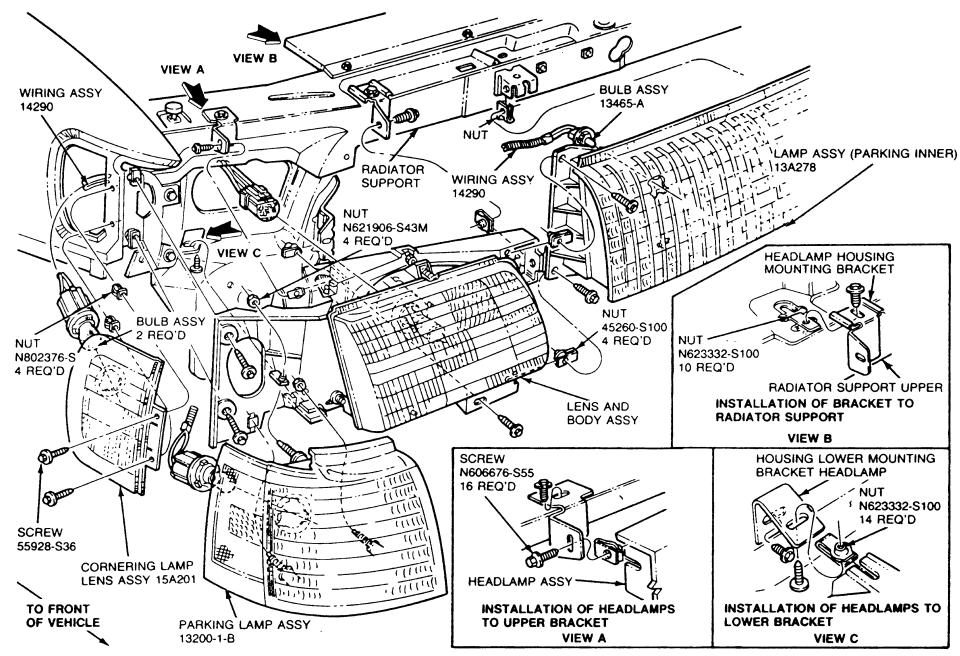


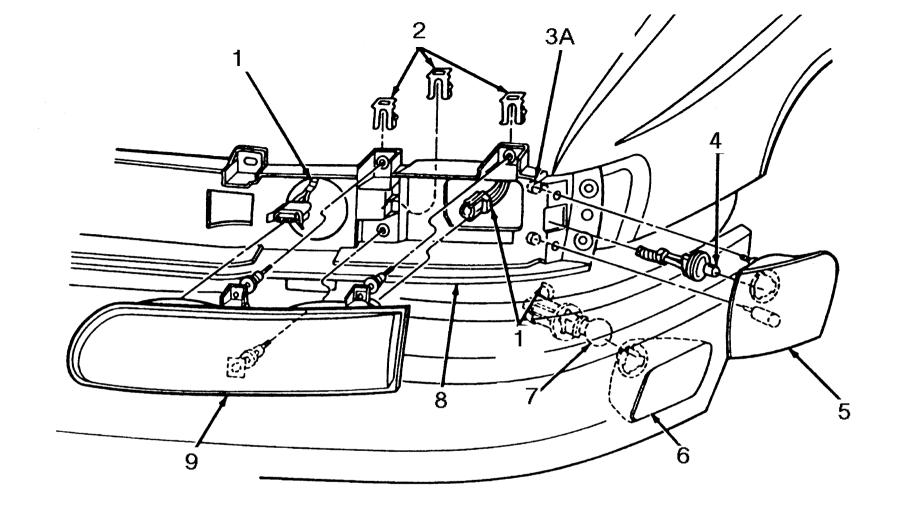






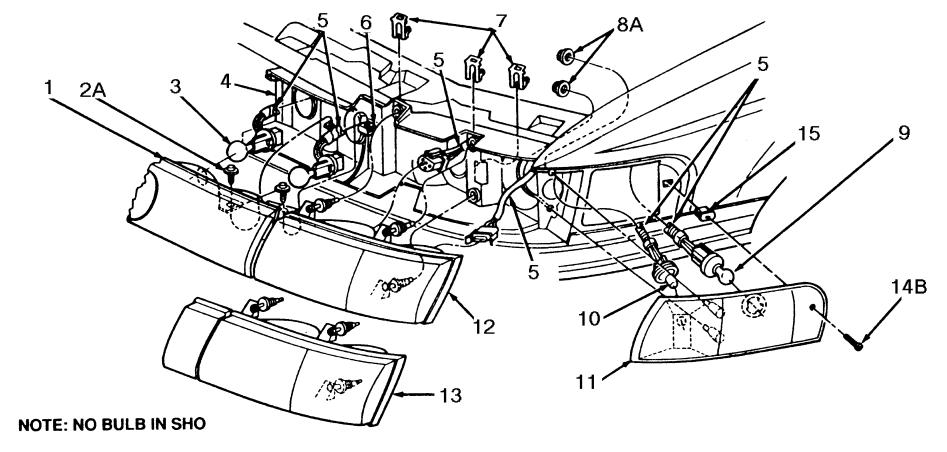






- Headlamp dash panel junction wire
- 2 Headlamp mounting clip (6 req'd)
- 3 Nut (4 req'd)
- 4 Front fender side Imap socket and wire (2 req'd)
- 5 Front side marker lamp assy

- 6 Cornering lamp (part of bumper assy)
- 7 Miniature bulb (2req'd)
- 8 Front bumper
- 9 Headlamp assy
- A Tighten to 5.2-7.2 Nm (47-63 lb.in.)



- 1 Parking lamp (Sable)
- 2 Screw (4 req'd)
- 3 Headlamp bulb and retainer (4 reg'd)
- 4 Grille opening panel reinforcement
- 5 Headlamp dash panel junction wire
- 6 Nut (4 req'd) (Sable)
- 7 Retainer/headlamp (6 req'd)
- 8 Nut (4 req'd)
- 9 Miniature bulb (2 req'd)

- 10 Miniature bulb (2 req'd)
- 11 Lamp assy cornering/side marker
- 12 Headlamp (Sable)
- 13 Headlamp (Taurus SHO)
- 14 Screw
- 15 Nut (2 req'd)
- A Tighten to 5.2-7.2 Nm (47-63 lb.in.)
- B Tighten to 0.8-1.7 Nm (7-15 lb.in.)

