ROUTINE MAINTENANCE

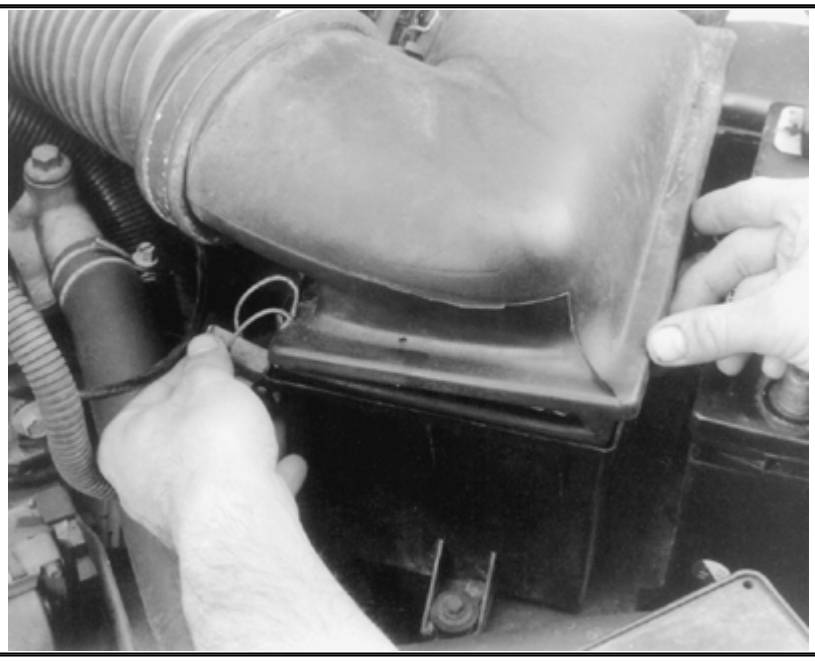
Air Cleaner

The air cleaner element should be replaced every 30 months or 30,000 miles (48,000 km). More frequent changes are necessary if the car is operated in dusty conditions.

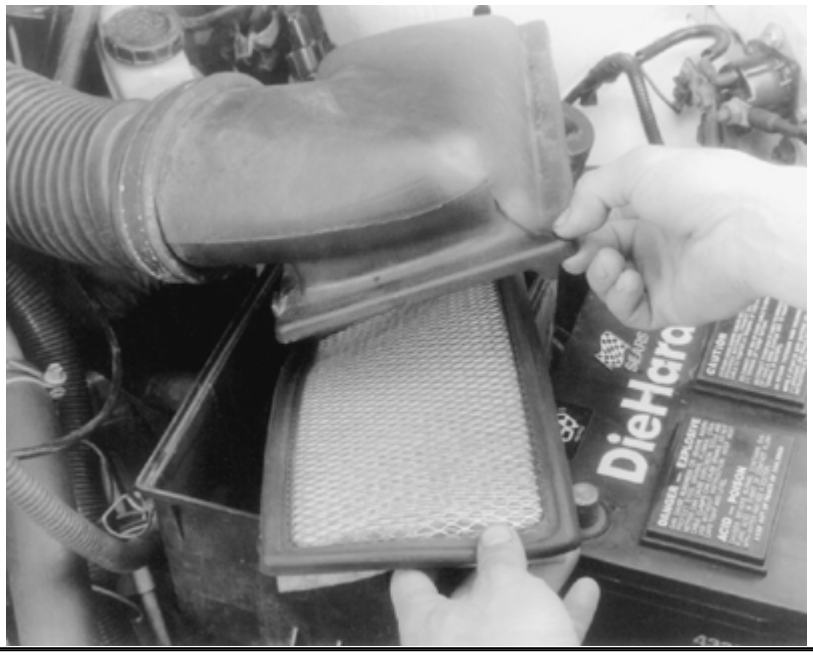
REMOVAL & INSTALLATION

Except 1994-95 Vehicles

1. **Loosen the air cleaner outlet tube clamps at both ends, then remove the tube. For the 2.5L and 3.0L engines, loosen the clamp at the throttle body only, and leave the tube connected to the cover.**
2. **On the 3.0L and the 3.0L SHO, disengage the airflow sensor electrical connector.**
3. **Release the air cleaner upper cover retaining clips or remove the retaining bolts.**
4. **Remove the air cleaner cover, then remove the air cleaner element.**



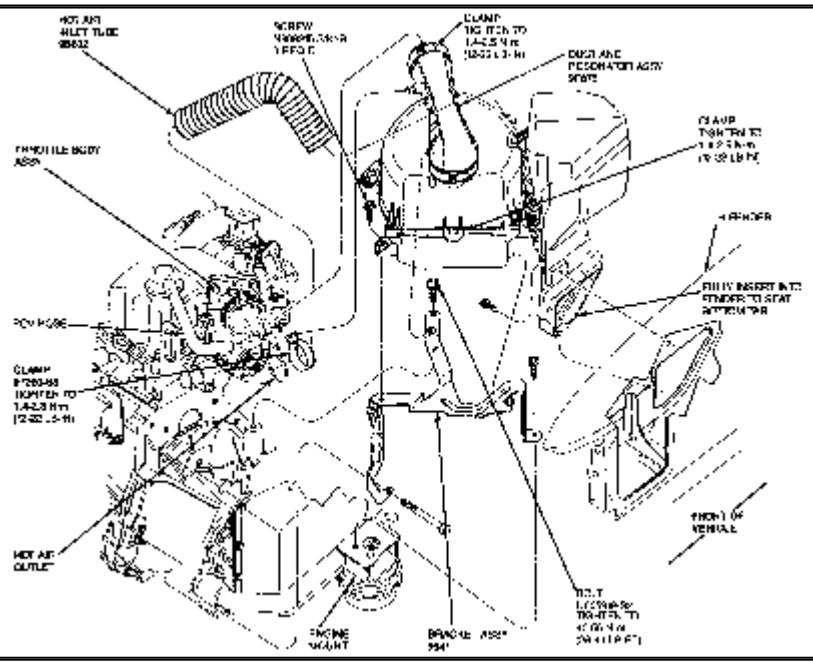
Unfastening the air cleaner cover retaining clips-early model 2.5L engine shown



Removing the air cleaner element-early model 2.5L engine shown

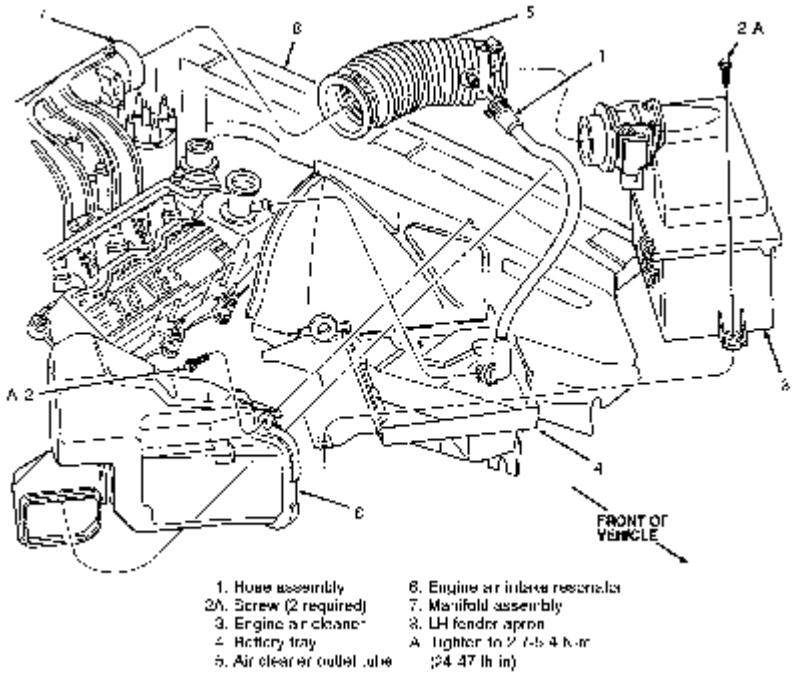
To install:

5. **Clean the inside surfaces of the air cleaner body, then install the new filter element.**
6. **Install the air cleaner upper cover, then install the bolts or fasten the retaining clips.**
7. **If removed, engage the airflow sensor electrical connector.**
8. **Install the air cleaner outlet tube.**



Exploded view of the air cleaner assembly and components-late model 2.5L shown

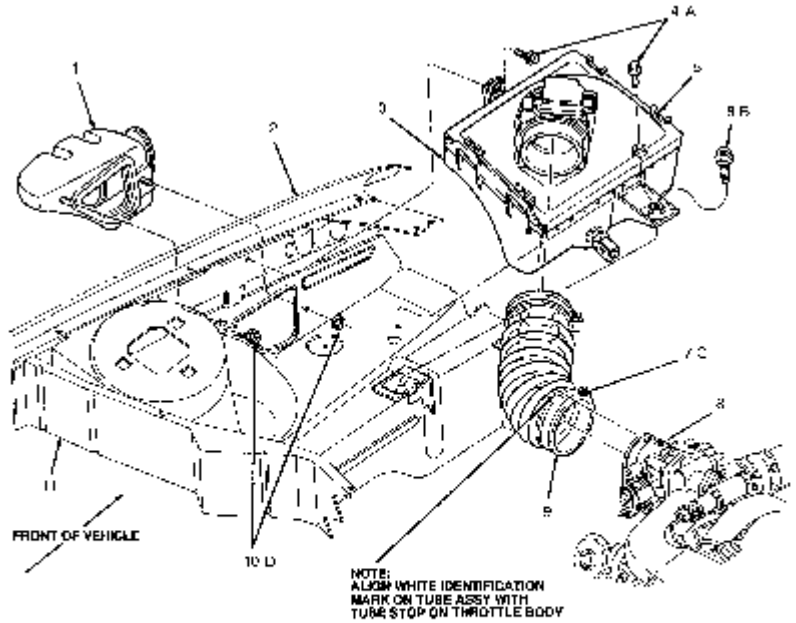
Click to enlarge



1. Hose assembly
2A. Screw (2 required)
3. Engine air cleaner
4. Battery tray
5. Air cleaner outlet tube
6. Engine air intake resonator
7. Manifold assembly
8. LH fender apron
A. Tighten to 2.7-5.4 N·m (24-47 lb-in)

Exploded view of the air cleaner assembly and components-3.0L engine shown

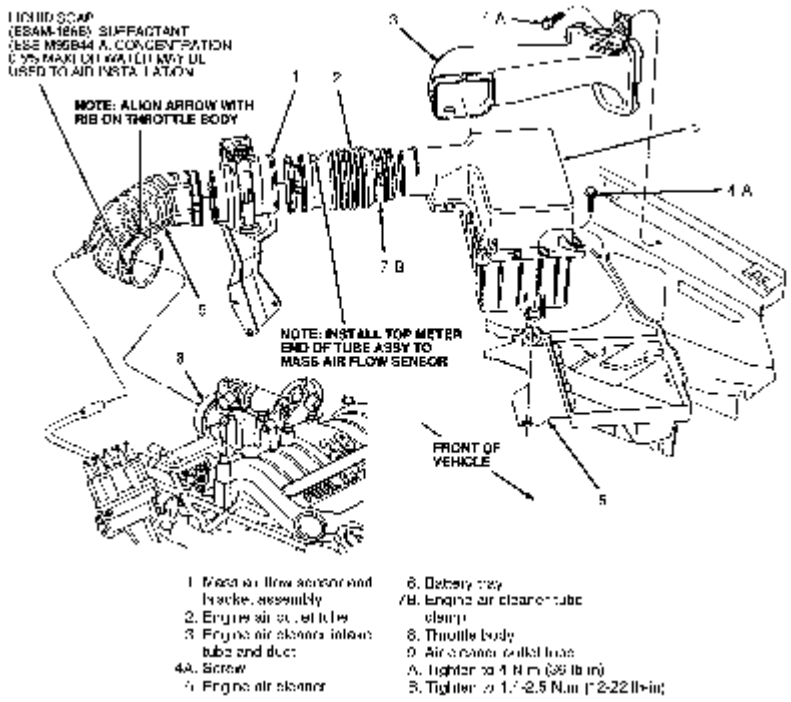
Click to enlarge



1. Engine air intake resonator
2. LH fender
3. Engine air cleaner
4A. Screw
5. Air cleaner cover retainer clip
6B. Bolt
7C. Clamp assembly (2 required)
8. Throttle body
9. Air cleaner outlet tube
10D. Nut and washer assembly
11. Gravel
A. Tighten to 12-18 N·m (9-13 lb-ft)
B. Tighten to 8-11 N·m (6-8 lb-ft)
C. Tighten to 1.4-2.3 N·m (12-20 lb-in)
D. Tighten to 5.5-7 N·m (49-62 lb-in)

Air cleaner assembly components-3.0L & 3.2L SHO engines shown

Click to enlarge



Air cleaner assembly components-3.8L engine shown

Click to enlarge

1994-95 Vehicles

1. Loosen the clamp securing the air cleaner outlet tube to the mass air flow sensor, then disconnect the air cleaner outlet tube.
2. If equipped, disconnect the engine control sensor wiring from the mass air flow sensor and the intake air temperature sensor.
3. On all engines except for the 3.8L engine, release the retaining clips to remove the air cleaner cover.
4. For the 3.8L engine, loosen the air cleaner cover retaining bolts until the cover is free from the air cleaner body, but DO NOT remove the screws.
5. Position the air cleaner cover aside, then remove the air cleaner element.

To install:

6. Clean all inside surfaces of the air cleaner and cover, then install the air cleaner element.
7. Position the air cleaner cover, then install the retaining clips or fasten the bolts, as applicable. If equipped, tighten the bolts to 20-30 inch lbs. (2.5-3.5 Nm).
8. If equipped, connect the engine control sensor wiring to the mass air flow sensor and the intake air temperature sensor.
9. Install the air cleaner outlet tube. On 3.0L engines, tighten the clamp to 24-48 inch lbs. (2.7-5.4 Nm). For all other engines, tighten the clamp to 12-22 inch lbs. (1.4-2.5 Nm).

Fuel Filter

RELIEVING FUEL SYSTEM PRESSURE

Except 2.5L CFI Engine

The pressure in the fuel system must be relieved before attempting to disconnect any fuel lines. A special valve is incorporated on the fuel rail assembly for the purpose of relieving the pressure in the fuel system.

1. **Remove the fuel tank cap.**
2. **Remove the cap from the pressure relief Schrader valve on the fuel rail.**
3. **Attach pressure gauge tool T80L-9974-A or equivalent, to the fuel pressure relief valve.**
4. **Release the pressure from the system into a suitable container.**
5. **Remove the pressure gauge tool, then install the cap on the pressure relief valve. Install the fuel tank cap.**

2.5L CFI Engine

1. **Disengage the electrical connector from the inertia switch, located on the left side of the luggage compartment.**
2. **Crank the engine for 15 seconds to relieve the fuel system pressure.**
3. **Connect the inertia switch.**

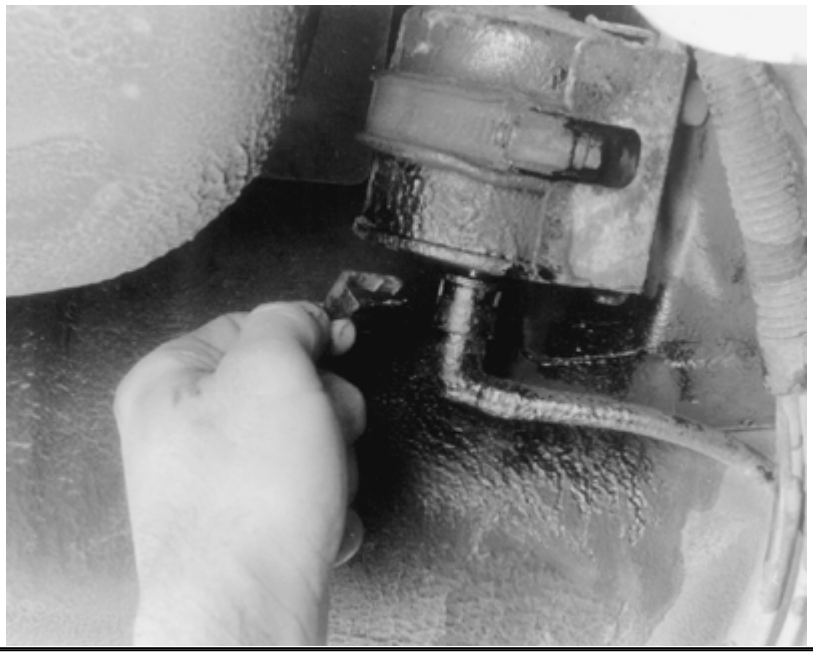
REMOVAL & INSTALLATION

The push connect fittings are designed with a retaining clip. Clips should be replaced whenever a connector is removed.