Side Marker Lamp, Front

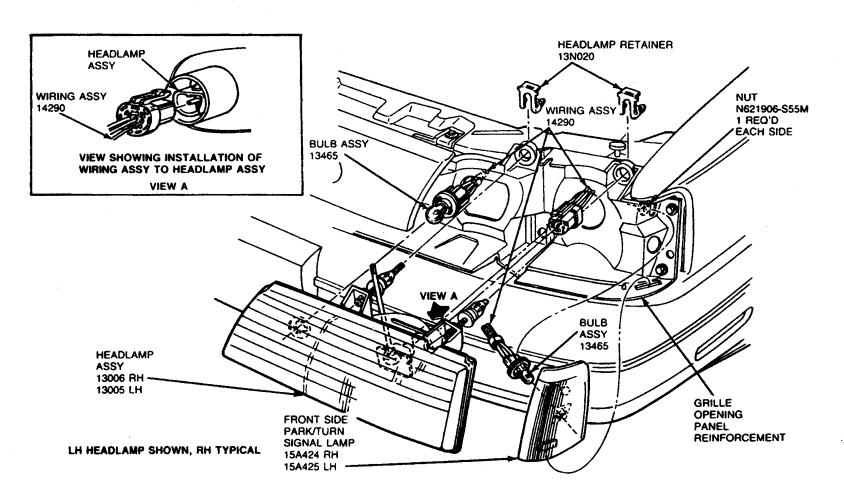
Taurus

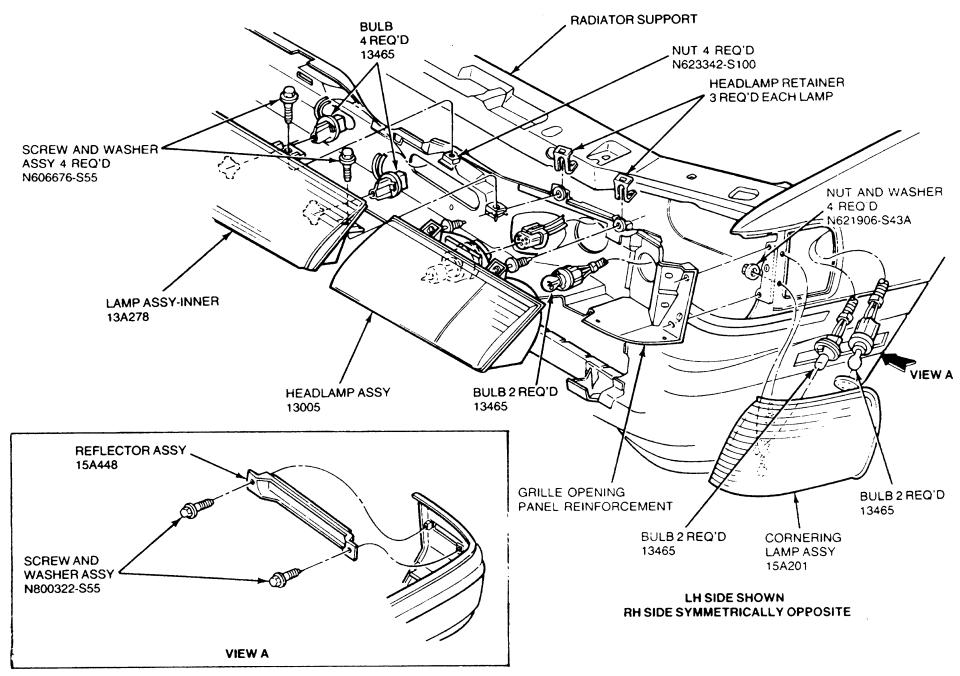
Removal

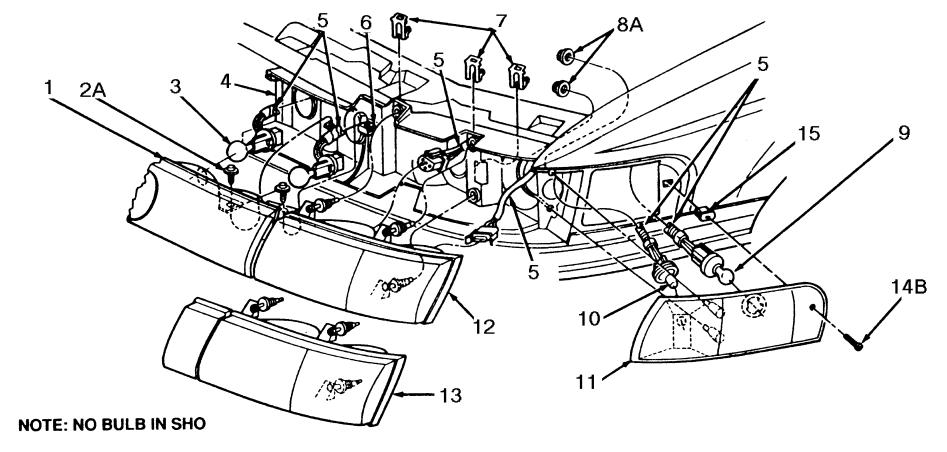
- 1. Remove one nut and washer from attaching stud at top of lamp assembly.
- 2. Rotate top of lamp outboard until stud tip has cleared slot in grille opening reinforcement.
- 3. Lift lamp to clear lower tab from grille opening panel reinforcement.
- 4. Remove bulb socket by twisting

Installation

- 1. Install bulb, if removed, and install bulb socket by twisting clockwise.
- 2. Position lamp in place by inserting tab on bottom of lamp lowering tab into slot on grille opening panel reinforcement.
- 3. Rotate lamp inboard to allow stud to enter upper slot in grille opening reinforcement.



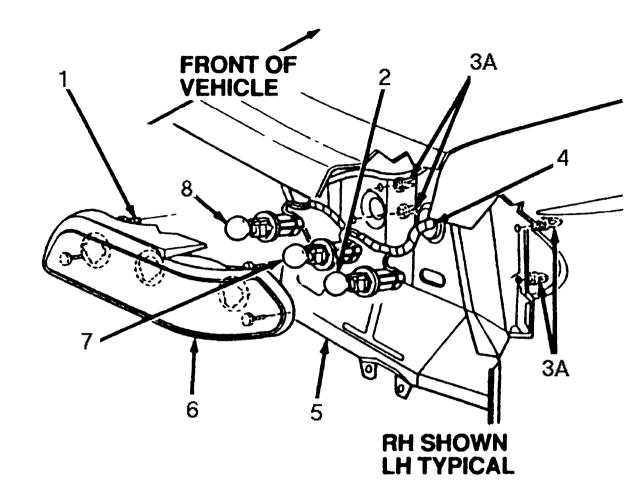




- 1 Parking lamp (Sable)
- 2 Screw (4 req'd)
- 3 Headlamp bulb and retainer (4 reg'd)
- 4 Grille opening panel reinforcement
- 5 Headlamp dash panel junction wire
- 6 Nut (4 req'd) (Sable)
- 7 Retainer/headlamp (6 req'd)
- 8 Nut (4 req'd)
- 9 Miniature bulb (2 req'd)

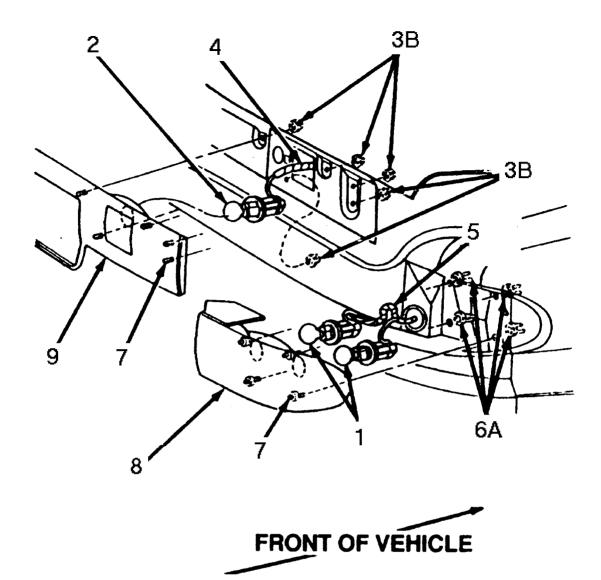
- 10 Miniature bulb (2 req'd)
- 11 Lamp assy cornering/side marker
- 12 Headlamp (Sable)
- 13 Headlamp (Taurus SHO)
- 14 Screw
- 15 Nut (2 req'd)
- A Tighten to 5.2-7.2 Nm (47-63 lb.in.)
- B Tighten to 0.8-1.7 Nm (7-15 lb.in.)

Taurus

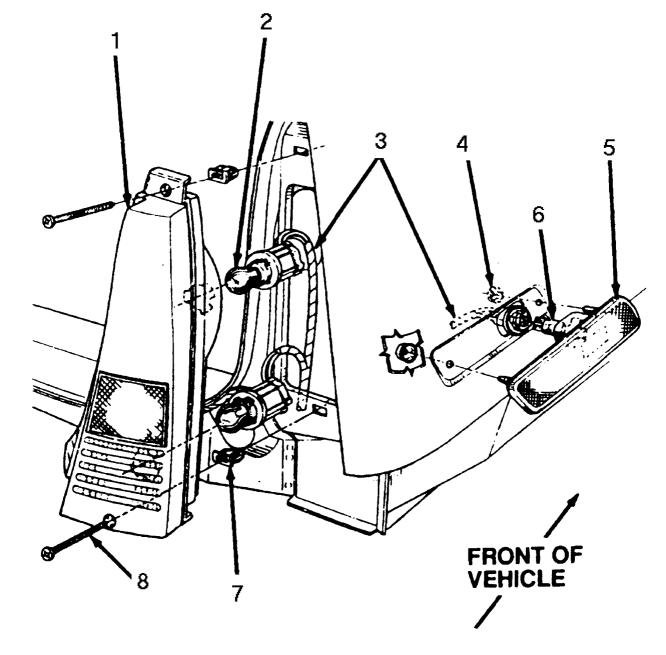


- 1 Stud (part of lamp assy)
- 2 Miniature bulb (2 req'd)
- 3 Nut
- 4 Wiring assy rear lamp
- 5 Lower back panel
- 6 Lamp assy
- 7 Miniature bulb (2 req'd)
- 8 Miniature bulb (2 req'd)
- A Tighten to 1.6-2.2 Nm (15-19 lb.in.)

Sable

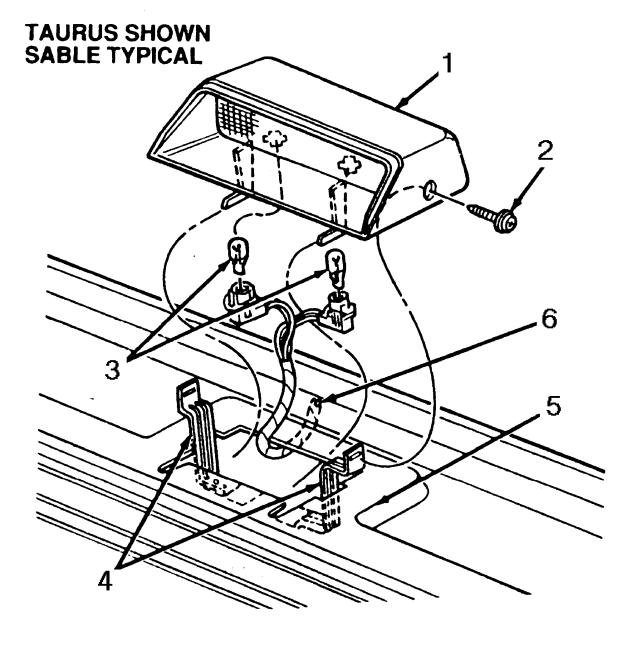


- 1 Miniature bulb (4 req'd)
- 2 Miniature bulb (2 req'd)
- 3 Nut (10 req'd)
- 4 Lamp socket and wiring
- 5 Rear lamp wiring
- 6 Nut (8 req'd)
- 7 Stud
- 8 Lamp
- 9 Rear lamp reflector
- A Tighten to 1.6-2.2 Nm (15-19 lb.in.)
- B Tighten to 1.2-1.8 Nm (11-15 lb.in.)

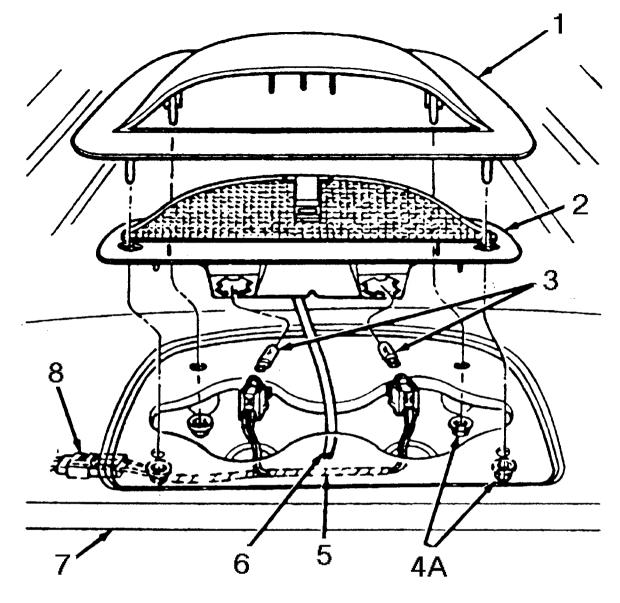


RH SHOWN, LH SYMMETRICALLY OPPOSITE

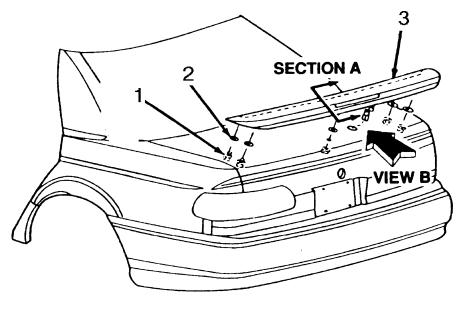
- 1 Rear lamp
- 2 Miniature bulb (2 req'd each lamp)
- 3 Rear lamp wiring
- 4 Nut (2 req'd each lamp)
- 5 Cornering lamp
- 6 Miniature bulb
- 7 Nut (2 req'd each lamp)
- 8 Screw (2 req'd each lamp)

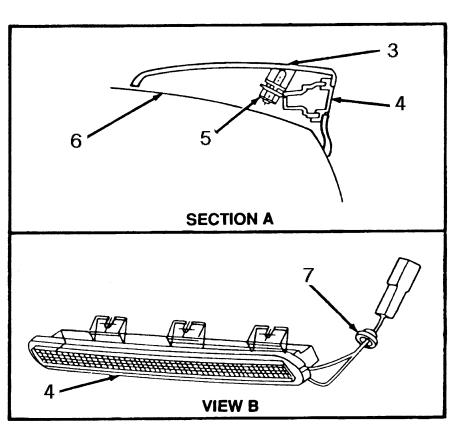


- 1 Rear hi-mount lamp
- 2 Screw (2 req'd)
- 3 Miniature bulb (2 req'd)
- 4 Rear hi-mount lamp retainer
- 5 Package tray trim panel
- 6 Rear lamp wiring