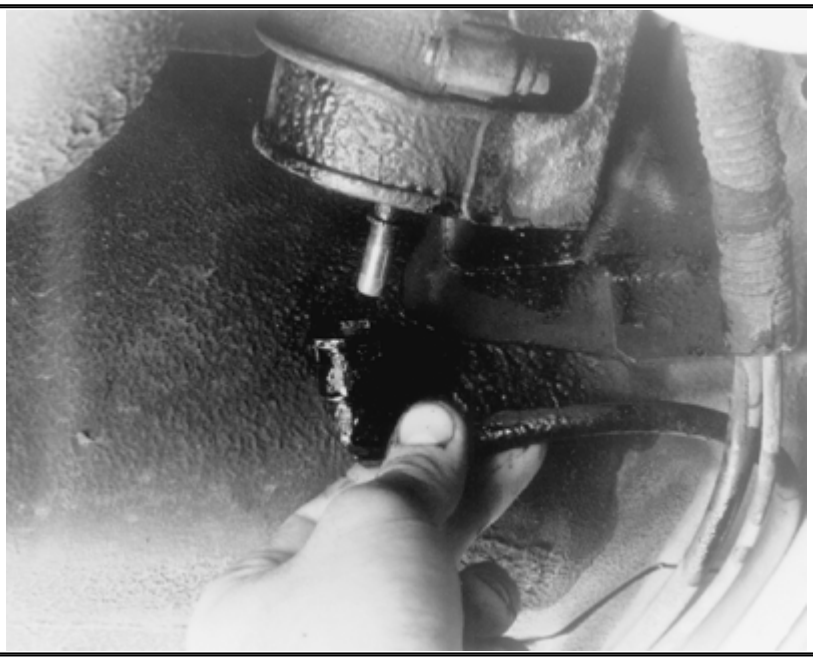
1. **Disconnect the negative battery cable.**
2. **Properly relieve the fuel system pressure. For details, refer to the procedure located earlier in this section.**
3. **Remove the push connect fittings at both ends of the fuel filter. This is accomplished by removing the hairpin clips from the fittings. Remove the hairpin clips by first bending, and then breaking the shipping tabs on the clips. Spread the 2 clip legs approximately $^{1}/_{8}$ in. (3mm) to disengage the body and push the legs into the fitting. Gently pull on the triangular end of the clip and work it clear of the fitting.**

When removing the clips, use your hands. Do NOT use tools, as damage may occur.

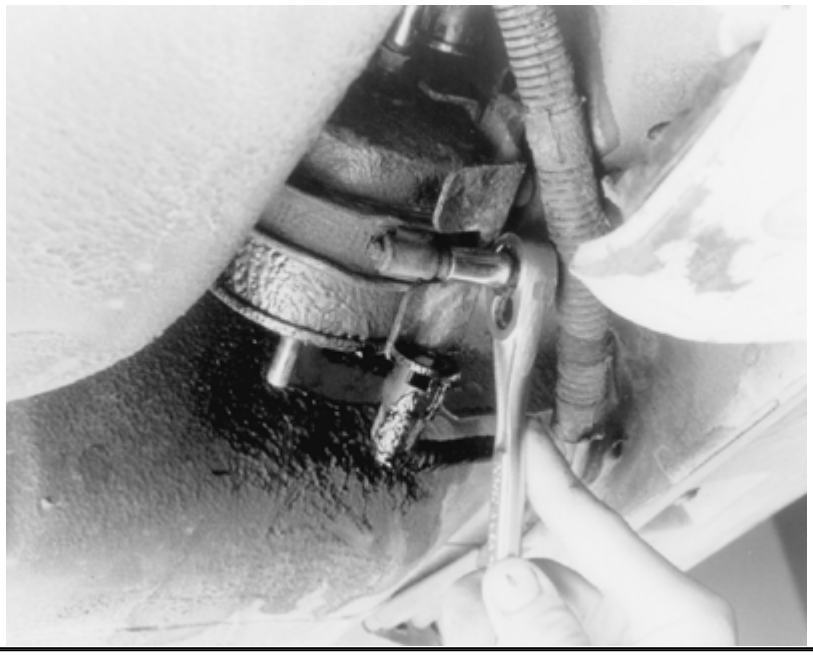
4. **Remove the filter from the mounting bracket by loosening the worm gear mounting clamp enough to allow the filter to pass through.**



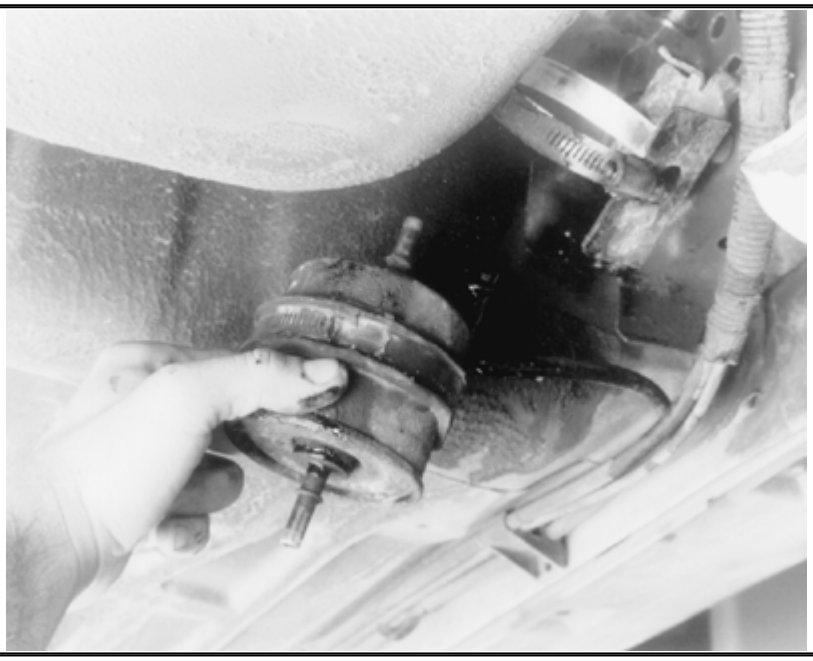
Removing the push connect fitting from the bottom of the fuel filter-Early model 2.5L shown



Removing the fuel line from the filter



Loosen the mounting clamp enough to allow the filter to pass through



Slide the fuel filter out of the mounting clamp

To install:

5. **Install the filter in the mounting bracket, ensuring that the flow direction arrow is pointing forward. Locate the fuel filter against the tab at the lower end of the bracket.**
6. **Insert a new hairpin clip into any 2 adjacent openings on each push connect fitting, with the triangular portion of the clip pointing away from the fitting opening. Install the clip to fully engage the body of the fitting. This is indicated by the legs of the hairpin clip being locked on the outside of the fitting body. Apply a light coat of engine oil to the ends of the fuel filter, then push the fittings onto the ends of the filter. When the fittings are engaged, a definite click will be heard. Pull on the fittings to ensure that they are fully engaged.**
7. **Tighten the worm gear mounting clamp to 15-25 inch lbs. (1.7-2.8 Nm).**

8. **Start the engine and check for leaks.**

PCV Valve

The Positive Crankcase Ventilation (PCV) system cycles crankcase gases back through the engine, where they are burned. The PCV valve regulates the amount of ventilating air and blow-by gas to the intake manifold and prevents backfire from traveling into the crankcase. For most vehicles, this system is comprised of a PCV valve connected to a tube or hose that goes from a grommet in the valve cover to the throttle body. On some engines, such as the 3.0L and 3.2L SHO, the system simply consists of a tube routed from the valve cover to the throttle body.

SERVICING

1. **Visually inspect the components of the PCV system. Check for rough idle, slow starting, high oil consumption and loose, leaking, clogged or damaged hoses.**
2. **Check the fresh air supply hose and the PCV hose for air leakage or flow restriction due to loose engagement, hose splitting, cracking or kinking, nipple damage, rubber grommet fit or any other damage.**
3. **If a component is suspected as the obvious cause of a malfunction, correct the cause before proceeding to the next step.**
4. **If all checks are okay, proceed to the pinpoint tests.**

PINPOINT TESTS

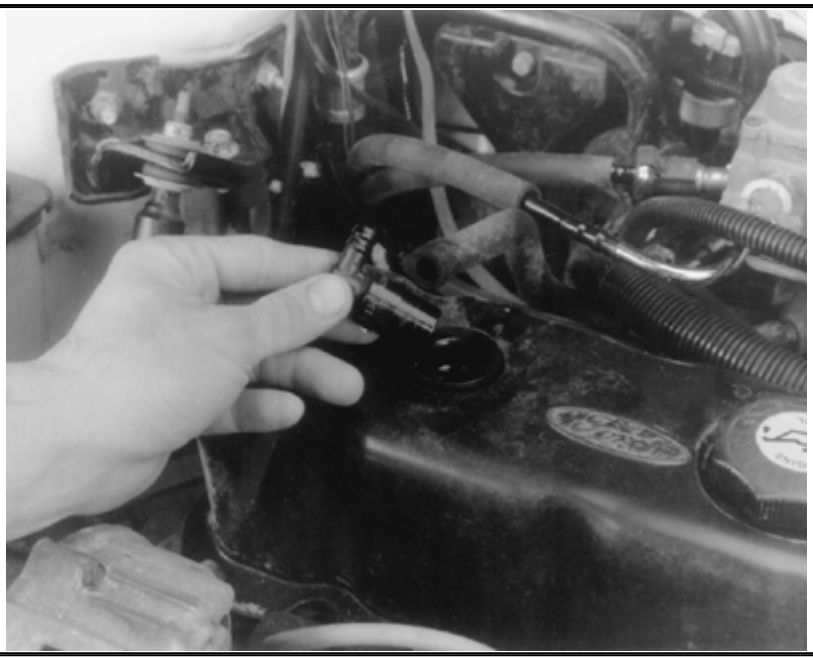
5. **If equipped, remove the PCV valve from the valve cover grommet and shake the valve. If the valve rattles when shaken, reinstall and proceed to Step 2. If the valve does not rattle, it is sticking and should be replaced.**
6. **Start the engine and bring it to normal operating temperature.**
7. **On the 2.5L engine, remove the corrugated hose from the oil separator nipple. On all other engines, disconnect the hose from the remote air cleaner or air outlet tube.**
8. **Place a stiff piece of paper over the nipple or hose end and wait 1 minute. If vacuum holds the paper in place, the system is okay; reconnect the hose. If the paper is not held in place, the system is plugged or the evaporative emission valve (if equipped) is leaking. If the evaporative emission valve is suspected of leaking, proceed to Step 5.**
9. **If equipped, disconnect the evaporative hose, and cap the connector.**
10. **Place a stiff piece of paper over the hose/nipple, as in Step 8, and wait 1 minute. If vacuum holds the paper in place, proceed to evaporative emission system testing. If the paper is not held in place, check for vacuum leaks/obstruction in the oil cap, PCV valve and hoses, or for split grommets. Also check the oil separator on the 2.5L engine and valve cover for a gasket lead or incorrect bolt torque.**

REMOVAL & INSTALLATION

2.5 and 3.0L Engines-Except SHO

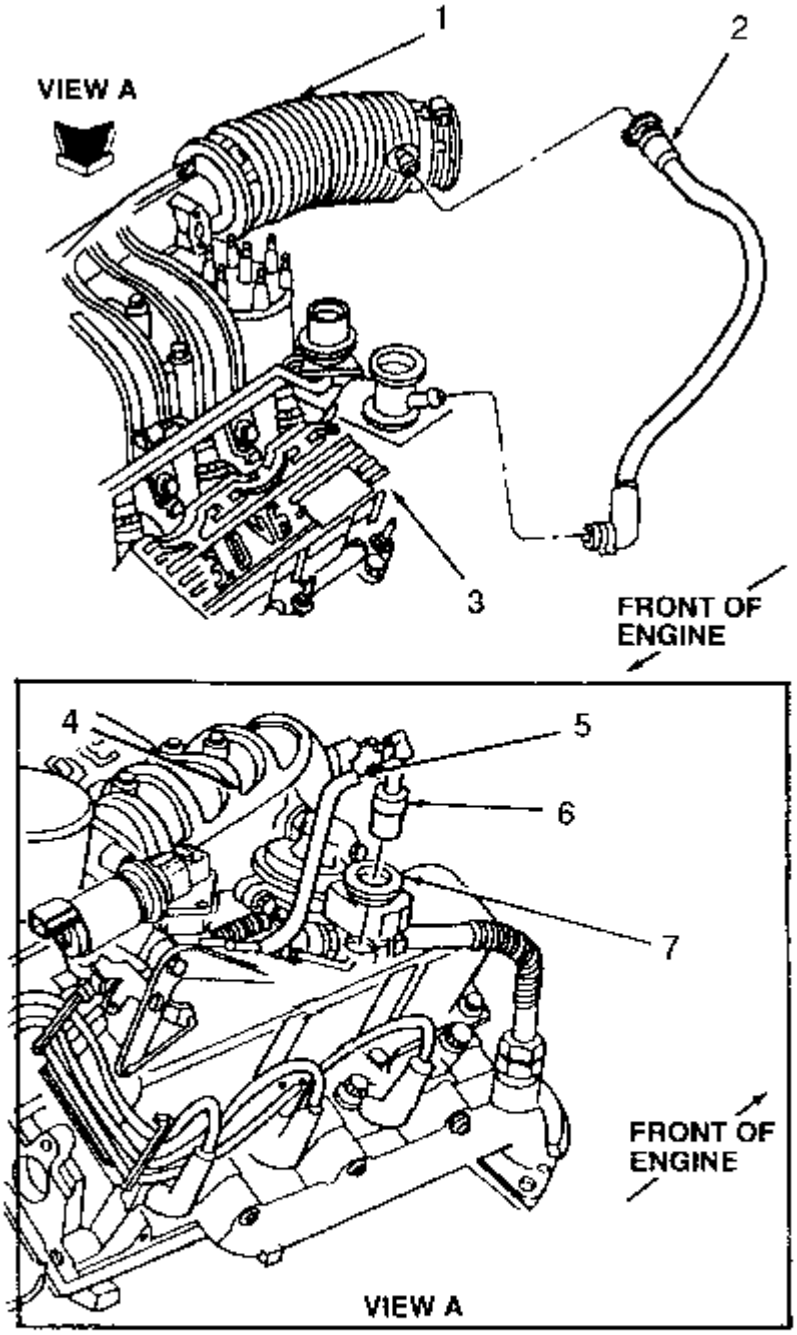
1. **Remove the fuel vapor hose and the crankcase ventilation hose from the PCV valve.**
2. **Remove the PCV valve from the PCV valve grommet.**

To install:



PCV system-early model 2.5L engine shown

3. **Inspect the valve and grommet for deterioration, and replace if necessary.**



1. Air cleaner outlet tube
2. Crankcase ventilation hose
3. Valve cover
4. Throttle body
5. Crankcase ventilation hose
6. Positive crankcase ventilation valve
7. Grommet

PCV system-late model 3.0L shown

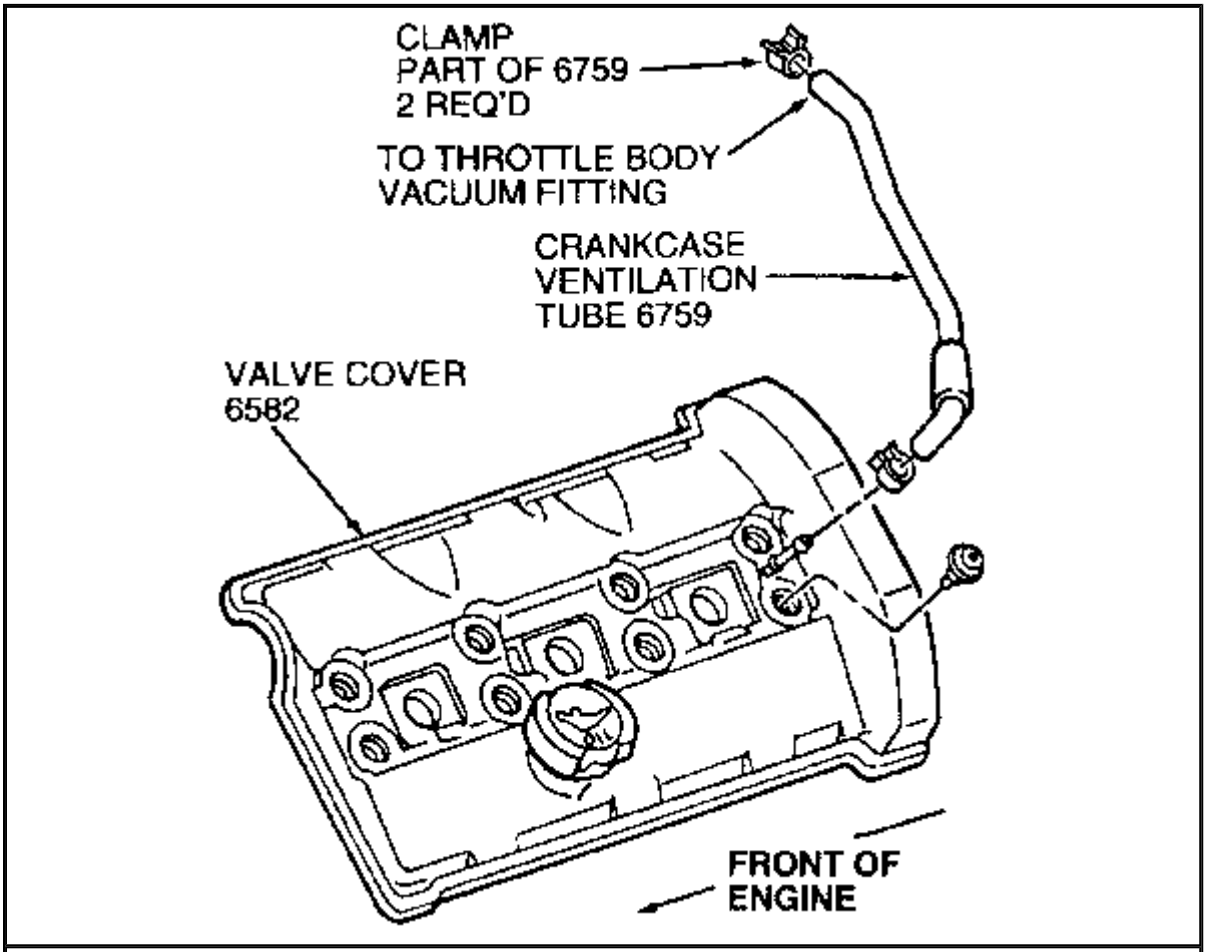
Click to enlarge

4. **Install the PCV valve into the valve grommet, then connect the fuel vapor and crankcase ventilation hoses.**