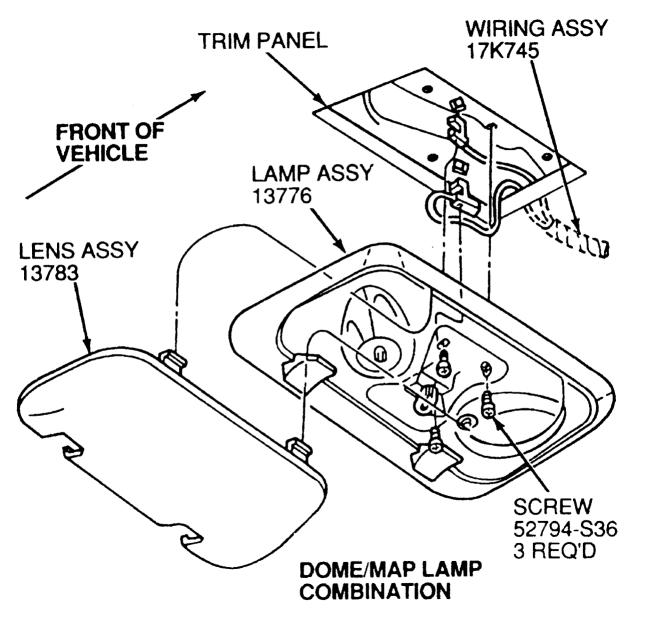


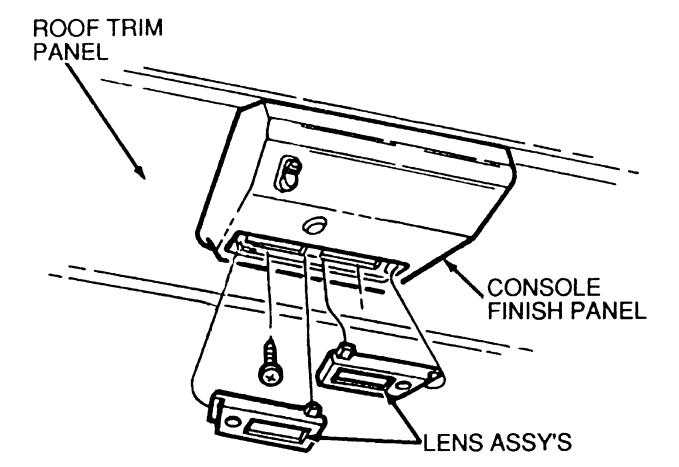
- 1 Rear hi-mount lamp cover
- 2 Rear hi-mount lamp
- 3 Miniature bulb
- 4 Nuts (4 req'd)
- 5 Rear hi-mount lamp wiring
- 6 Window washer hose
- 7 Liftgate
- 8 Rear lamp extension wiring
- A Tighten to 2-2.8 Nm (18-24 lb.in.)

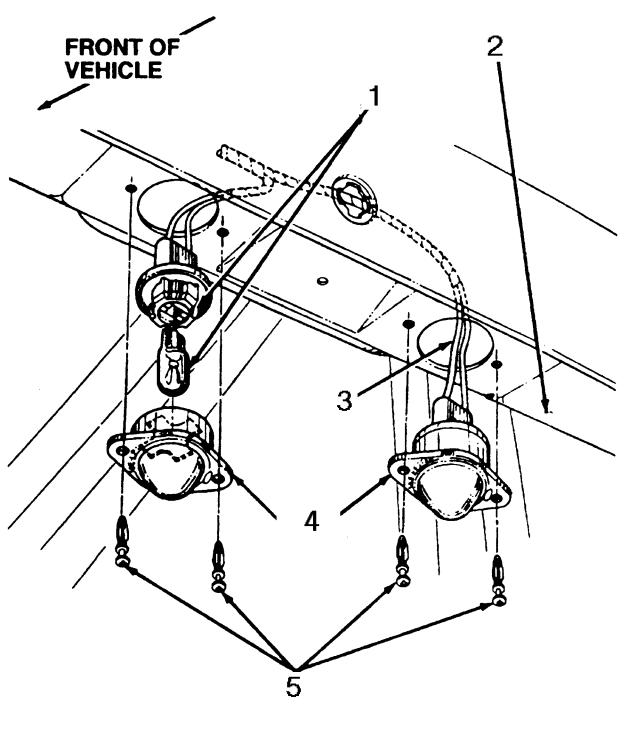




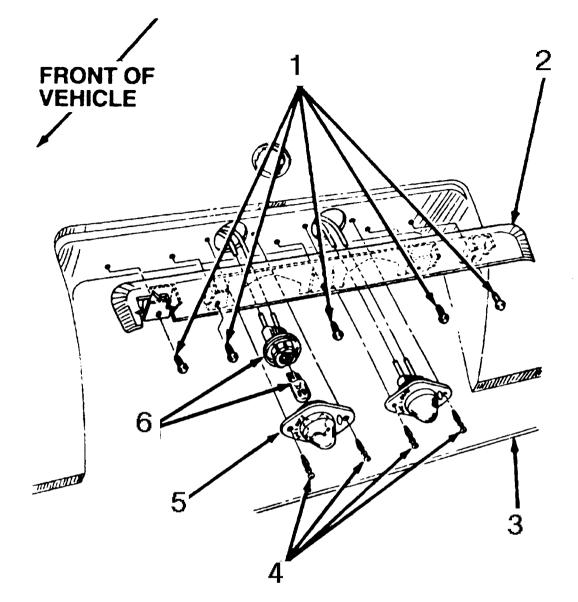
- 1 Nut and washer assy (5 req'd)
- 2 Washer sealer (5 req'd)
- 3 Spoiler
- 4 Rear hi-mount lamp
- 5 Nut and washer assy (3 req'd)
- 6 Luggage compartment door
- 7 Grommet



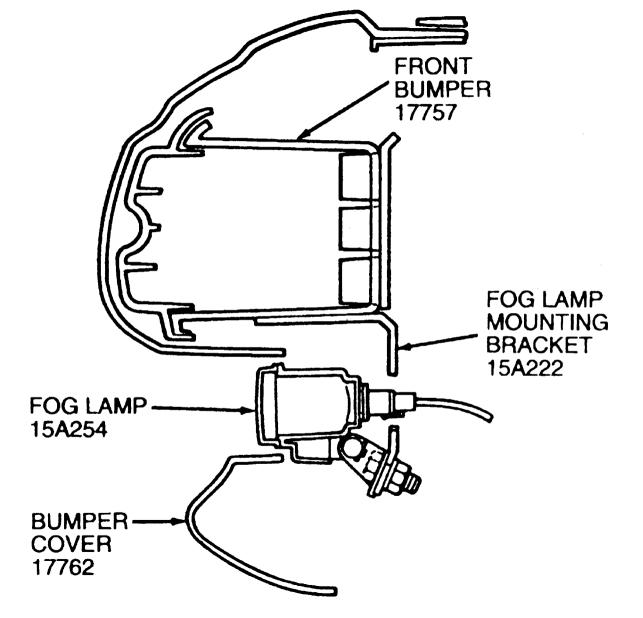


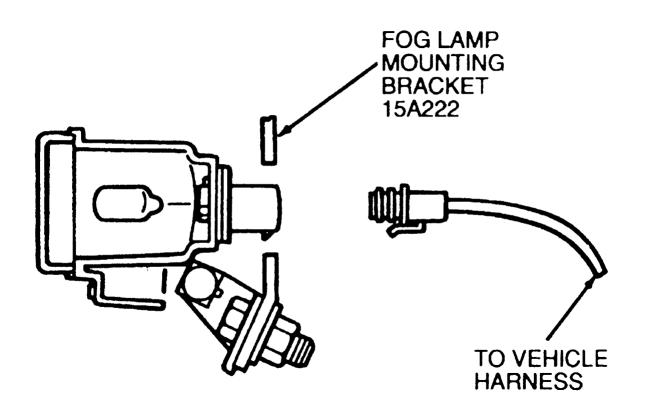


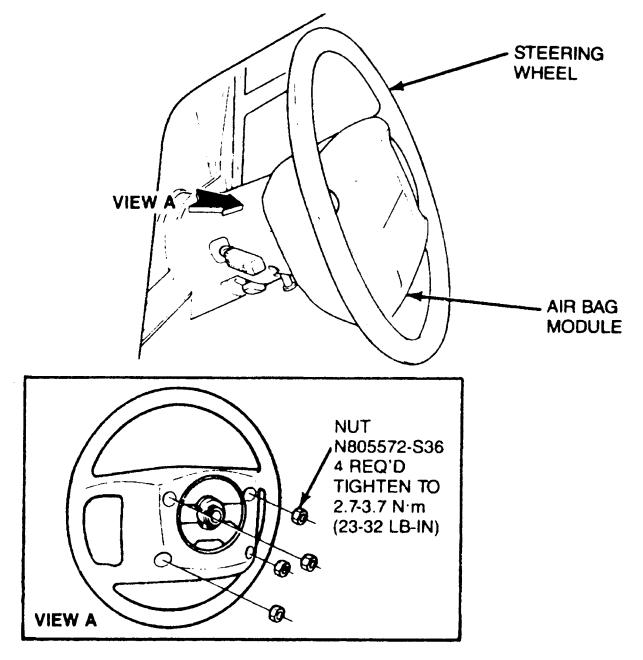
- 1 Miniature bulb
- 2 Luggage compartment door
- 3 Lamp socket and wiring
- 4 Lamp
- 5 Rivet (4 req'd)