3.0L and 3.2L SHO Engines

1. **Loosen the crankcase ventilation tube clamps.**
2. **Carefully disconnect the tube from the left-hand side valve cover fitting and the throttle body.**

To install:



PCV system-3.0L/3.2L SHO shown

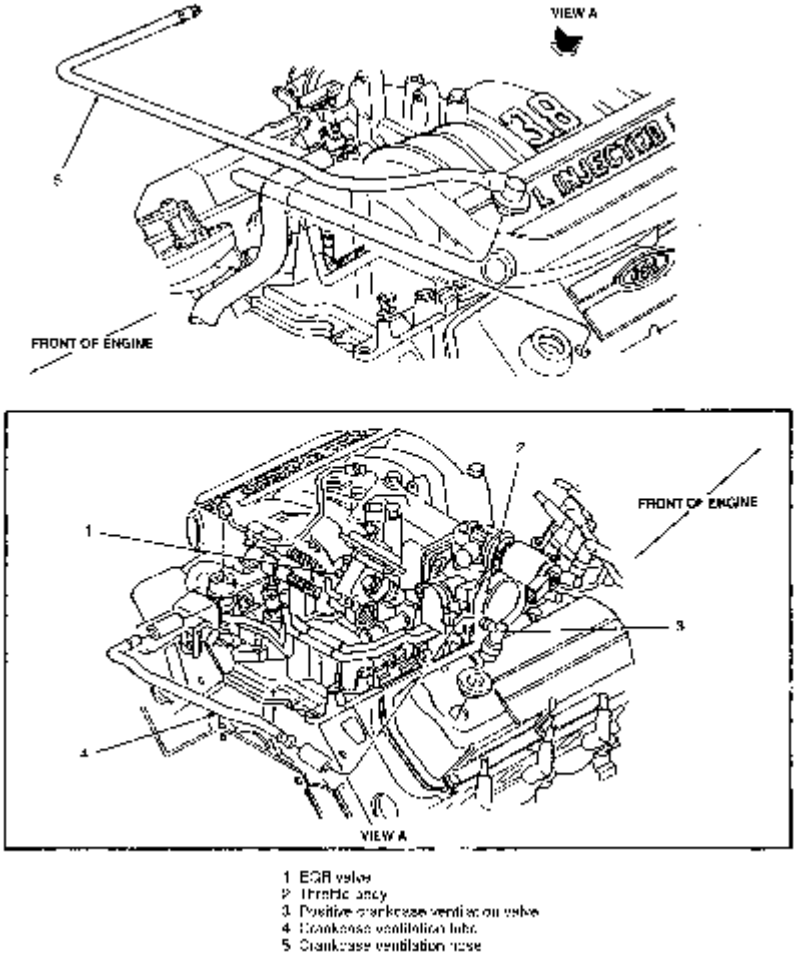
Click to enlarge

3. **Inspect the crankcase ventilation tube for deterioration and replace if necessary.**
4. **Connect the tube to the valve cover fitting and the throttle body, then secure with the retaining clamps.**

3.8L Engine

1. **Disconnect the crankcase ventilation tube from the PCV valve.**
2. **Remove the valve from the PCV valve grommet.**

To install:



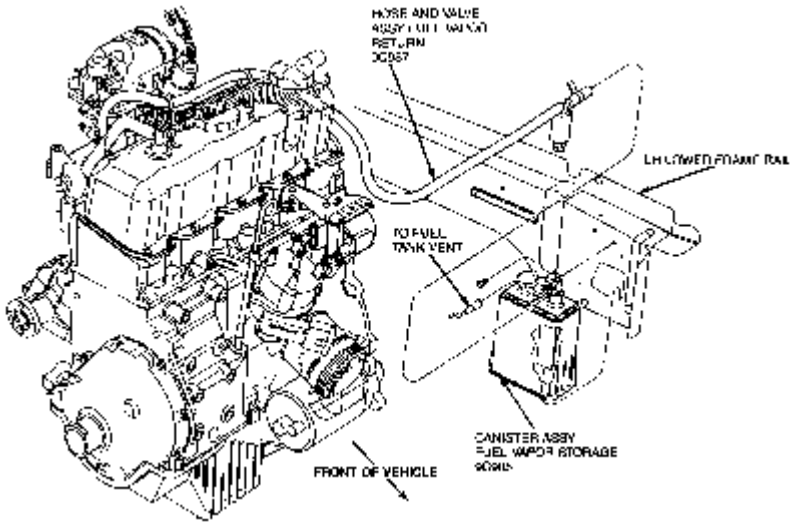
PCV system-late model 3.8L shown

Click to enlarge

3. **Inspect the PCV valve and grommet for deterioration, and replace if necessary.**
4. **Install the PCV valve into the valve grommet, then connect the crankcase ventilation tube.**

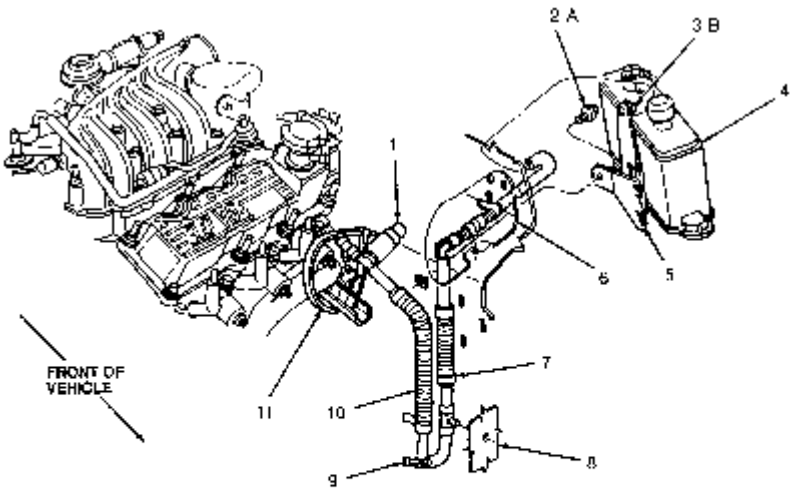
Evaporative Canister

To prevent gasoline vapors from being vented into the atmosphere, an evaporative emission system captures the vapors and stores them in a carbon-filled canister. The 3.0L Flexible Fuel (FF) vehicles utilize 4 separate canisters for this purpose.



Evaporative emission control system and related components-2.5L engine

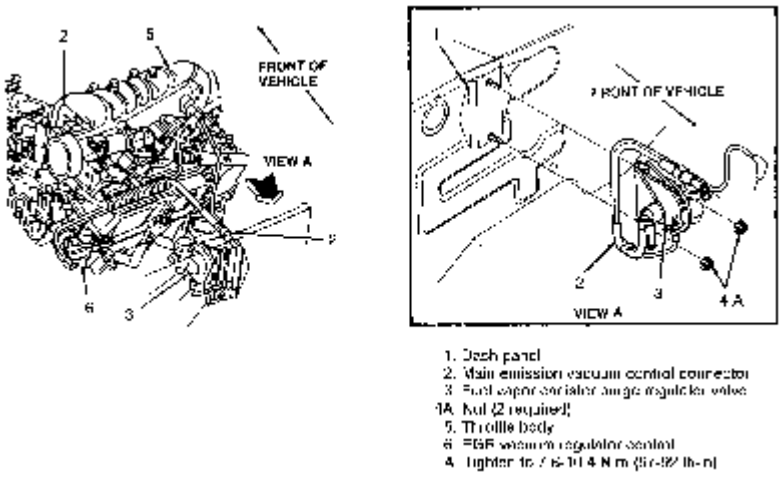
Click to enlarge



1. Evaporative emission canister purge solenoid
2. Bolt
3. Bolt
4. Evaporative emissions canister
5. evaporative emission canister bracket
6. LH headlamp opening (part of 16138)
7. Evaporative emission tube
8. Radiator support
9. Fuel tank vent tube (part of 9K313)
10. Evaporator emission hose
11. Tie strap
A. Tighten to 21.2-28.8 N.m (15.21 lb ft)
B. Tighten to 5.2-7.2 N.m (46-63 lb-in)

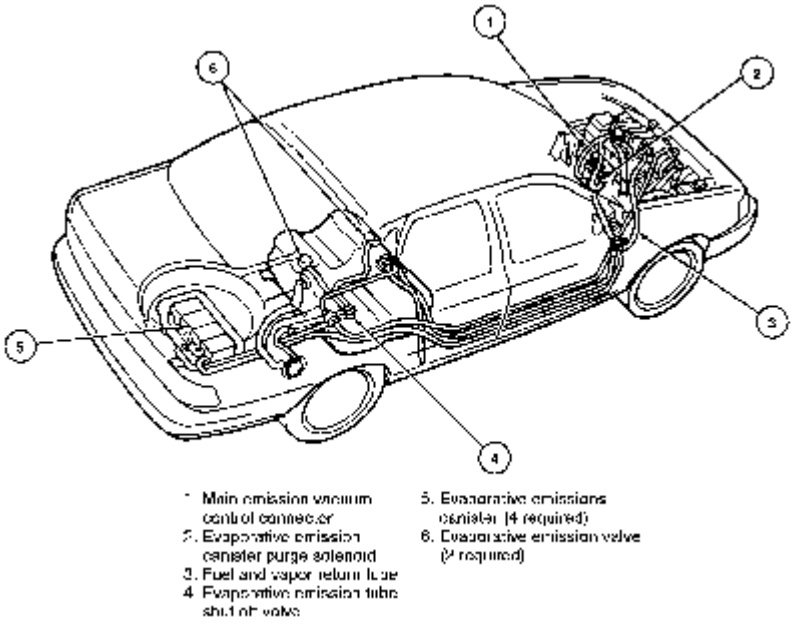
Evaporative emission control system and related components-3.0L engine (Except Flexible Fuel)

Click to enlarge



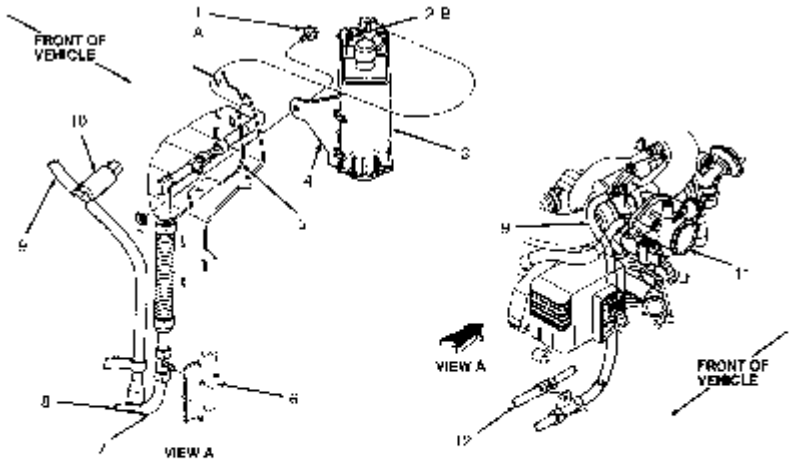
Evaporative emission control system and related components-3.0L Flexible Fuel (FF) engine

Click to enlarge



Location of system components-3.0L Flexible Fuel (FF) engine

Click to enlarge

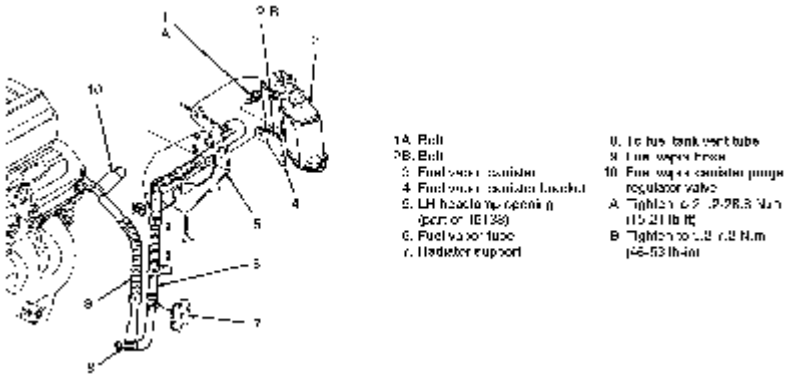


9. Evaporative emission hose
10. Evaporative emission canister purge solenoid
11. Throttle body
12. Battery ground cable
A. Tighten to 21.2 28.8 N.m (15.21 lb ft)
B. Tighten to 5.2 7.2 N.m (46 63 lb in)

1. Bolt
2. Bolt
3. Evaporative emissions canister
4. Evaporative emissions canister bracket
5. LH headlamp opening (part of 16138)
6. Radiator support
7. Evaporative emission tube
8. Fuel tank vent tube (part of SK313)

Evaporative emission control system and related components-3.0L SHO shown; 3.2L SHO similar

Click to enlarge



Evaporative emission control system and related components-3.8L engine

Click to enlarge

SERVICING

Since the canister is purged of fumes when the engine is operating, no real maintenance is required. However, the canister should be visually inspected for cracks, loose connections, etc. The emission canister is located on the driver's side fender near the battery, except for the 3.0 FF, which uses four evaporative emissions canisters mounted under the rear floor pan. The canister should have no liquid fuel in it; if it does, replace it. Replacement is simply a matter of disconnecting the hoses, loosening the mount and replacing the canister.

Removing the carbon canister-Early model 2.5L shown

Battery

GENERAL MAINTENANCE

Loose, dirty, or corroded battery terminals are a major cause of "no-start.'' Every 3 months or so, remove the battery terminals and clean them. This will help to retard corrosion.

Check the battery cables for signs of wear or chafing and replace any cable or terminal that looks marginal. Battery terminals can be easily cleaned and inexpensive terminal cleaning tools are an excellent investment that will pay for themselves many times over. They can usually be purchased from any well-equipped auto store or parts department. Side terminal batteries require a different tool to clean the threads in the battery case. The accumulated white powder and corrosion can be cleaned from the top of the battery with an old toothbrush and a solution of baking soda and water.

Unless you have a maintenance-free battery, check the electrolyte level and the specific gravity of each cell. Be sure that the vent holes in each cell cap are not blocked by grease or dirt. The vent holes allow hydrogen gas, formed by the chemical reaction in the battery, to escape safely.

Battery maintenance may be accomplished with household items (such as baking soda to neutralize spilled acid) or with special tools such as this post and terminal cleaner

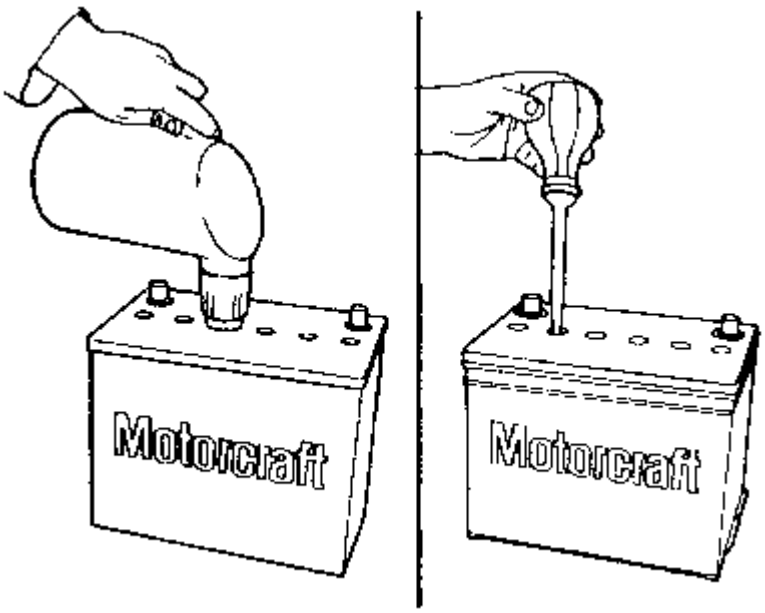
The underside of this special battery tool has a wire brush to clean post terminals

Place the tool over the terminals and twist to clean the post

FLUID LEVEL (EXCEPT MAINTENANCE-FREE BATTERIES)

Check the battery electrolyte level at least once a month, or more often in hot weather or during periods of extended car operation. The level can be checked through the case on translucent polypropylene batteries; the cell caps must be removed on other models. The electrolyte level in each cell should be kept filled to the split ring inside, or the line marked on the outside of the case.

If the level is low, add only distilled water, or colorless, odorless drinking water, through the opening until the level is correct. Each cell is completely separate from the others, so each must be checked and filled individually.



Two devices used to maintain electrolyte level: A self-leveling filler which fills to a predetermined level and a syringe-type filler

If water is added in freezing weather, the car should be driven several miles to allow the water to mix with the electrolyte. Otherwise, the battery could freeze.

SPECIFIC GRAVITY (EXCEPT MAINTENANCE-FREE BATTERIES)

At least once a year, check the specific gravity of the battery using a hydrometer.

A hydrometer, is an inexpensive instrument available from many sources, including auto parts stores. The hydrometer has a squeeze bulb at one end and a nozzle at the other. Battery electrolyte is sucked into the hydrometer until the float is lifted from its seat. The specific gravity is then read by noting the position of the float. Generally, if after charging, the specific gravity between any two cells varies more than 50 points (0.50), the battery is bad and should be replaced.

It is not possible to check the specific gravity in this manner on sealed (maintenance-free) batteries. Instead, the indicator built into the top of the case must be relied on to display any signs of battery deterioration. If the indicator is dark, the battery can be assumed to be OK. If the indicator is light, the specific gravity is low, and the battery should be charged or replaced.

CABLES

Once every 6 months, the battery terminals and the cable clamps should be cleaned. Loosen the clamps and remove the cables, negative cable first. On batteries with posts on top, the use of a puller specially made for this purpose is recommended. Damage may occur to the battery if proper terminal pullers are not used. These are inexpensive, and available in auto parts stores. Side terminal battery cables are secured with a bolt, and do not require a puller.