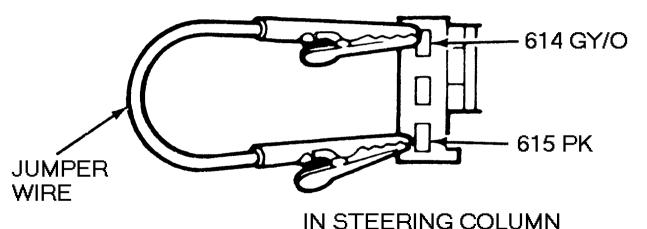
- 1 Screw (5 req'd)
- 2 Rear license plate lamp shield
- 3 Luggage compartment door
- 4 Rivet (4 req'd)
- 5 Lamp
- 6 Miniature bulb

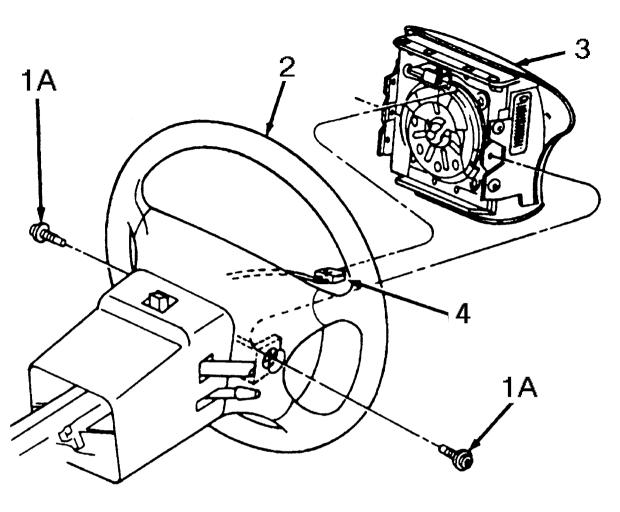




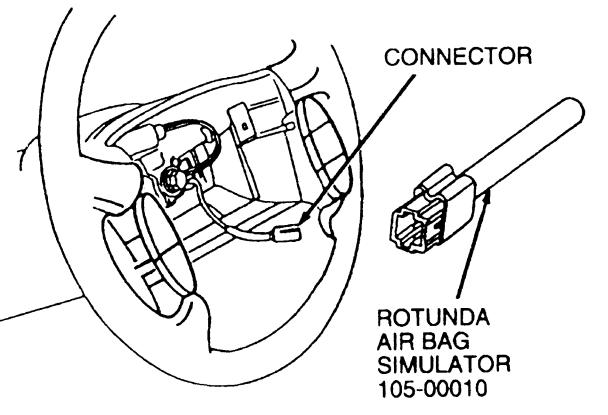


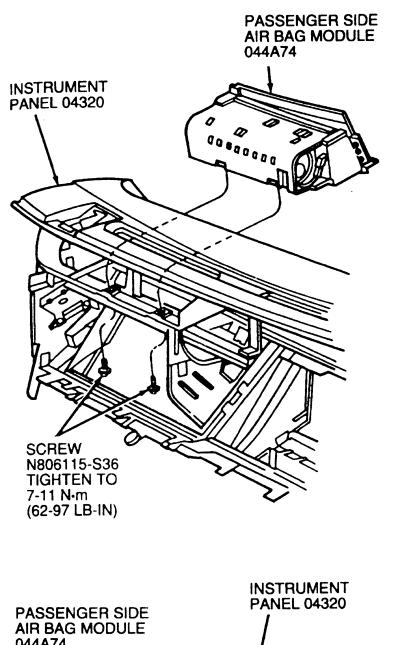
AIR BAG MODULE CLOCKSPRING CONNECTOR

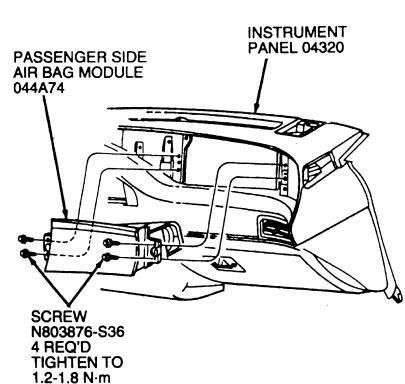




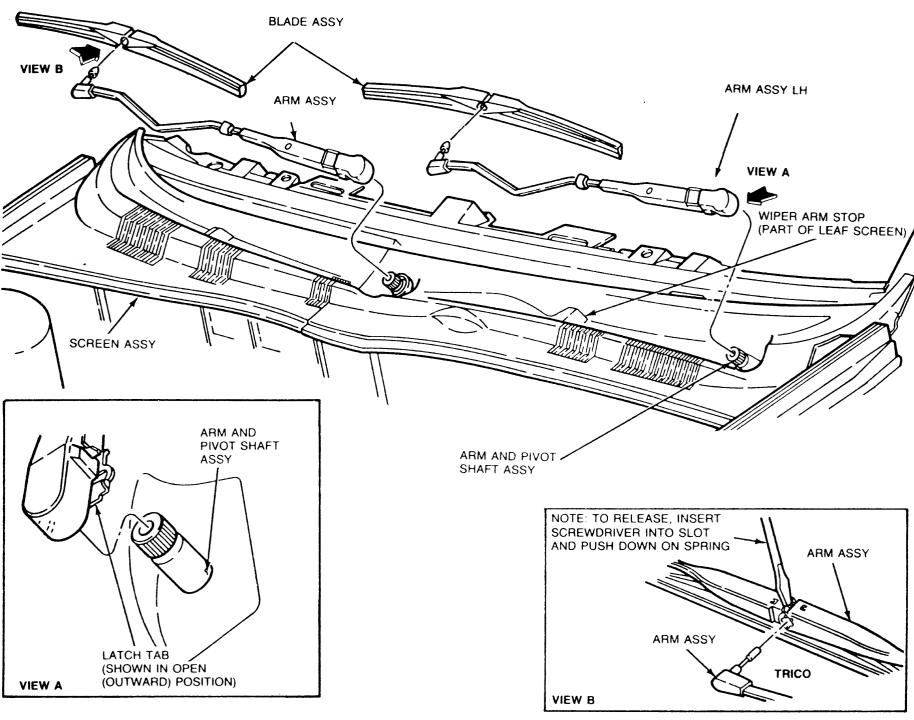
- 1 Screw and washer assembly (2 req'd)
- 2 Steering wheel
- 3 Driver side air bag module
- 4 Driver air bag wiring-to-air bag sliding contact connector
- A Tighten to 10.2-13.8 Nm (8-10 lb.ft.)

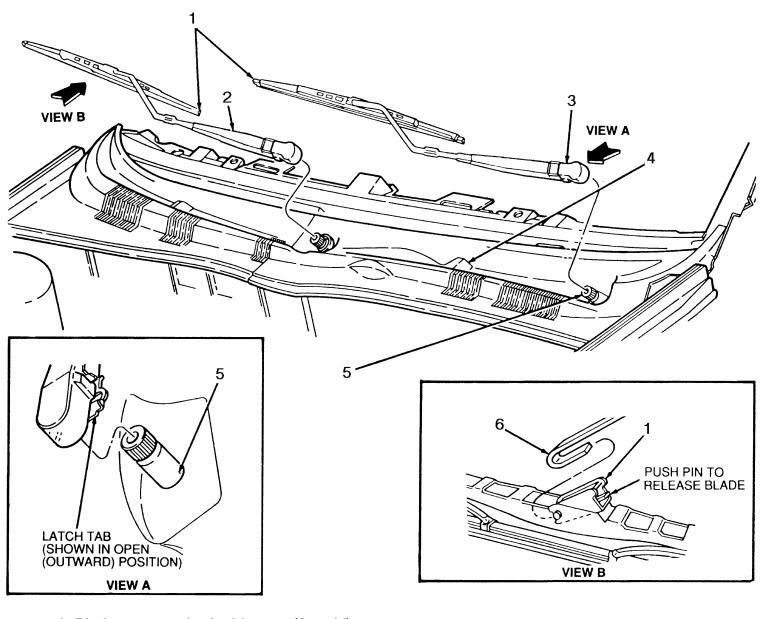




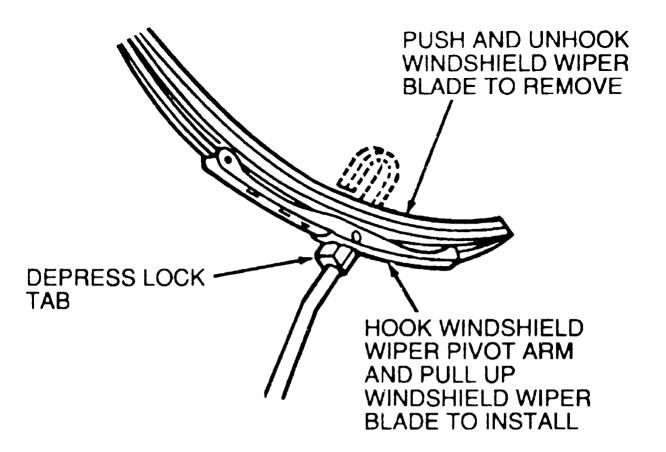


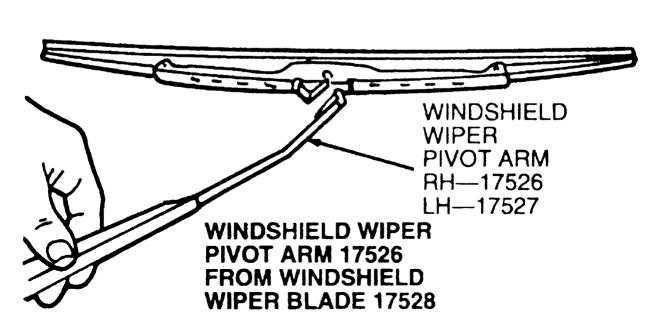
(11-16 LB-IN)

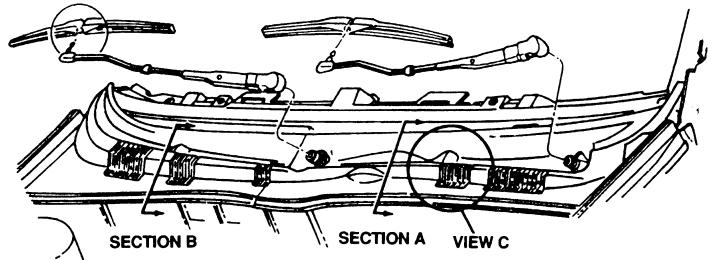


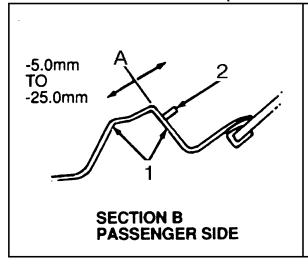


- 1 Blade assy windwshield wiper (2 req'd)
- 2 Arm assy
- 3 Arm assy LH
- 4 Wiper arm stop
- 5 Arm and pivot shaft assy

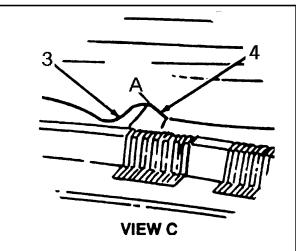




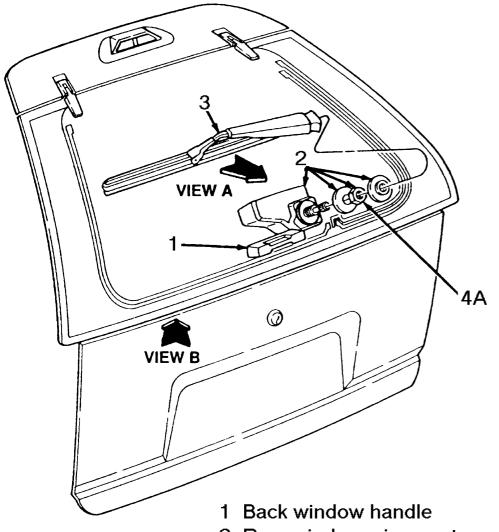




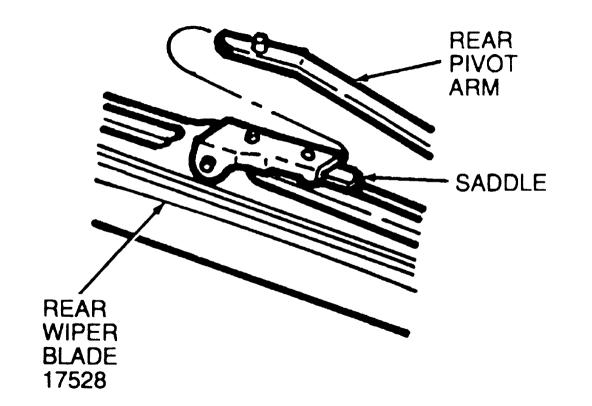
-5.0mm
TO
-25.0mm
2
SECTION A
DRIVER SIDE