Clean the cable clamps and the battery terminal with a wire brush, until all corrosion, grease, etc. is removed and the metal is shiny. It is especially important to clean the inside of the clamp thoroughly, since a small deposit of foreign material or oxidation there can prevent a sound electrical connection and inhibit starting and/or charging. Special tools are available for cleaning these parts, one type for conventional batteries and another type for side terminal batteries.

Before installing the cable, loosen the battery hold-down clamp or strap, remove the battery and check the battery tray. Clear it of any debris, and check it for soundness. Rust should be wire brushed away, and the metal given a coat of anti-rust paint. Before replacing the battery, wash it with soap and water to remove any dirt. Replace the battery and tighten the hold-down clamp or strap securely, but be careful not to overtighten, which will crack the battery case.

After the clamps and terminals are clean, reinstall the cables, negative cable last; do not hammer on the clamps to install. Tighten the clamps securely, but do not distort them. Give the clamps and terminals a thin external coat of grease after installation, to retard corrosion.

Check the cables at the same time that the terminals are cleaned. If the cable insulation is cracked or broken, or if the ends are frayed, the cable should be replaced with a new cable of the same length and gauge.

Keep flames and sparks away from the battery; it gives off explosive hydrogen gas. Battery electrolyte contains sulfuric acid. If you should splash any on your skin or in your eyes, flush the affected areas with

plenty of clear water; if it lands in your eyes, get medical help immediately.

CHARGING

Before recharging a battery, see if any of the following problems exist:

- **Loose alternator belt**
- **Pinched or grounded alternator/voltage regulator wiring harness**
- **Loose wiring connection at the alternator and/or voltage regulator**
- **Loose or corroded connections at the battery and/or the engine ground**
- **Excessive battery drain due to any accessories or lighting left on.**

If any of these exist, remedy the problem, then check to see if the battery still needs to be charged. Cold batteries will not readily accept a charge. Therefore, batteries should be allowed to warm up to approximately 41°F (5°C) before charging. This may require allowing the battery to warm up at room temperature for four to eight hours, depending on the initial temperature and the size of the battery. A battery which has been completely discharged may be slow to accept a charge initially, and in some cases may not accept a charge at the normal charger setting. When batteries are in this condition, charging can be started by using a dead battery switch, on chargers equipped with one.

Completely discharged batteries, which have been discharged for a prolonged period of time (over one month) or which have an open circuit voltage of less than two volts, may not indicate accepting a charge even when the dead battery switch is used. The initial charge rate accepted by batteries in this condition is so low, that the ammeter on some charges will not show any indication of charge for up to 10 minutes. To determine whether a battery is accepting a charge, follow the charger manufacturer's instructions for the use of the dead battery switch. If the dead battery switch is the spring-loaded type, it should be held in the ON position for up to three minutes.

After releasing the dead battery switch and with the charger still on, measure the battery voltage. If it shows 12 volts or higher, the battery is accepting a charge and is capable of being recharged. But, it may require up to two hours of charging on batteries colder than 41°F (5°C) before the charge rate is high enough to register on the charger ammeter. If a battery cannot be charged by this procedure, it should be replaced.

Once the battery has begun to accept a charge, it can be charge to serviceable state or full charge by one of two methods:

- **Use the AUTOMATIC setting on chargers so equipped. This setting maintains the charging rate within safe limits by adjusting the voltage and the current to prevent excessive gassing and the spewing of electrolyte. About two to four hours is needed to charge a completely discharged battery to a serviceable state. If a full state of charge is desired, the charge can be completed by a low current rate of 3-5 amps for several hours.**
- **The second method is to use the MANUAL or constant current setting on the charger. Initially set the charging rate for 30-40 amps and maintain this setting for about 30 minutes or as long as there is not excessive gassing and electrolyte spewing. If gassing results, the charge rate must be reduced to a level where gassing will stop. This is especially true for maintenance-free batteries, in which**

excessive gassing will result in non-replaceable loss of electrolyte, shortening the battery life.

The total charge necessary will vary with battery size and its initial state of charge. In general, to bring a discharged battery to a serviceable state of charge, the amount of charging current multiplied by the charging time should equal the battery amp-hour capacity. For example, a 45 AH battery will need 15 amps of charge for three hours, or 9 amps of charge for five hours. If a full state of charge is desired, the charge can be completed by a low constant current of 3-5 amps for several hours.

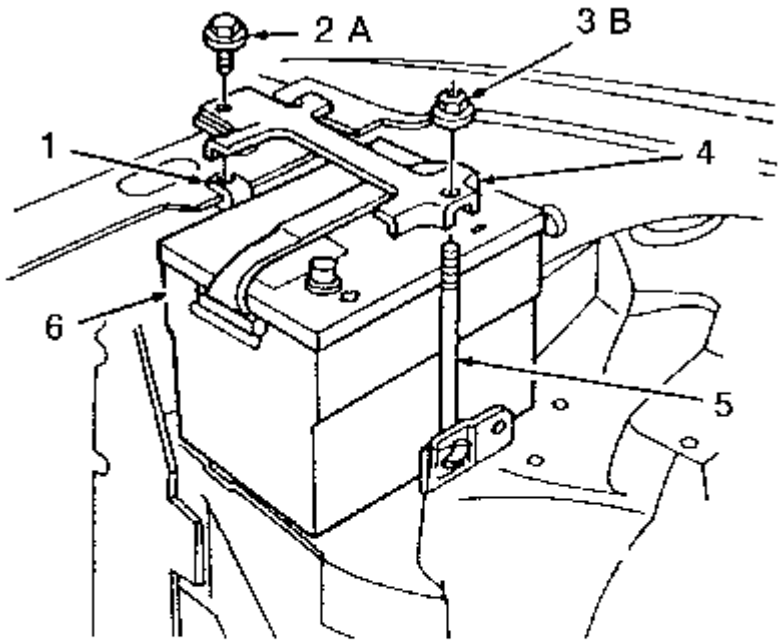
REPLACEMENT

The cold power rating of a battery measures battery starting performance and provides an approximate relationship between battery size and engine size. As a general rule, the cold power rating of a replacement battery should match or exceed your engine size in cubic inches.

CAUTION

Batteries normally produce explosive gases which can cause personal injury. DO NOT allow flames, sparks or lighted substances to come near the battery. When charging or working near a battery, always shield your face and protect your eyes. Also, always provide adequate ventilation.

1. **Carefully disconnect the negative battery cable from the battery terminal, and position it aside.**
2. **Carefully disconnect the positive cable from the battery terminal, and position it aside.**
3. **Clean the cable terminals using an acid neutralizing solution and a terminal cleaning brush.**
4. **Remove the battery hold-down clamp(s) by disconnecting the retaining nut(s) and bolt(s).**
5. **Remove the battery.**



1. U-nut
2A. Bolt (1 required)
3B. Nut (1 required)
4. Bracket
5. J-bolt
6. Battery assembly
A. Tighten to 7-10 N.m (62-88 lb-in)
B. Tighten to 3-5 N.m (27-44 lb-in)

Common battery hold-down assembly

Click to enlarge

To install:

6. **Clean the battery tray and hold-down clamp(s) with a wire brush and scraper. Replace any components that are worn.**
7. **Place the battery in the battery tray making sure that the positive and negative terminals are in the same position as they were previous to removal.**
8. **Assemble and tighten the hold-down hardware so that the battery is secure. Do not overtighten.**

For some vehicles, when the battery is disconnected and reconnected, abnormal driving symptoms may temporarily occur. The reason for this is that the Powertrain Control Module (PCM) has to relearn its adaptive strategy. Your vehicle may have to be driven 10 miles or more for the module to relearn the strategy.

9. **Secure the positive, then the negative battery cables to the proper terminals. Do not overtighten.**

Belts

All vehicles are equipped with V-ribbed drive belts. Replacement belts should be of the same type as originally installed. Loose belts will result in slippage and cause improper operation of the driven accessory, power steering, air conditioning, etc. Overtightened belts will put a severe load on accessory bearings and will almost certainly cause them to self-destruct. Some systems are equipped with an automatic belt tensioner, and will not require any tension adjustments. The drive belt condition should be inspected at 60,000 miles (96,000 km), then at every 15,000 miles (24,000 km) thereafter.

INSPECTION

Inspect all drive belts for excessive wear, cracks, glazed condition, and frayed or broken cords. Replace any drive belt showing one or more of the above conditions.

If a drive belt continually gets cut, the crankshaft pulley might have a sharp projection on it. Have the pulley replaced if this condition continues.

ADJUSTMENT

Alternator Belt

2.5L, 3.2L SHO, 3.8L AND SOME 3.0L ENGINES

The V-ribbed belts used on these engines, utilize an automatic belt tensioner which maintains proper belt tension for the life of the belt. The automatic belt tensioner has a belt wear indicator mark, as well as **MIN** and **MAX** marks. If the indicator mark is not between the **MIN** and **MAX** marks, the belt is worn or an incorrect belt is installed.

3.0L ENGINE WITHOUT AUTOMATIC TENSIONER-EXCEPT SHO

1. **Disconnect the negative battery cable.**
2. **Loosen the alternator adjustment and pivot bolts.**
3. **Apply tension to the belt using the adjusting screw.**
4. **Using a belt tension gauge, set the belt to the proper tension. The tension should be 140-160 lbs. (533-711 N) for a new belt or 110-130 lbs. (356-445 N) for a used belt on vehicles through 1991. On 1992 vehicles, tighten to 190-210 lbs. (845-935 N) for a new belt and 140-160 lbs. (622-712 N) for a used belt.**
5. **When the belt is properly tensioned, tighten the alternator adjustment bolt to 27 ft. lbs. (37 Nm).**
6. **Remove the tension gauge and run the engine for 5 minutes.**
7. **With the engine OFF and the belt tension gauge in place, check that the adjusting screw is in contact with the bracket before loosening the alternator adjustment bolt. Rotate the adjustment screw until the belt is tensioned to 110-130 lbs. (356-445 N) for vehicles through 1991 or 140-160 lbs. (622-712 N) for 1992 vehicles.**
8. **Tighten the alternator adjustment bolt to 27 ft. lbs. (37 Nm) and the pivot bolt to 43 ft. lbs. (58 Nm).**

3.0L SHO ENGINE

1. **Disconnect the negative battery cable.**

2. Loosen the idler/tensioner pulley nut.
3. Turn the adjusting bolt until the belt is adjusted properly.

Turning the wrench to the right tightens the belt adjustment; turning the wrench to the left loosens the belt tension.

4. Tighten the idler/tensioner pulley nut to 25-37 ft. lbs. (34-50 Nm) and check the belt tension.

REMOVAL & INSTALLATION

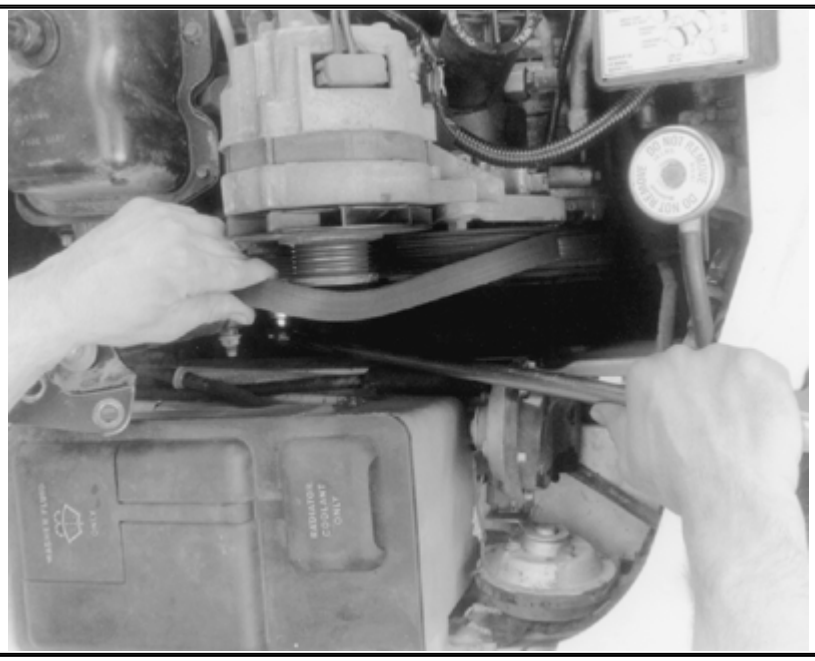
When installing belts on the pulley, ensure that all of the V-grooves are making contact with the pulleys.

2.5L Engine

ALTERNATOR, POWER STEERING AND AIR CONDITIONING BELT

1. Insert a $^{1}/_{2}$ in. breaker bar into the square hole in the tensioner, then rotate the tensioner counterclockwise and remove the belt from the pulleys.

Be careful when removing or installing belts that the tool doesn't slip!



Removing the belt from the pulleys-early 2.5L engine shown

To install:

2. Install the belt over all pulleys except the alternator pulley.
3. Rotate the tensioner as described in Step 1 and install the belt over the alternator pulley. Check that all the V-grooves make proper contact with the pulleys.

3.0L Engine-Except SHO

ALTERNATOR BELT WITHOUT AUTOMATIC TENSIONER

1. Loosen the adjusting arm and pivot bolts.

2. Turn the alternator belt adjusting screw counterclockwise until the old belt can be removed.
3. Remove the belt.

To install:

4. Install the new belt over the pulleys. Check that all the V-grooves make proper contact with the pulleys.
5. Adjust the belt tension, then tighten the adjusting arm and pivot bolts.

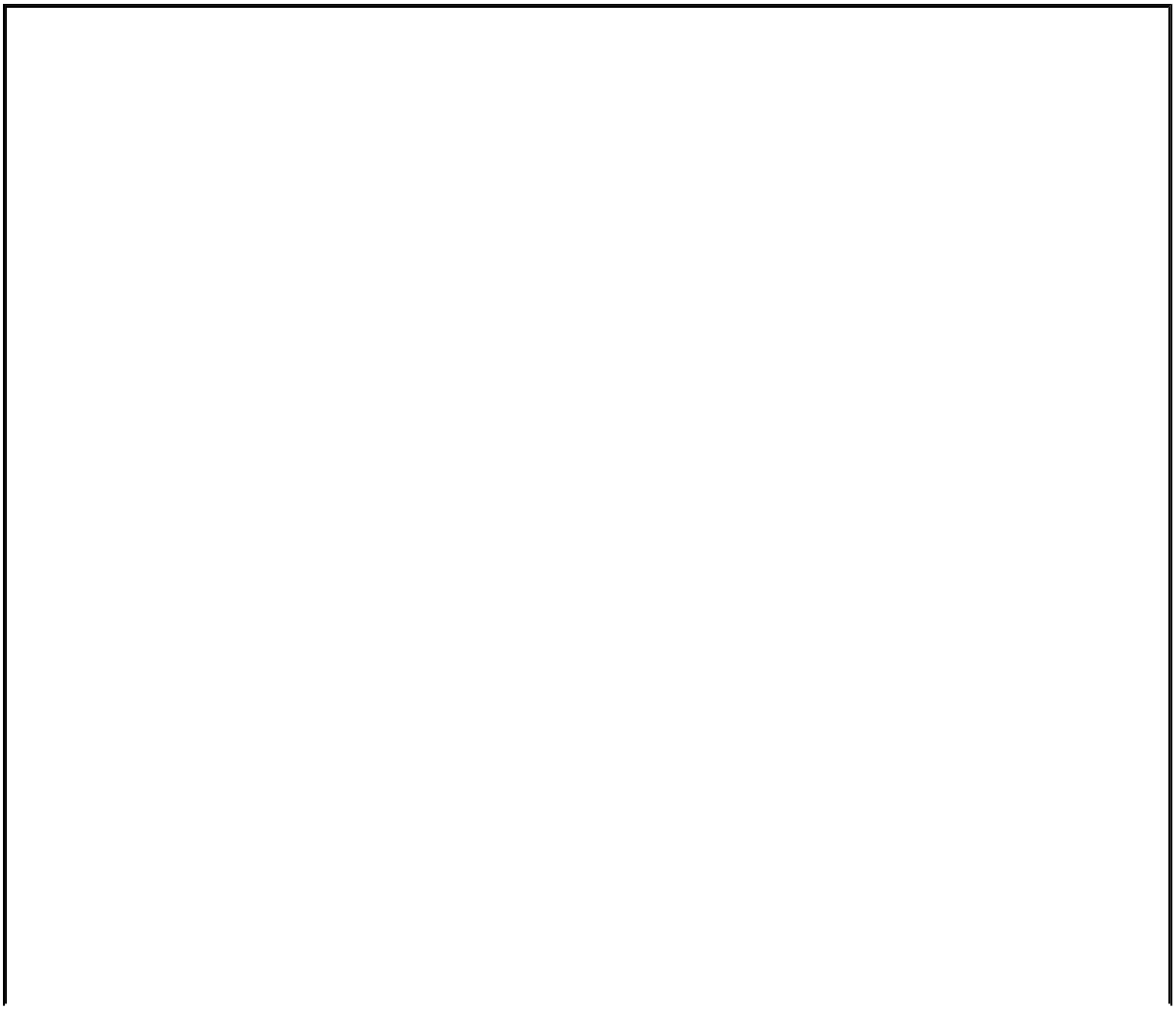
3.0L SHO Engine

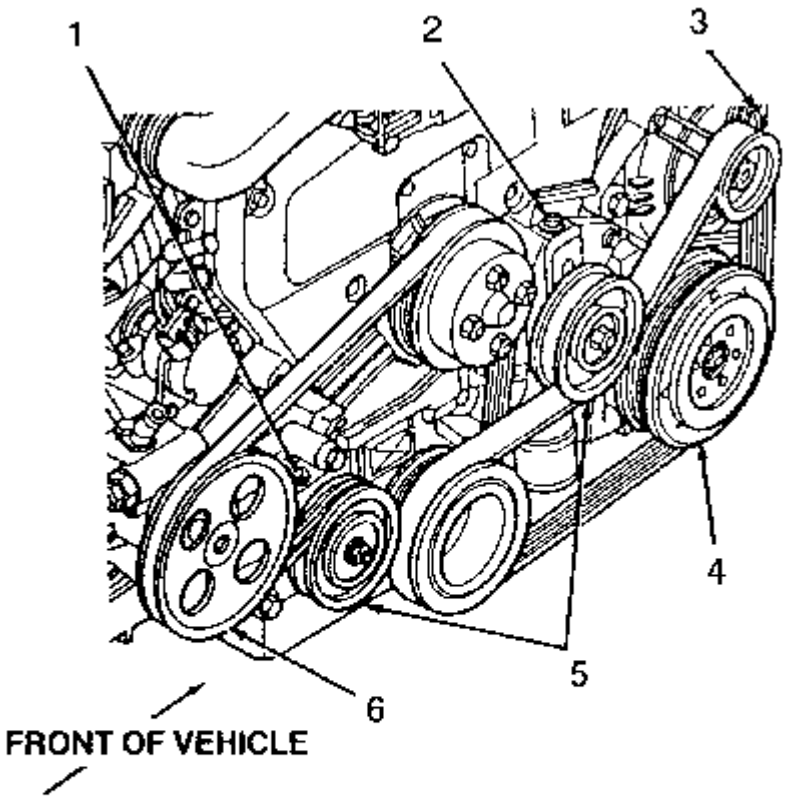
ALTERNATOR BELT

1. Loosen the nut in the center of the idler pulley.
2. Loosen the idler adjusting screw until the old belt can be removed, then remove the belt.

To install:

3. Install the new belt over the pulleys in proper contact with the pulleys.
4. Adjust the new belt to specifications as follows: Turn the idler pulley nut to the right to tighten the belt to a specification of 220-265 lbs. (980-1180 N). Torque the idler pulley nut to 25-37 ft. lbs. (34-50 Nm).





1. P/S water pump belt tension adjusting screw
2. A/C generator belt tension adjusting screw
3. Generator
4. A/C compressor
5. Drive belt tensioner pulley
6. Power steering pump

3.0L SHO accessory drive belts schematic

Click to enlarge

POWER STEERING AND AIR CONDITIONING BELT

1. **Remove the alternator belt.**
2. **Loosen the nut on the tensioner pulley.**
3. **Turn the belt adjusting screw on the tensioner counterclockwise until the belt can be removed, then remove the belt.**

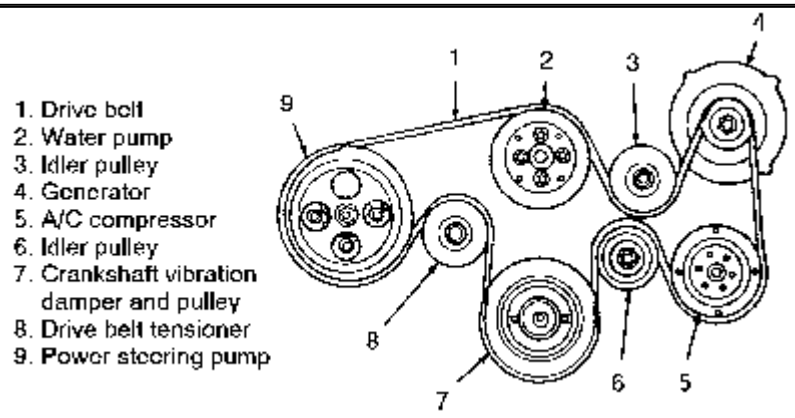
To install:

4. **Position the new belt over the proper pulleys, making sure the V-grooves are properly seated.**
5. **Install the alternator belt.**
6. **Adjust the power steering and air conditioning belt to a specification of 154-198 lbs. (690-980 N) with a belt tension gauge.**
7. **Adjust the alternator belt.**

3.2L SHO Engine

WITH AUTOMATIC TENSIONER

1. **Place a 14mm socket over the bolt on the drive belt tensioner and rotate it clockwise (downward) to release belt tension.**
2. **Remove the drive belt from the pulleys.**



3.2L SHO belt schematic

Click to enlarge

To install:

3. **Install the drive belt over all the pulleys except for the power steering pump pulley. Make sure that all the V-grooves make proper contact with the pulleys.**
4. **Place a 14mm socket over the bolt on the drive belt tensioner pulley and rotate it clockwise (downward), then install the drive belt over the power steering pump pulley.**

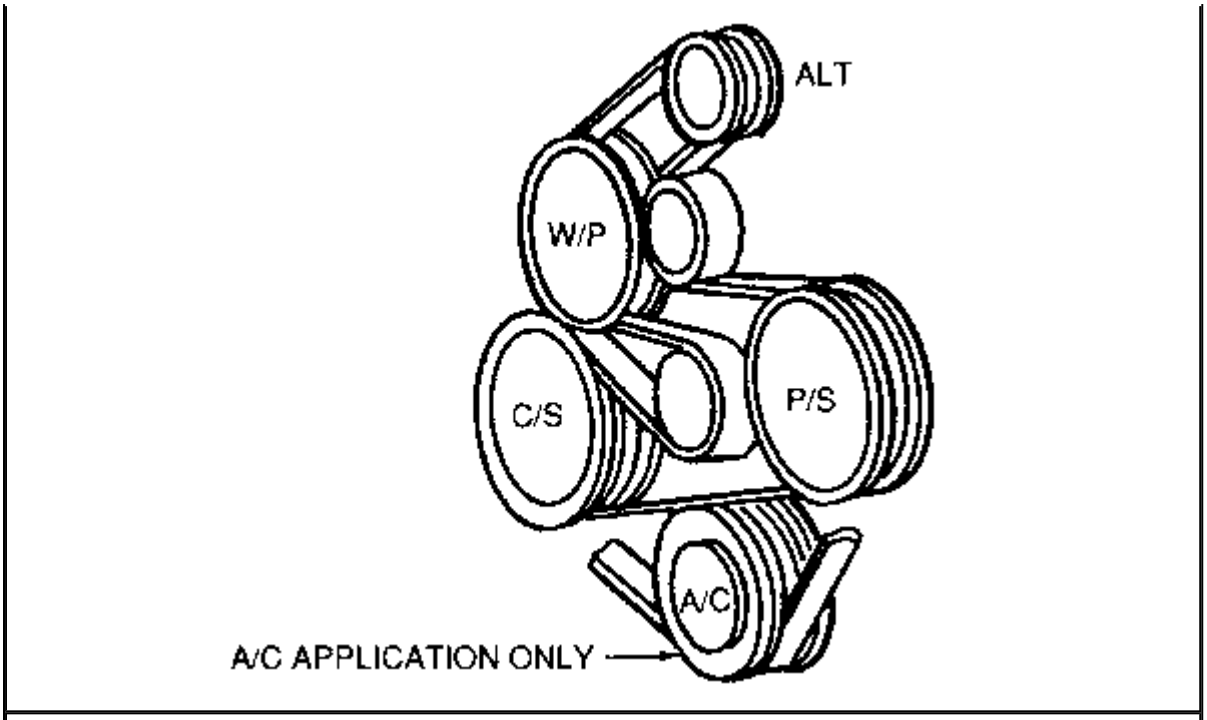
3.0L Engine (Except SHO) and 3.8L Engine

VEHICLES THROUGH 1993 WITH AUTOMATIC TENSIONER

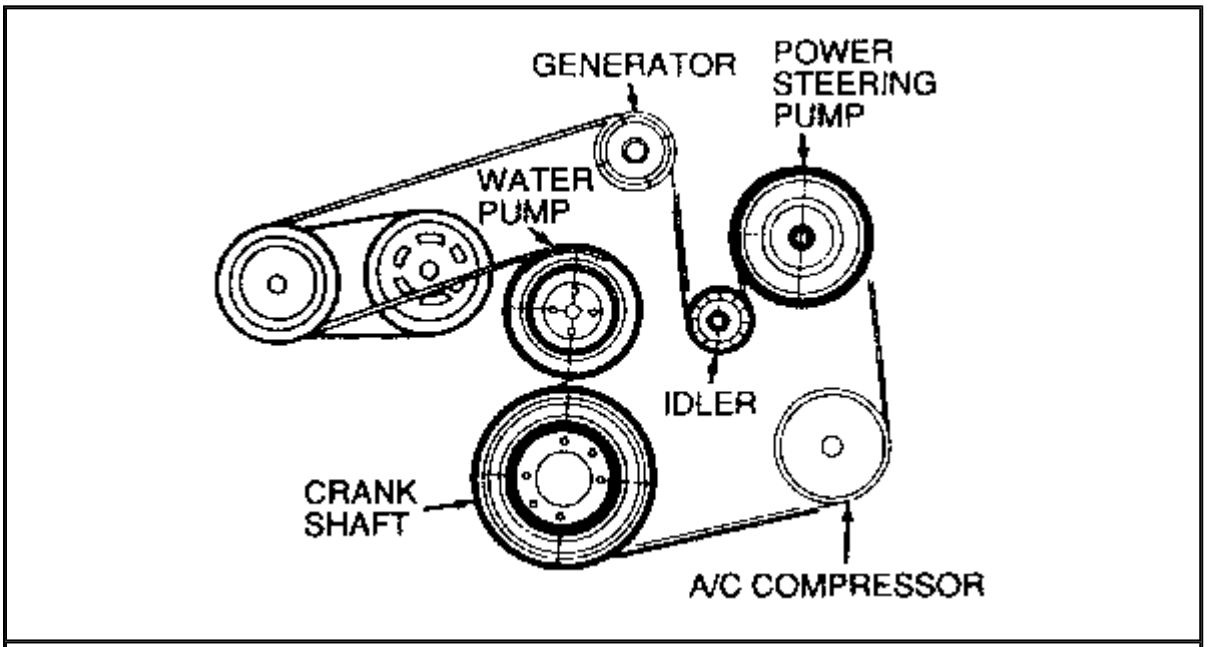
1. **Insert a $^{1}/_{2}$ in. breaker bar into the square hole in the tensioner.**

On the 3.8L engine, the tensioner has a $^{1}/_{2}$ in. square hole cast into the rear of the tension arm directly behind the pulley. On the 3.0L engine, the $^{1}/_{2}$ in. square hole is cast into the spring housing on the front of the tensioner.

2. **Rotate the tensioner clockwise and remove the belt.**



3.0L belt schematic-1993 shown



3.8L belt schematic-1993 shown

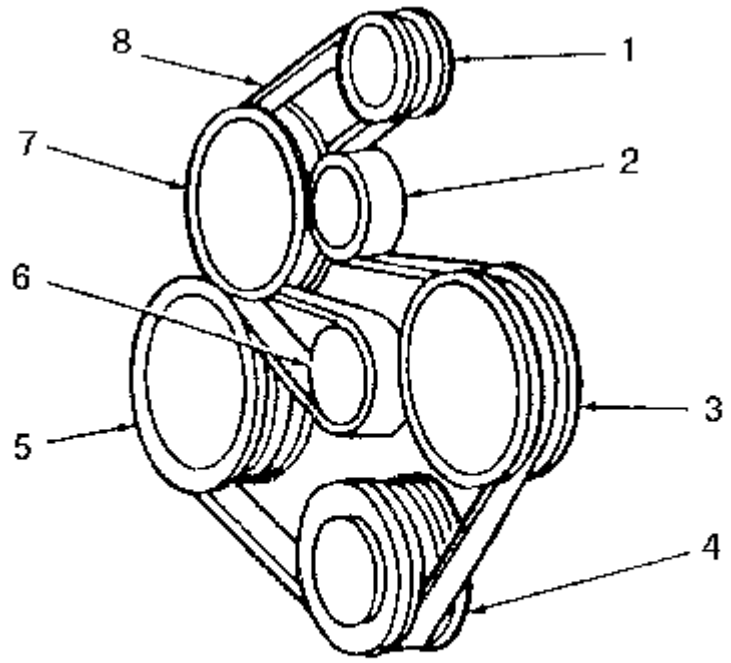
Click to enlarge

To install:

3. **Install the drive belt over all the pulleys, except for the alternator pulley on the 3.0L engine for vehicles through 1992, or the idler pulley for 1993 3.0L vehicles.**
4. **Rotate tensioner counterclockwise and install the belt over the alternator pulley. Make sure that all the V-grooves make proper contact with the pulleys.**
5. **On the 3.0L engine, install the alternator belt for vehicles through 1992.**
6. **For 1993 3.0L vehicles, install the drive belt over the idler pulley.**

1994-95 VEHICLES WITH AUTOMATIC TENSIONER

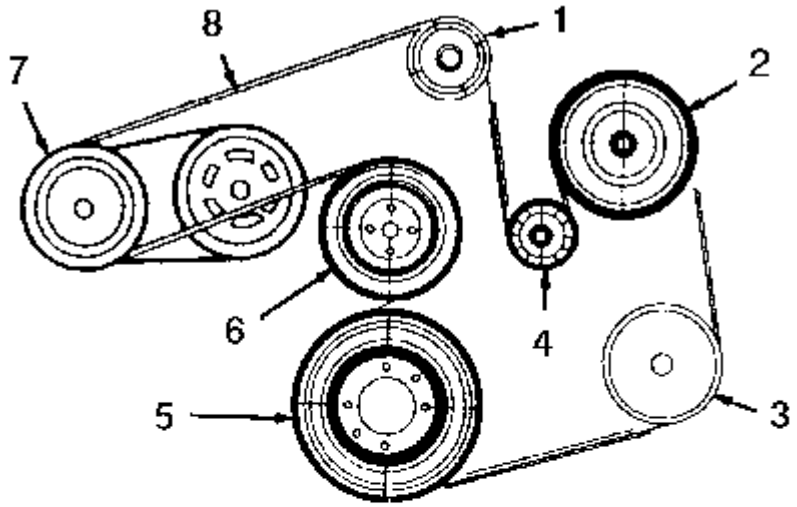
1. **Using a 15mm socket or wrench on the attaching bolt, rotate the drive belt tensioner pulley clockwise to relieve the tension.**
2. **Remove the drive belt.**



1. Generator
2. Drive belt tensioner
3. Power steering pump
4. A/C compressor
5. Crankshaft pulley
6. Idler pulley
7. Water pump
8. Drive belt

3.0L accessory drive belt schematic-1995 shown

Click to enlarge



1. Generator
2. Power steering pump
3. A/C compressor
4. Idler pulley
5. Crankshaft vibration damper and pulley
6. Water pump
7. Drive belt tensioner
8. Drive belt

3.8L accessory drive belt schematic-1995 shown

Click to enlarge

To install:

3. **Install the drive belt over all the pulleys, other than the drive belt tensioner.**
4. **Rotate the drive belt tensioner clockwise, using a 15mm socket or wrench, then install the belt over the drive belt tensioner pulley.**
5. **Make sure that all of the V-grooves make proper contact with the pulleys.**

Timing Belt

INSPECTION

Vehicles equipped with the 3.0L and 3.2L SHO engines are the only vehicles covered by this manual which utilize timing belts. The timing belt should be inspected for cracks, wear, or other damage, and should be replaced every 100,000 miles (160,000 km). For timing belt removal and installation procedures, please refer to ***Section 3*** of this manual.

Hoses

INSPECTION

Upper and lower radiator hoses, along with the heater hoses, should be inspected for deterioration, leaks and loose hose clamps at least every 15,000 miles (24,000 km). It is also wise to check the hoses periodically in early spring and at the beginning of the fall or winter when you are performing other maintenance. A quick visual inspection may discover a weakened hose which could have left you stranded had it remained unrepaired.

Whenever you are checking the hoses, make sure the engine and cooling system are cold. Visually inspect for cracking, rotting or collapsed hoses, and replace as necessary. Run your hand along the length of the hose. If a weak or swollen spot is noted when squeezing the hose wall, the hose should be replaced.

REMOVAL & INSTALLATION

1. **Disconnect the negative battery cable, then place protective covers over the fenders.**
2. **Place a suitable drain pan under the radiator.**

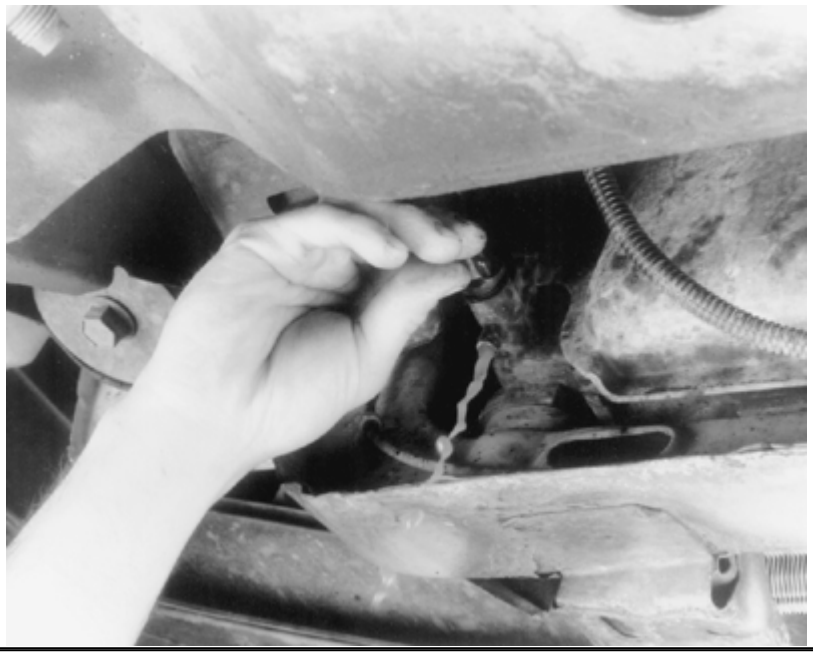
CAUTION

Never remove the pressure cap while the engine is running, or personal injury from scalding hot coolant or steam may result. If possible, wait until the engine has cooled to remove the pressure cap. If this is not possible, wrap a thick cloth around the pressure cap, then depress and turn it slowly to the stop. Step back while pressure is released from the cooling system. When you are sure all the pressure has been released, turn and remove the cap.