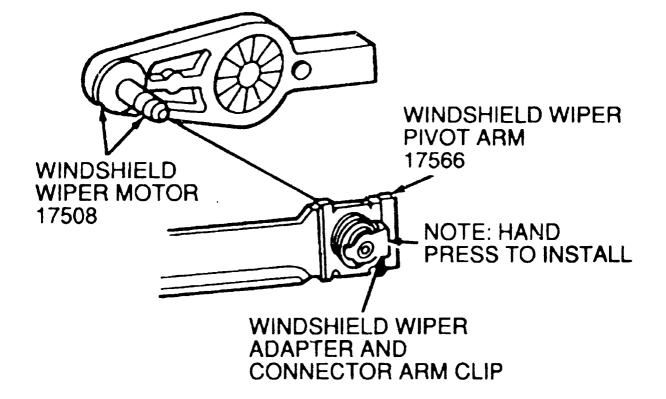


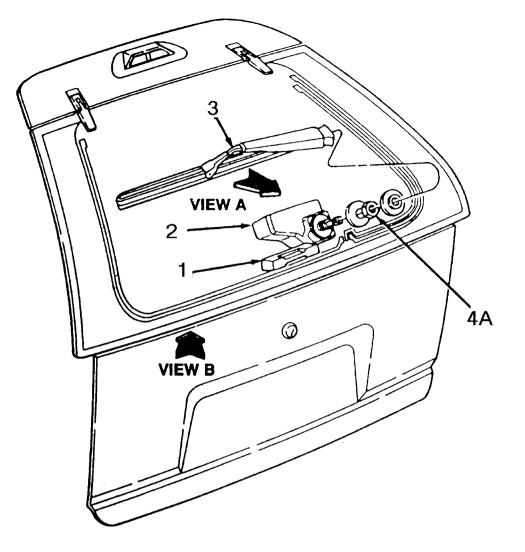
- 1 Cowl vent screen
- 2 Windshield wiper pivot arm
- 3 Top surface
- 4 Park surface
- A 5.0-25.0 mm (0.19-0.98 inches)

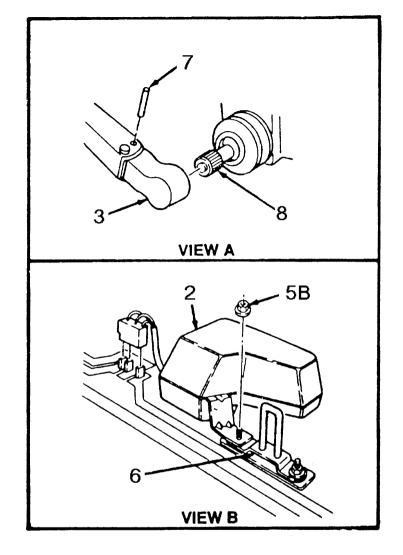


- 1.6mm (0.063 INCH) DIAMETER **VIEW A VIEW B**
- 2 Rear window wiper motor assy
- 3 Rear arm and blade assy
- 4A Nut
- 5B Nut and washer assy
 - 6 Back window latch striker assy
 - A Tighten to 15-20 Nm (11-14 lb.ft.)
 - B Tighten to 5-8 Nm (4-6 lb.ft.)



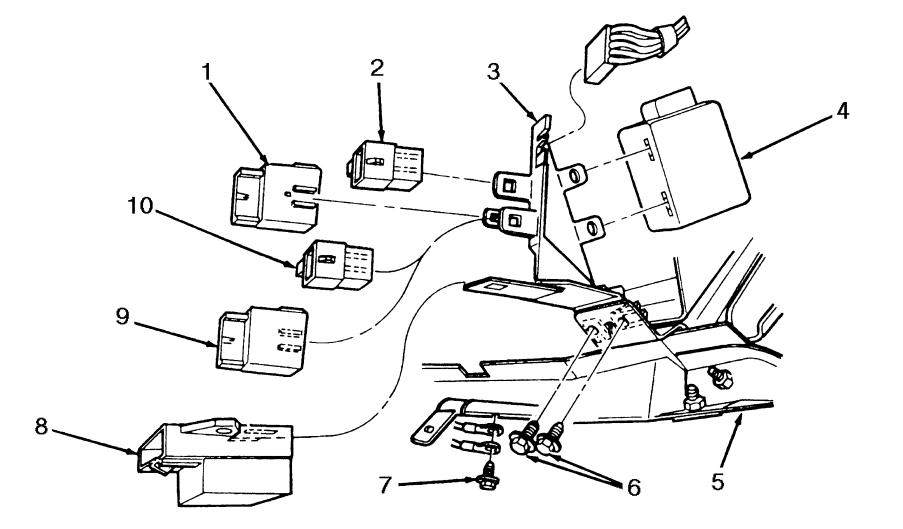






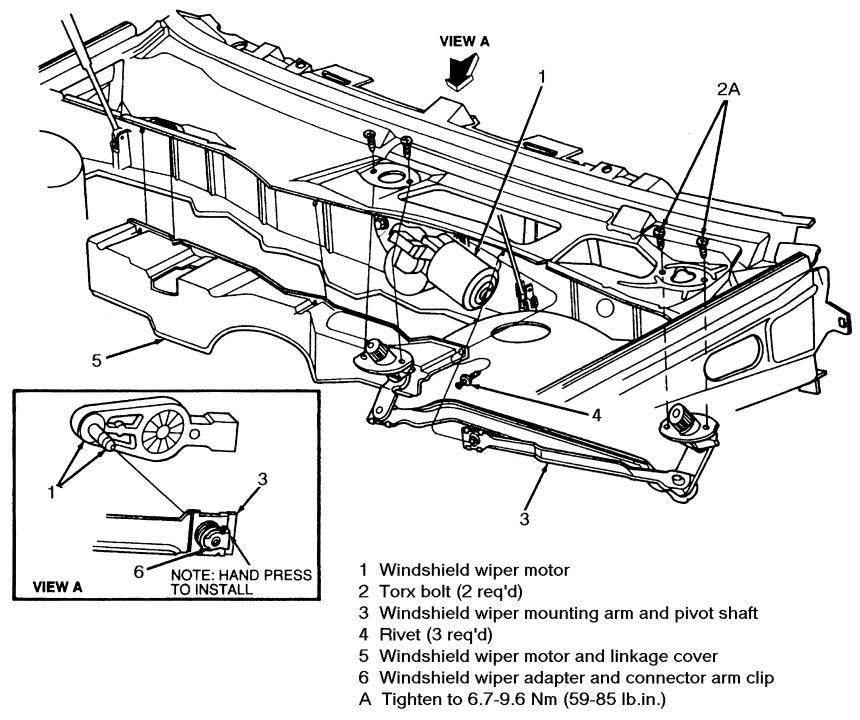
- 1 Back window handle
- 2 Rear window wiper motor cover
- 3 Rear arm and blade assy
- 4 Grommet and washer nut
- 5 Nut and washer assy (2 req'd)

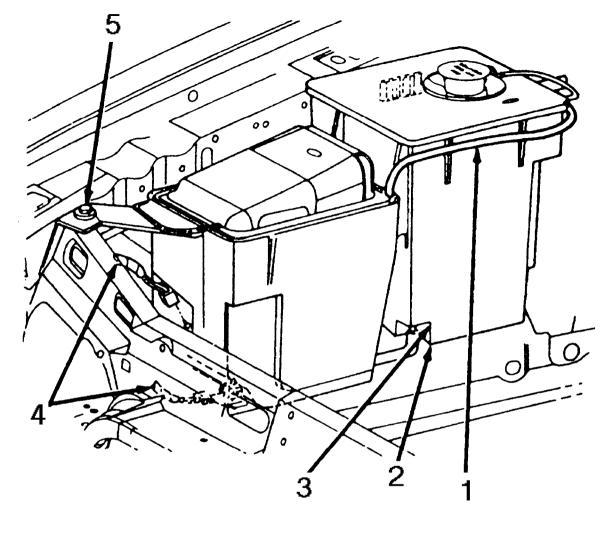
- 6 Back window latch striker assy
- 7 1/16-inch diameter roll pin
- 8 Rear windshield wiper motor
- A Tighten to 15-20 Nm (11-14 lb.ft.)
- B Tighten to 5-8 Nm (44-53 lb.in.)