If only the upper hose is to be replaced, you need only drain off enough coolant so that the level is below the hose.

3. **Remove the radiator pressure cap. Attach a $^{3}/_{8}$ in. (9.5mm) diameter hose to the radiator draincock, then open the draincock and drain the radiator.**

Opening the radiator draincock located at the lower rear corner of the radiator

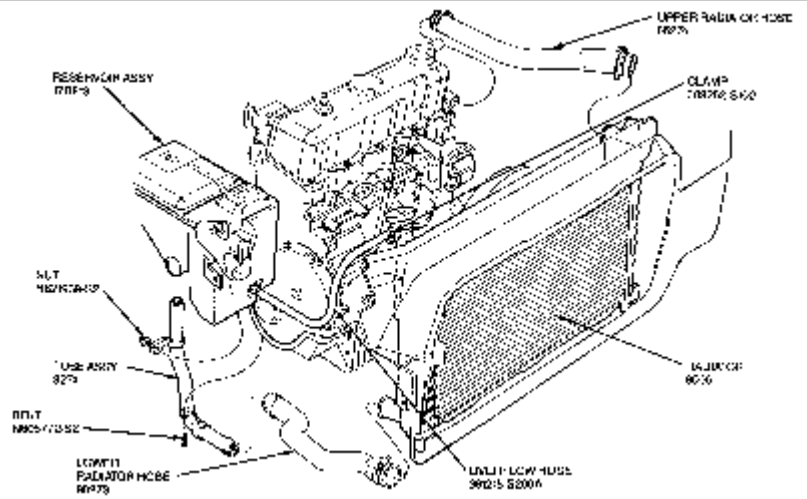


Attaching a small hose to the draincock will help direct the flow of coolant into the drainpan, thereby reducing the mess

CAUTION

The engine should be cool before any hoses are replaced. If engine is hot, let it cool down for at least an hour. When draining the coolant, keep in mind that cats and dogs are attracted by 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.

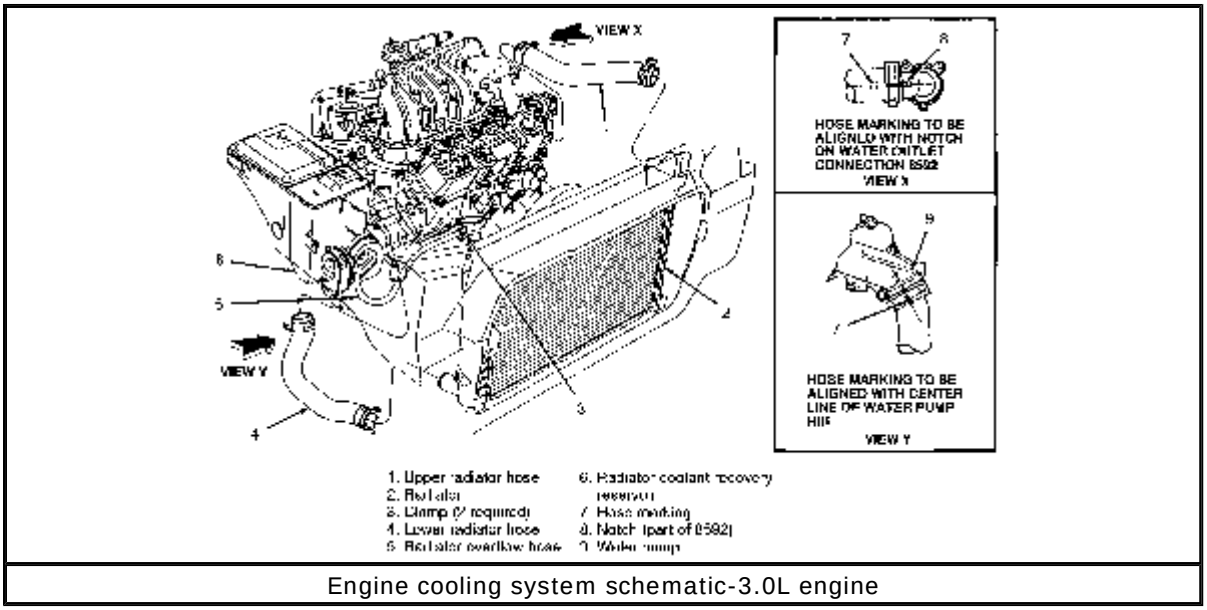
4. **After the radiator has drained, position the drain pan under the hose to be removed.**
5. **To remove the lower hose, loosen the lower hose clamps, then disconnect the hose from the water pump or radiator lower hose tube, and allow it to drain. Disconnect the other end of the hose from the radiator and remove the hose.**



Exploded view of the engine cooling system -2.5L engine

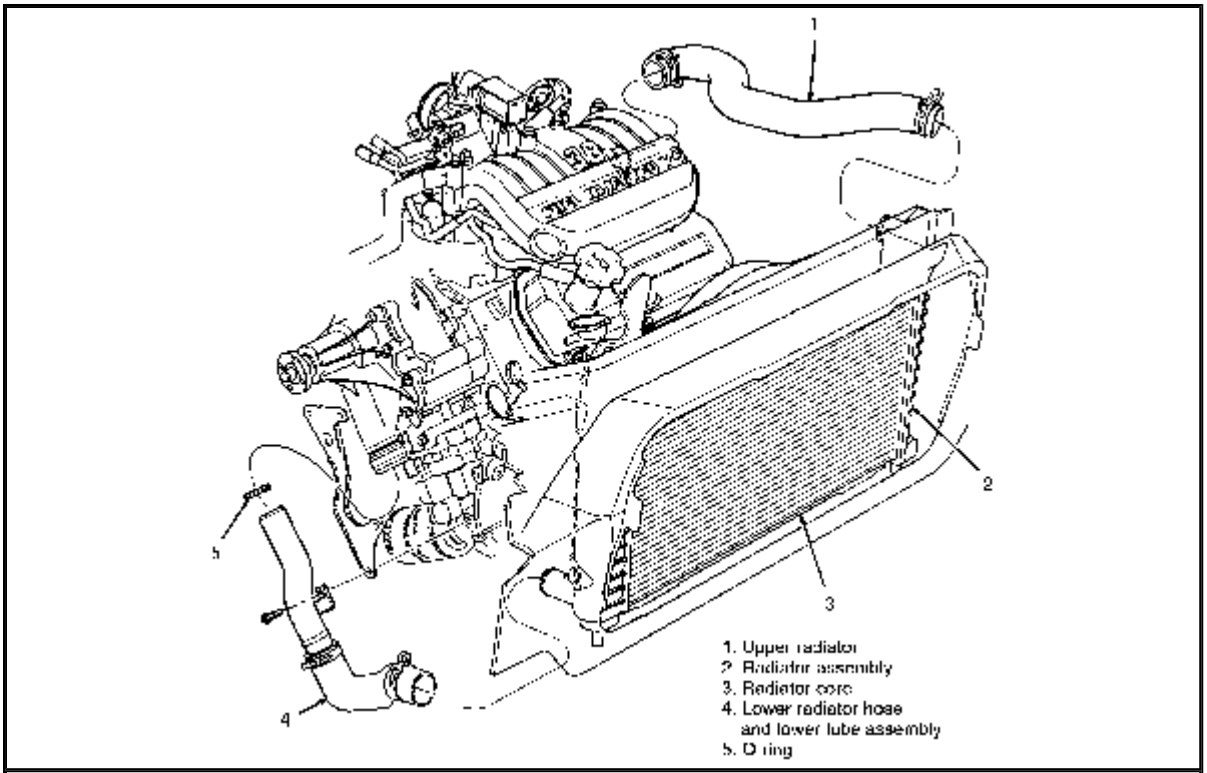
Click to enlarge

6. **To remove the upper hose, loosen the retaining clamps, then disconnect and remove the hose.**



Engine cooling system schematic-3.0L engine

Click to enlarge



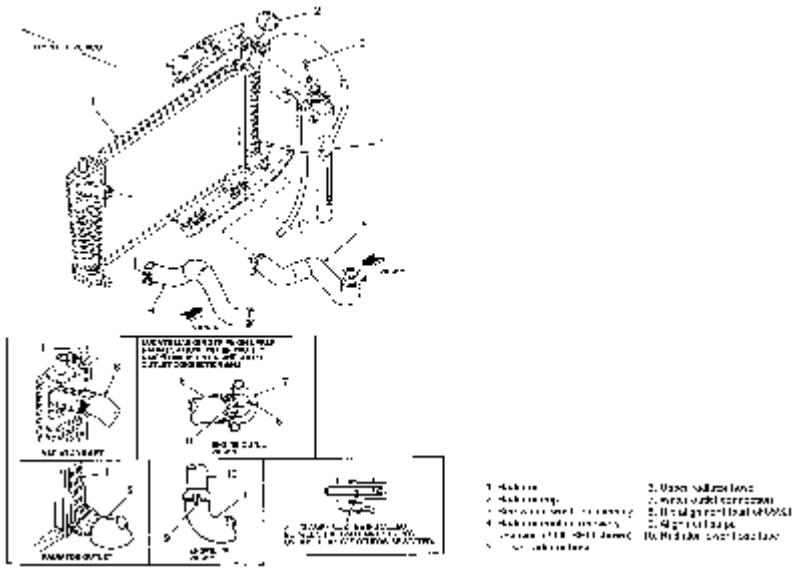
Exploded view of the engine cooling system-3.8L engine

Click to enlarge

7. **To remove the heater hose(s), loosen the clamps, then remove the hose(s).**

To install:

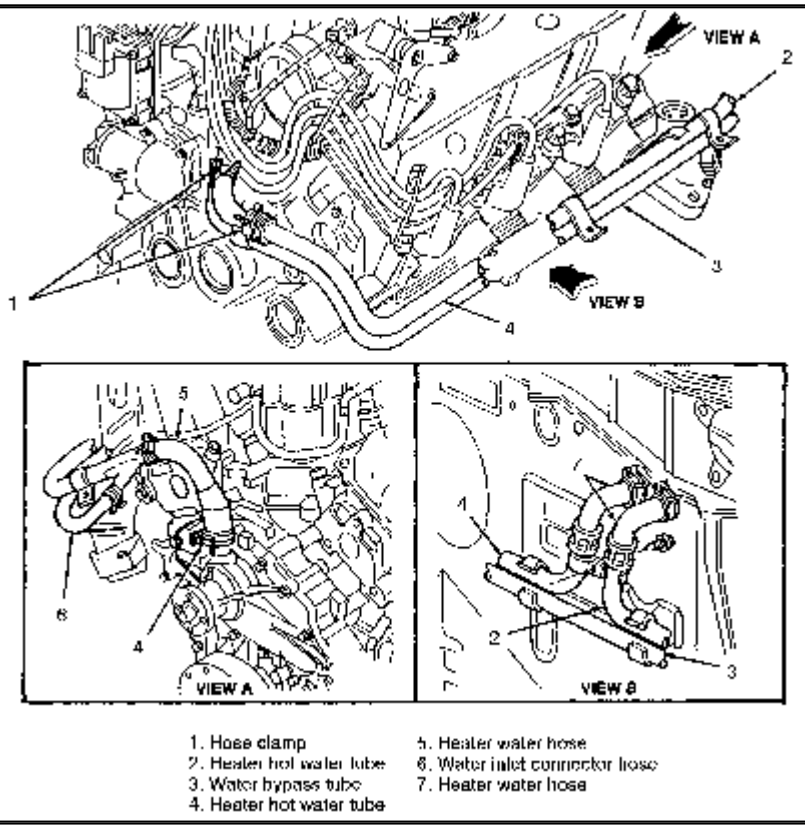
8. **Position the hose(s) to the appropriate connection(s).**
9. **If applicable, position the hose clamps between the alignment marks on both ends of the hose, then slide the hose onto the connections.**
10. **Tighten the hose clamps to 20-30 inch lbs. (2.2-3.4 Nm).**



Cooling system components-3.0L and 3.2L SHO engines

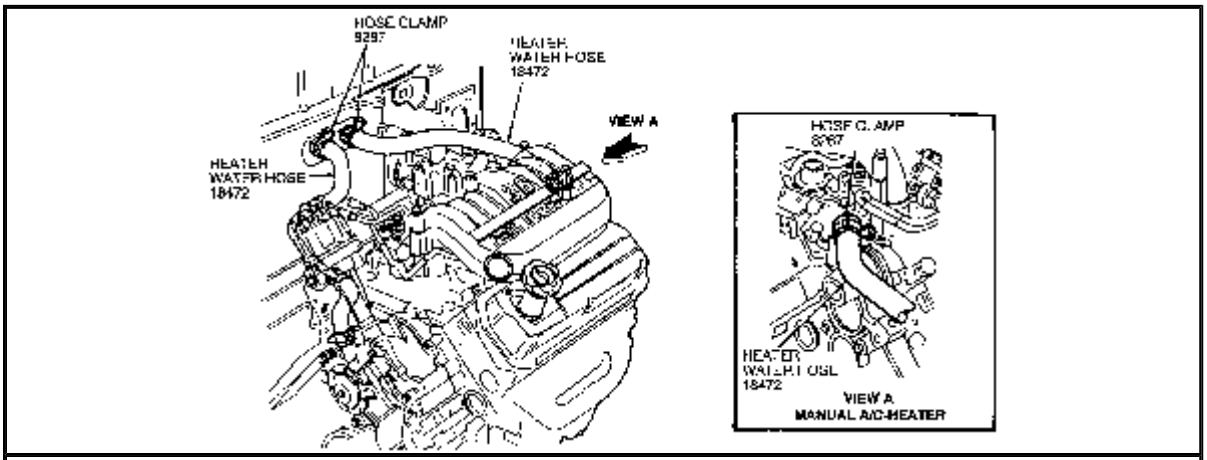
Click to enlarge

11. **Close the radiator draincock. Fill the cooling system with a 50/50 mixture of Ford Premium Cooling System Fluid E2FZ-19549-AA or B (CXC-8-B in Canada) or equivalent and water.**



Heater hose locations-3.0L engine

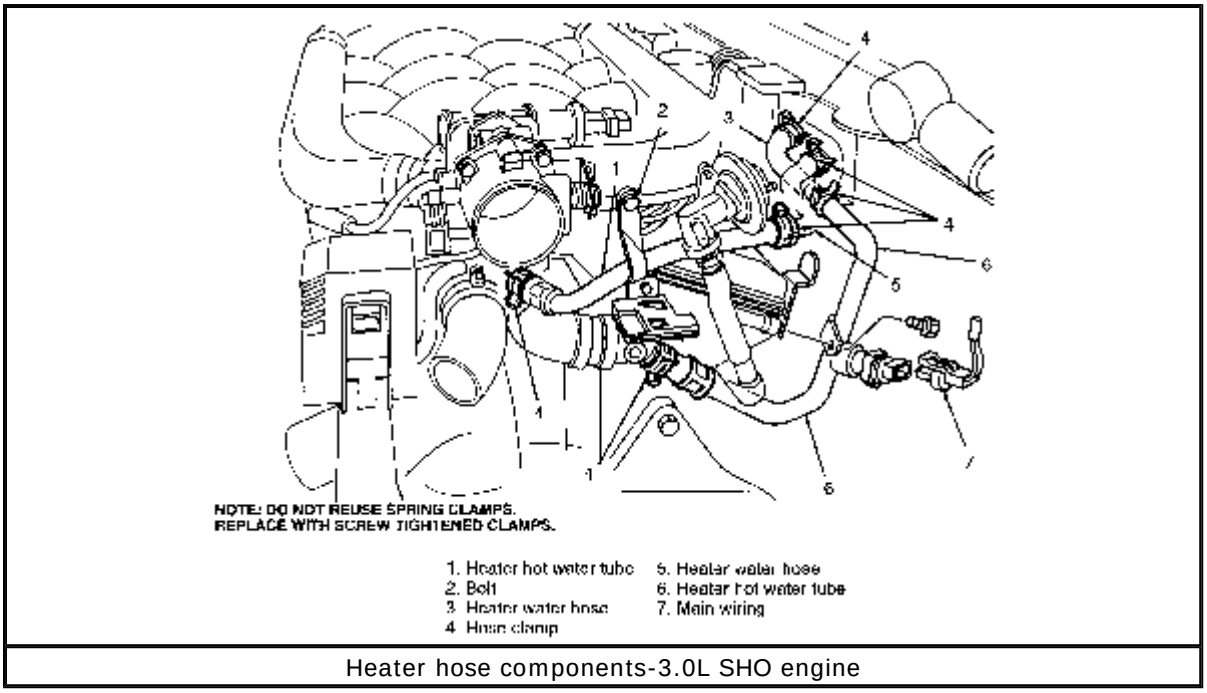
Click to enlarge



Heater hose assembly-3.8L engine

Click to enlarge

12. **Connect the negative battery cable, then start the engine and check for coolant leaks.**