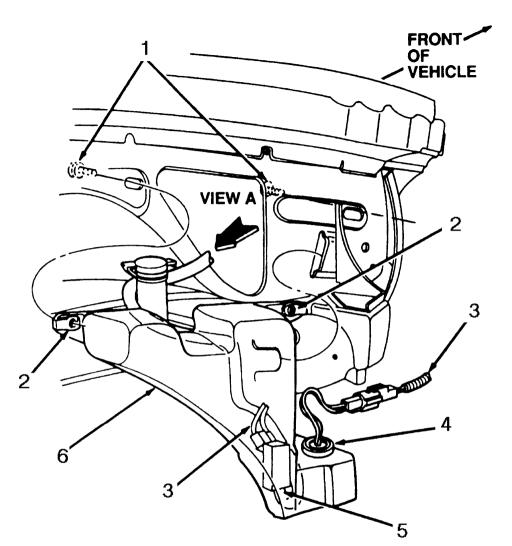
- 1 Indicator assy
- 2 Relay assy horn
- 3 Bracket assy relay panel
- 4 Windshield wiper control module
- 5 Instrument panel assy

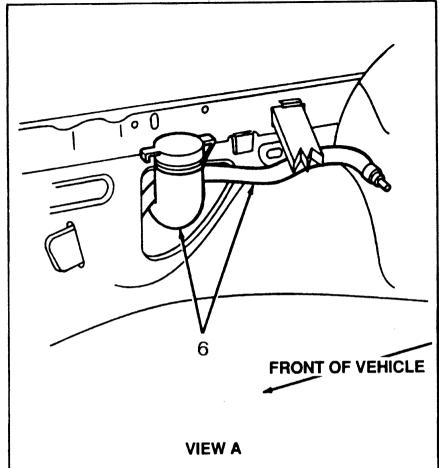
- 6 Screw (2 req'd)
- 7 Screw
- 8 Safety belt warning chime assy
- 9 Rear window defroster timer (Sable)
- 10 Relay assy fog lamps (SHO)



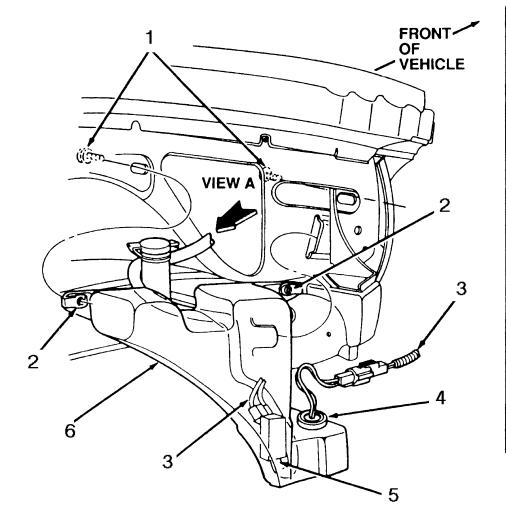


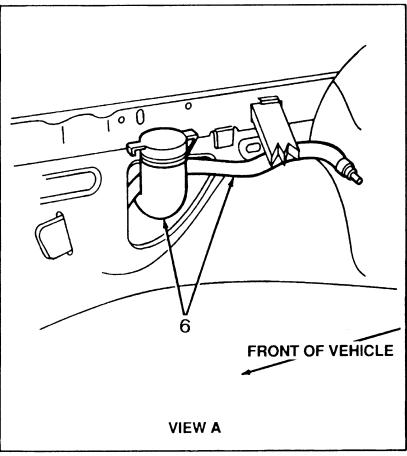
- 1 Windshield washer hose
- 2 Windshield washer reservoir
- 3 Windshield washer pump
- 4 Headlamp dash panel junction wire
- 5 Screw



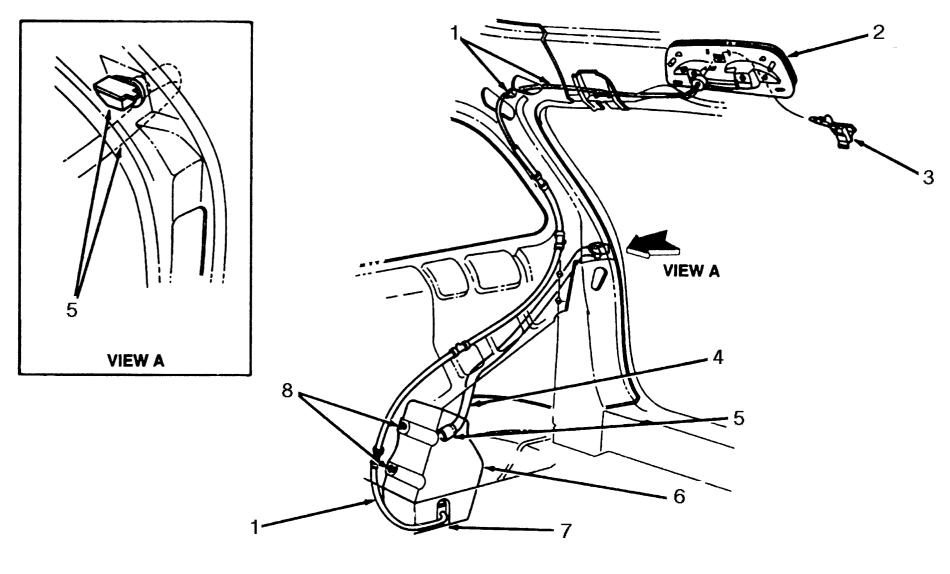


- 1 Screw (2 req'd)
- 2 J-Nut (2 req'd)
- 3 Headlamp dash panel junction wire
- 4 Windshield washer reservoir fluid level sensor
- 5 Windshield washer pump
- 6 Windshield washer reservoir



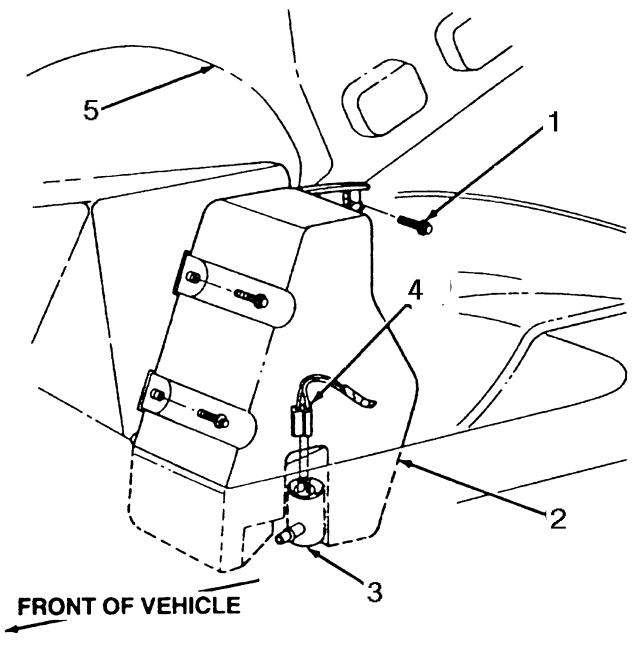


- 1 Screw (2 req'd)
- 2 J-nut (2 req'd)
- 3 Headlamp dash panel junction wire
- 4 Windshield washer reservoir fluid level sensor
- 5 Windshield washer pump
- 6 Windshield washer reservoir



- 1 Windshield washer hose
- 2 Rear Hi-mount lamp
- 3 Windshield washer nozzle jet and bracket
- 4 Windshield washer reservoir fill and cap assy

- 5 Clamp
- 6 Windshield washer reservoir
- 7 Windshield washer pump
- 8 Screw (3 req'd)



- 1 Screw (3 req'd)
- 2 Windshield washer reservoir
- 3 Windshield washer pump
- 4 Rear window wiper/washer wire
- 5 Quarter trim panel