Heater hose components-3.0L SHO engine

Click to enlarge

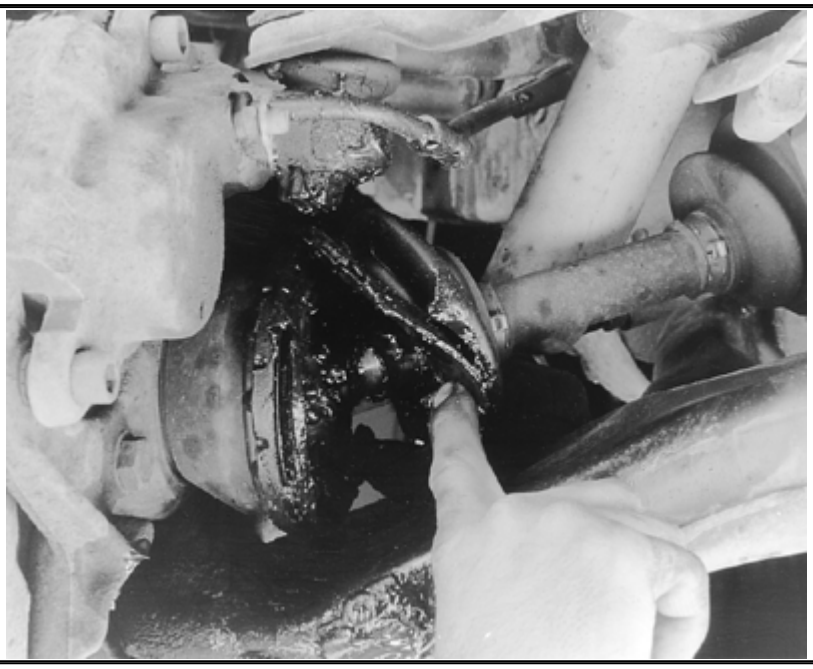
13. **When the engine cools, recheck the coolant level in the radiator, or reservoir container, then remove the fender covers.**

CV Boot

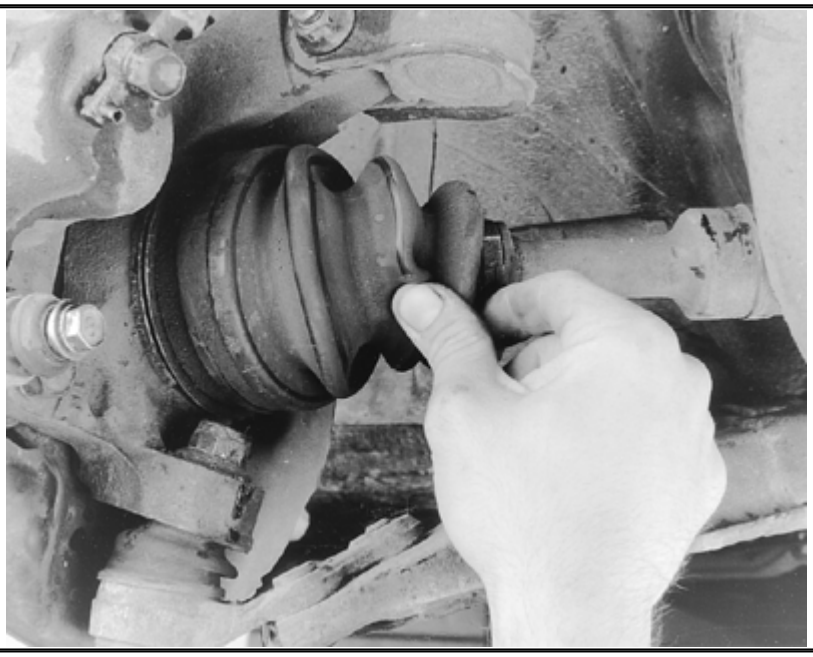
INSPECTION

CV joint boots should be periodically inspected. It would be a wise idea to examine the boot every time your vehicle is raised and supported. Check the boot for signs of cracks, tears or splits and repair/replace as necessary. For CV boot and joint repair, as well as overhaul procedures, please refer to ***Section 7*** of this

manual.



View of a torn CV boot



View of a CV boot in good condition

Air Conditioning

Some 1992-93 and all 1994-95 vehicles are equipped with a refrigerant (R-134a) that is incompatible with the older R-12 or Freon®. This newerrefrigerant is NOT available commercially in most areas, and it may be illegalto service a vehicle with this refrigerant. If you have a vehicle equipped withR-134a, it should be taken to a qualified technician for all A/C service.

Some 1992-93 vehicles equipped with the 3.0L engine, and all 1994-95 vehicles are using R-134a refrigerant, rather than the conventional R-12 refrigerant. The new R-134a refrigerant is not harmful to the ozone layer of the atmosphere. It

has many of the same properties as the old type of refrigerant and is similar in both form and function. These two refrigerants are not interchangeable with one another. Therefore, do not mix the two types of refrigerant, the tools used in servicing the air conditioning system, or component replacement parts from these two types of air conditioning systems. Failure to follow these guidelines will result in damage to the vehicle air conditioning system, and may also result in personal injury to the individual.

SYSTEM IDENTIFICATION

In order to determine which type of system your vehicle has, an identification data plate is located on the major system components. If the system components have YELLOW R-134a non-cfc tags, then the system requires R-134a refrigerant. These systems can also be identified by a gold-colored air conditioning compressor clutch and green-colored O-rings used throughout the system.

GENERAL SERVICING PROCEDURES

It is recommended, and possibly required by law, that a qualifiedtechnician perform the following services.

The most important aspect of air conditioning service is the maintenance of a pure and adequate charge of refrigerant in the system. A refrigeration system cannot function properly if a significant percentage of the charge is lost. Leaks are common because the severe vibration encountered underhood in an automobile can easily cause a sufficient cracking or loosening of the air conditioning fittings. As a result, the extreme operating pressures of the system force refrigerant out.

The problem can be understood by considering what happens to the system as it is operated with a continuous leak. Because the expansion valve regulates the flow of refrigerant to the evaporator, the level of refrigerant there is fairly constant. The receiver/drier stores any excess refrigerant, so a loss will first appear as a reduction in the level of liquid. As this level nears the bottom of the vessel, some refrigerant vapor bubbles will begin to appear in the stream of liquid supplied to the expansion valve. This vapor decreases the capacity of the expansion valve very little as the valve opens to compensate for its presence. As the quantity of liquid in the condenser decreases, the operating pressure will drop there and throughout the high side of the system. As the refrigerant continues to be expelled, the pressure available to force the liquid through the expansion valve will continue to decrease, and, eventually, the valve's orifice will prove to be too much of a restriction for adequate flow, even with the needle fully withdrawn.

At this point, low side pressure will start to drop, and severe reduction in cooling capacity, marked by freeze-up of the evaporator coil, will result. Eventually, the operating pressure of the evaporator will be lower than the pressure of the atmosphere surrounding it, and air will be drawn into the system wherever there are leaks in the low side.

Because all atmospheric air contains at least some moisture, water will enter the system and mix with the refrigerant and oil. Trace amounts of moisture will cause sludging of the oil, and corrosion of the system. Saturation and clogging of the filter/drier, and freezing of the expansion valve orifice will eventually result. As air fills the system to a greater and greater extent, it will interfere more and more with the normal flows of refrigerant and heat.

From this description, it should be obvious that much of the technician's time will

be spent detecting leaks, repairing them, and then restoring the purity and quantity of the refrigerant charge. A list of general rules should be followed in addition to all safety precautions:

- **Keep all tools as clean and dry as possible.**
- **Thoroughly purge the service gauges and hoses of air and moisture before connecting them to the system. Keep them capped when not in use.**
- **Thoroughly clean any refrigerant fitting before disconnecting it, in order to minimize the entrance of dirt into the system.**
- **Plan any operation that requires opening the system beforehand in order to minimize the length of time it will be exposed to open air. Cap or seal the open ends to minimize the entrance of foreign material.**
- **When adding oil, pour it through an extremely clean and dry tube or funnel. Keep the oil capped whenever possible. Do not use oil that has not been kept tightly sealed.**
- **Use only the appropriate refrigerant. Although you are unlikely to find it for sale, Do NOT use old containers of R-12 which were intended for cleaning or powering air horns.**
- **Completely evacuate any system that has been opened to replace a component, other than when isolating the compressor, or that has leaked sufficiently to draw in moisture and air. This requires evacuating air and moisture with a good vacuum pump for at least one hour. If a system has been open for a considerable length of time, it may be advisable to evacuate the system for up to 12 hours (overnight).**
- **Use a wrench on both halves of a fitting that is to be disconnected, so as to avoid placing torque on any of the refrigerant lines.**
- **When overhauling a compressor, pour some oil into a clean glass and inspect it. If there is evidence of dirt or metal particles, or both, flush all refrigerant components with clean refrigerant before evacuating and recharging the system. In addition, if metal particles are present, the compressor should be replaced.**
- **Schrader valves may leak only when under full operating pressure. Therefore, if leakage is suspected, but cannot be located, operate the system with a full charge of refrigerant and look for leaks from all Schrader valves. Replace any faulty valves.**

SAFETY WARNINGS

Because of the inherent dangers involved with working on air conditioning systems and R-12 refrigerant, the following safety precautions must be strictly adhered to in order to service the system safely:

Some vehicles covered by this manual are equipped with R-134a, NOT R-12refrigerant. These 2 refrigerants are NOT compatible. Using the incorrectrefrigerant in an R-134a system will lead to compressor failure, refrigerantoil sludge and/or poor air conditioning system performance.

- **Avoid contact with a charged refrigeration system, even when working on another part of the air conditioning system or vehicle. If a heavy tool comes into contact with a section of copper tubing or a heat exchanger, it can easily cause the relatively soft material to rupture.**
- **When it is necessary to apply force to a fitting which contains refrigerant, as when checking that all system couplings are securely tightened, use a wrench on both parts of the fitting involved, if possible. This will avoid putting torque on the refrigerant tubing. (It is advisable, when possible, to use tubing or line wrenches**

when tightening these flare nut fittings.

R-12 refrigerant is a chlorofluorocarbon which, when released into theatmosphere, can contribute to the depletion of the ozone layer in the upperatmosphere. Ozone filters out harmful radiation from the sun.

- **Do NOT attempt to discharge the system by merely loosening a fitting, or removing the service valve caps and cracking these valves. Precise control is possible only when using the service gauges. Wear protective gloves when connecting or disconnecting service gauge hoses.**

Be sure to consult the laws in your area before servicing the airconditioning system. In some cases, it is illegal to perform repairs involvingrefrigerant unless the work is done by a certified technician.

- **Discharge the system using the proper discharge equipment, as high concentrations of the gas can exclude oxygen and act as an anesthetic. When leak testing or soldering this is particularly important, as toxic gas is formed when the R-12 contacts any flame.**
- **NEVER start a system without first verifying that both service valves (if equipped) are backseated, and that all fittings throughout the system are snugly connected.**
- **Always wear goggles when working on a system to protect the eyes. If refrigerant contacts the eye, it is advisable in all cases to see a physician as soon as possible.**
- **Frostbite from liquid refrigerant should be treated by first gradually warming the area with cool water, and then gently applying petroleum jelly. A physician should be consulted.**
- **Always completely discharge the system into a suitable recovery system before painting the vehicle (if the paint is to be baked on), or before welding anywhere near the refrigerant lines.**
- **When servicing the system, minimize the time that any refrigerant line or fitting is open to the air in order to prevent moisture or dirt from entering the system. Contaminants such as moisture or dirt can damage internal system components. Always replace O-rings on lines or fittings which are disconnected. Prior to installation, coat, but do not soak, replacement O-rings with suitable compressor oil.**

Most repair work on an air conditioning system should be left to acertified professional. DO NOT, under any circumstances, attempt to loosen ortighten any fittings or perform any work other than that outlined here.

SYSTEM INSPECTION

It is possible to detect possible air conditioning system problems by a visual inspection. Check for a broken air conditioning belt, dirt blocking the condenser, disconnected wires, a loose compressor clutch, and oily residue around the air conditioning hose fittings. Missing service gauge port caps may also cause a leak to develop.

REFRIGERANT LEVEL CHECKS

The only way to accurately check the refrigerant level is to measure the system evaporator pressures with a manifold gauge set, although rapid on/off cycling of

the compressor clutch indicates that the air conditioning system is low on refrigerant. The normal refrigerant capacity is 39-41 oz. (1106-1162 grams).

GAUGE SETS

The following procedure is for the attachment of a manifold gauge set to the service gauge port valves. If charging station equipment is used, follow the equipment manufacturer's instructions.

CAUTION

The air conditioning system is under high pressure when the engine isrunning. When connecting and disconnecting the manifold gauge set, make surethe engine is not running.

1. **Turn both manifold gauge set valves fully clockwise to close the high and low pressure hoses at the gauge set refrigerant center outlet.**

Rotunda high side adapter set D81L-19703-A or Motorcraft Tool YT-354/355(or equivalent) is required to connect the manifold gauge set or a chargingstation to the high pressure service access gauge port valve.

2. **Remove the caps from the high and low pressure service gauge port valves.**
3. **If the manifold gauge set hoses do not have the valve depressing pins in them, install fitting adapters T71P-19703-S and R containing the pins on the manifold gauge hoses.**
4. **Connect the high and low pressure refrigerant hoses to their respective service ports, making sure they are hooked up correctly and fully seated. Tighten the fittings by hand, making sure they are not cross-threaded. Remember that an adapter is necessary to connect the manifold gauge hose to the high pressure fitting.**

DISCHARGING THE SYSTEM

Air conditioning system R-12 refrigerant is a chlorofluorocarbon which,when released into the atmosphere, can contribute to the depletion of the ozonelayer in the upper atmosphere. Ozone filters out harmful radiation from thesun. ALWAYS use an approved recovery/recycling machine that meets SAE standardswhen discharging the air conditioning system. Follow the operating instructionsprovided with the approved equipment exactly to properly discharge the air conditioningsystem.

WARNING

Some 1992 and later vehicles use R-134a refrigerant in place of theconventional R-12 refrigerant. Refer to the information on R-134a refrigerant systems in this Section. Also, any air conditioning equipment used to service the conventional R-12 refrigerant systems CANNOT be used to service the R-134a refrigerant systems.

The use of refrigerant recovery systems and recycling stations makes possible the recovery and reuse of refrigerant after contaminants and moisture have been

removed. If a recovery system or recycling station is used, the following general procedures should be followed, in addition to the operating instructions provided by the equipment manufacturer.

1. **Connect the refrigerant recycling station hose(s) to the vehicle air conditioning service ports and the recovery station inlet fitting.**

Hoses should have shut off devices or check valves within 12 in. (305mm)of the hose end to minimize the introduction of air into the recycling stationand to minimize the amount of refrigerant released when the hoses aredisconnected.

2. **Turn the power to the recycling station ON to start the recovery process. Allow the recycling station to pump the refrigerant from the system until the station pressure goes into a vacuum. On some stations, the pump will be shut off automatically by a low pressure switch in the electrical system. On other units it may be necessary to manually turn off the pump.**
3. **Once the recycling station has evacuated the vehicle air conditioning system, close the station inlet valve, if equipped. Then, switch OFF the electrical power.**
4. **Allow the vehicle air conditioning system to remain closed for about 2 minutes. Observe the system vacuum level as shown on the gauge. If the pressure does not rise, disconnect the recycling station hose(s).**
5. **If the system pressure rises, repeat Steps 2, 3 and 4 until the vacuum level remains stable for 2 minutes.**

EVACUATING THE SYSTEM

Some 1992 and later vehicles use R-134a refrigerant in place of theconventional R-12 refrigerant. Refer to the information on R-134a refrigerantsystems in this Section. Also, any air conditioning equipment used to serviceR-12 refrigerant systems CANNOT be used to service R-134a refrigerant systems.

1. **Connect a manifold gauge set as follows:**
    1. **Turn both manifold gauge set valves fully to the right, to close the high and low pressure hoses to the center manifold and hose.**
    2. **Remove the caps from the high and low pressure service gauge port valves.**
    3. **If the manifold gauge set hoses do not have valve depressing pins in them, install fitting adapters T71P19703S and R or equivalent, which have pins, on the low and high pressure hoses.**
    4. **Connect the high and low pressure hoses, or adapters, to the respective high and low pressure service gauge port valves. High side adapter set D81L-19703-A or tool YT-354/355 or equivalent is required to connect a manifold gauge set or charging station to the high pressure gauge port valve.**

Service tee fitting D87P-19703-A, which may bemounted on the clutch cycling pressure switch fitting, is available for use inthe low pressure side of fixed orifice tube systems, to be used in place of thelow pressure

gauge port valve.

2. **Leak test all connections and components with flame-type leak detector 023-00006 or equivalent, or electronic leak detector 055-00014, 055-00015 or equivalent.**

> **CAUTION**
>
> Fumes from flame-type leak detectors are noxious; avoid inhaling fumes orpersonal injury may result.

Good ventilation is necessary in the area where air conditioning leaktesting is to be done. If the surrounding air is contaminated with refrigerantgas, the leak detector will indicate this gas all the time. Odors from otherchemicals such as antifreeze, diesel fuel, disc brake cleaner or other cleaningsolvents can cause the same problem. A fan, even in a well ventilated area, isvery helpful in removing small traces of air contamination that might affectthe leak detector.

3. **Using an approved recovery/recycling station, properly discharge the refrigerant system.**
4. **Make sure both manifold gauge valves are turned fully clockwise. Make sure the center hose connection at the manifold gauge is tight.**
5. **Connect the manifold gauge set center hose to a vacuum pump.**
6. **Open the manifold gauge set valves and start the vacuum pump.**
7. **Evacuate the system with the vacuum pump until the low pressure gauge reads at least 25 in. Hg (84 kPa) or as close to 30 in. Hg (101 kPa) as possible. Continue to operate the vacuum pump for 15 minutes. If a part of the system has been replaced, continue to operate the vacuum pump for another 20-30 minutes.**
8. **When evacuation of the system is complete, close the manifold gauge set valves and turn the vacuum pump OFF.**
9. **Observe the low pressure gauge for 5 minutes to ensure that system vacuum is held. If vacuum is held, charge the system. If vacuum is not held for 5 minutes, leak test the system, service the leaks and evacuate the system again.**

CHARGING THE SYSTEM

Some 1992 and later vehicles use R-134a refrigerant in place of theconventional type R-12 refrigerant. Refer to the information on R-134arefrigerant systems in this section. Also any air conditioning equipment usedto service R-12 refrigerant systems CANNOT be used to service R-134arefrigerant systems.

1. **Connect a manifold gauge set according to the proper procedure. Properly discharge and evacuate the system.**
2. **With the manifold gauge set valves closed to the center hose, disconnect the vacuum pump from the manifold gauge set.**
3. **Connect the center hose of the manifold gauge set to a refrigerant drum.**

Use only a safety type dispensing valve.

4. **Loosen the center hose at the manifold gauge set and open the refrigerant drum valve. Purge air and moisture from the center hose, then tighten the center hose**

connection at the manifold gauge set.

5. **Detach the wire harness snap lock connector from the clutch cycling or low pressure switch and install a jumper wire across the 2 terminals of the connector.**
6. **Open the manifold gauge set low side valve to allow refrigerant to enter the system. Keep the refrigerant container in an upright position.**
7. **When no more refrigerant is being drawn into the system, start the engine and set the control assembly to the MAX cold and HI blower positions to draw the remaining refrigerant into the system. If equipped, press the air conditioning switch. Continue to add refrigerant to the system until the specified weight of the refrigerant is in the system. Then close the manifold gauge set low pressure valve and the refrigerant supply valve.**
8. **Remove the jumper wire from the clutch cycling or low pressure switch snap lock connector. Attach the connector to the pressure switch.**
9. **Operate the system until pressures stabilize to verify normal operation and system pressures.**
10. **In high ambient temperatures, it may be necessary to operate a high volume fan positioned to blow air through the radiator and condenser to aid in cooling the engine and prevent excessive refrigerant system pressures.**
11. **When charging is completed and system operating pressures are normal, disconnect the manifold gauge set from the vehicle. Install the protective caps on the service gauge port valves.**

LEAK TESTING THE SYSTEM

Connect the manifold gauge set. Be sure that both valves are closed. Both gauges should read about 122-163 in. Hg (413-551 kPa) with the engine not running. If very little or no pressure is indicated, leave the vacuum pump valve closed. Open the refrigerant tank valve and set the low pressure gauge valve to the counterclockwise position. This will open the system to tank pressure. Check all system connections, the compressor head gasket and shaft seal for leaks using a leak detector tool.

Windshield Wipers

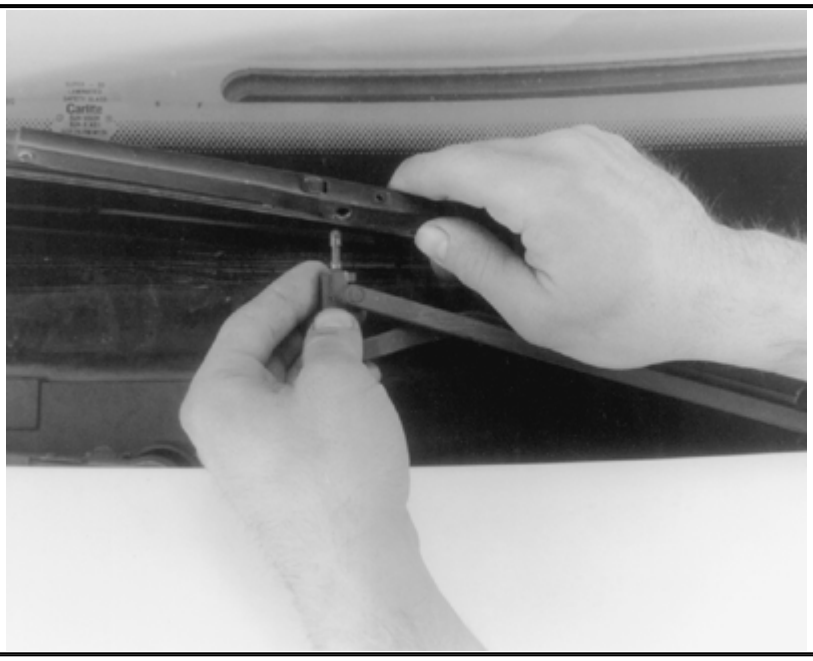
For maximum effectiveness and longest element (refill) life, the windshield and wiper blades should be kept clean. Dirt, tree sap, road tar and so on, will cause streaking, smearing and blade deterioration if left on the glass. It is advisable to wash the windshield carefully with a commercial glass cleaner at least once a month. Clean off the wiper blades with the wet rag afterwards. Do not attempt to move the wipers by hand; damage to the motor and drive mechanism could result.

To inspect and/or remove the wiper refills, place the wiper switch in the **LOW** speed position and the ignition switch in the **ACC** position. When the wiper blades are approximately vertical on the windshield, turn the ignition switch to **OFF**.

Examine the wiper refills. If they are cracked, broken or torn, they should be replaced immediately. Replacement intervals will vary with usage, although ozone deterioration usually limits refill life to about one year. If the wiper pattern is smeared or streaked, or if the blade chatters across the glass, the refills should be replaced. It is easiest and most sensible to replace the refills in pairs.

REMOVAL & INSTALLATION

Normally, if the wipers are not cleaning the windshield properly, only the refill has to be replaced. The blade and arm usually require replacement only in the event of damage. It is not necessary (except on new Tridon® refills) to remove the arm or the blade to replace the refill (rubber part), though you may have to position the arm higher on the glass. You can do this by turning the ignition switch **ON** and operating the wipers. When they are positioned where they are accessible, turn the ignition switch **OFF**.



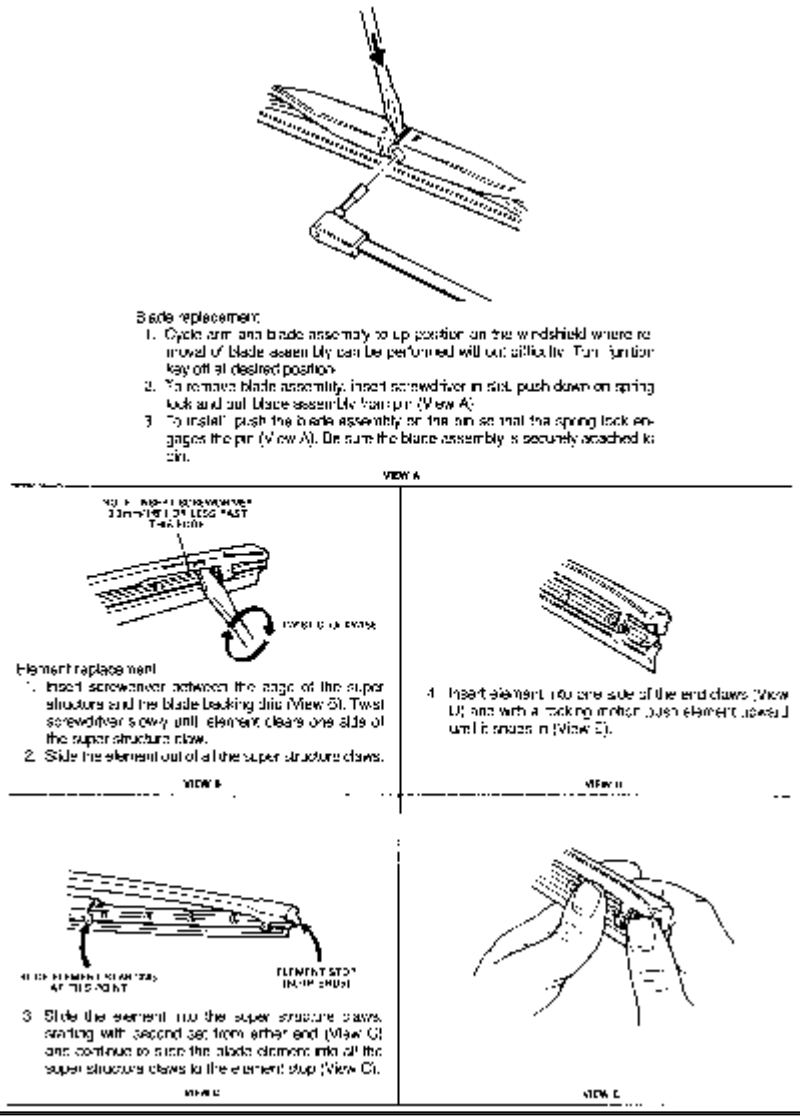
If necessary, the entire blade and insert may be removed from the end of the arm

If your vehicle is equipped with aftermarket blades, there are several different possible types of refills. Aftermarket wipers frequently use a different type blade or refill than the original. Here are some common aftermarket blades, though not all may be available for your car.

Most Anco® styles use a release button that is pushed down to allow the refill to slide out of the yoke jaws. The new refill slides back into the frame and locks in place.

Some Trico® refills are removed by locating where the metal backing strip or the refill is wider. Insert a small prybar between the frame and metal backing strip. Press down to release the refill from the retaining tab.

Other types of Trico® refills have two metal tabs which are unlocked by squeezing them together. The rubber filler can then be withdrawn from the frame jaws. A new refill is installed by inserting the refill into the front frame jaws and sliding it rearward to engage the remaining frame jaws. There are usually four jaws; be certain when installing, that the refill is engaged in all of them. At the end of its travel, the tabs will lock into place on the front jaws of the wiper blade frame.

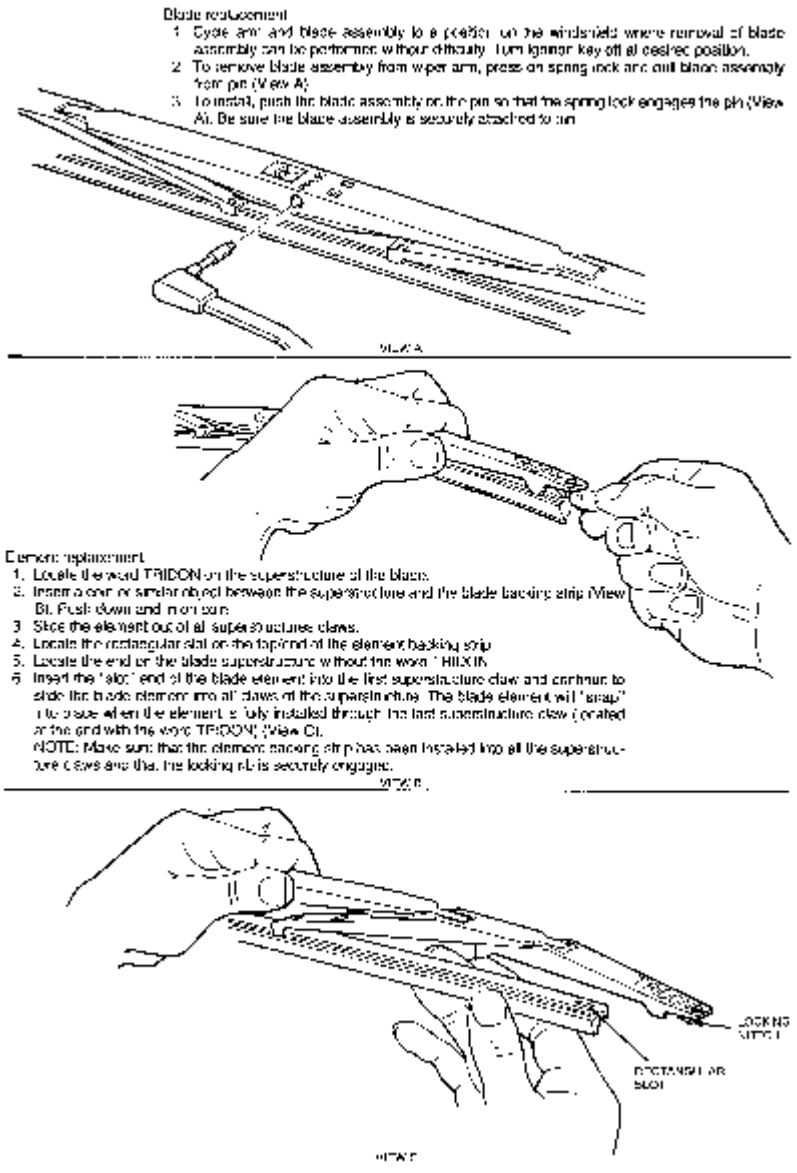


Wiper blade replacement-Trico®

Click to enlarge

Another type of refill is made from polycarbonate. The refill has a simple locking device at one end which flexes downward out of the groove into which the jaws of the holder fit, allowing easy release. By sliding the new refill through all the jaws and pushing through the slight resistance when it reaches the end of its travel, the refill will lock into position.

To replace the Tridon® refill, it is necessary to remove the wiper arm or blade. This refill has a plastic backing strip with a notch about 1 in. (25mm) from the end. Hold the blade (frame) on a hard surface so the frame is tightly bowed. Grip the tip of the backing strip and pull up while twisting counterclockwise. The backing strip will snap out of the retaining tab. Do this for the remaining tabs until the refill is free of the arm. The length of these refills is molded into the end and they should be replaced with identical types.



Wiper blade replacement-Tridon®

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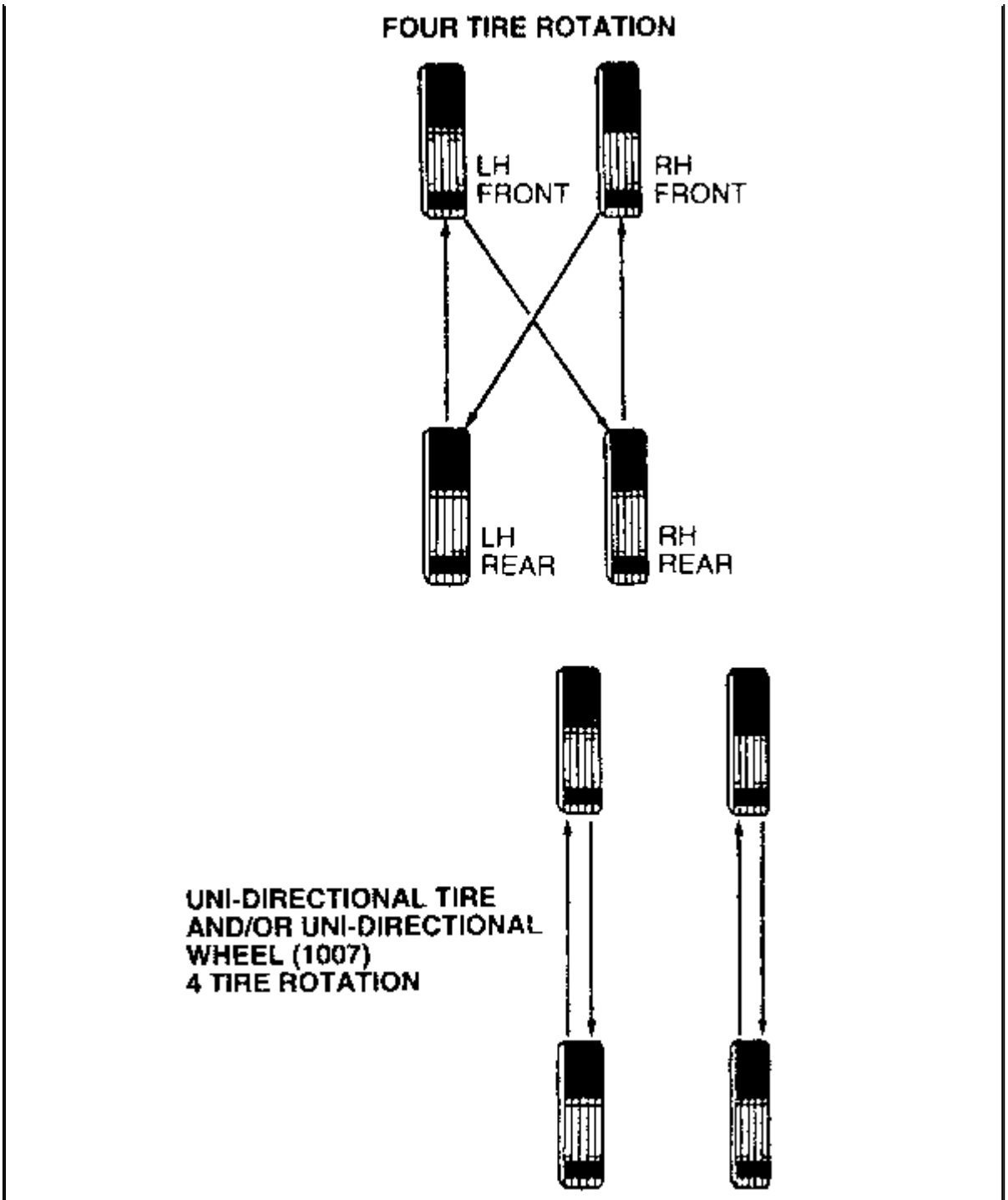
Regardless of the type of refill used, make sure that all of the frame jaws are engaged as the refill is pushed into place and locked. If the metal blade holder and frame are allowed to touch the glass during wiper operation, the glass will be scratched.

Tires and Wheels

TIRE ROTATION

Tire wear can be equalized by switching the position of the tires about every 7,500 miles (12,000 km). Including a conventional spare tire in the rotation pattern can give up to 20% more tread life. Do not include a SpaceSaver® or other temporary spare tire in the rotation pattern.



Tire rotation patterns-NEVER use the temporary spare for tire rotation or as a regular tire

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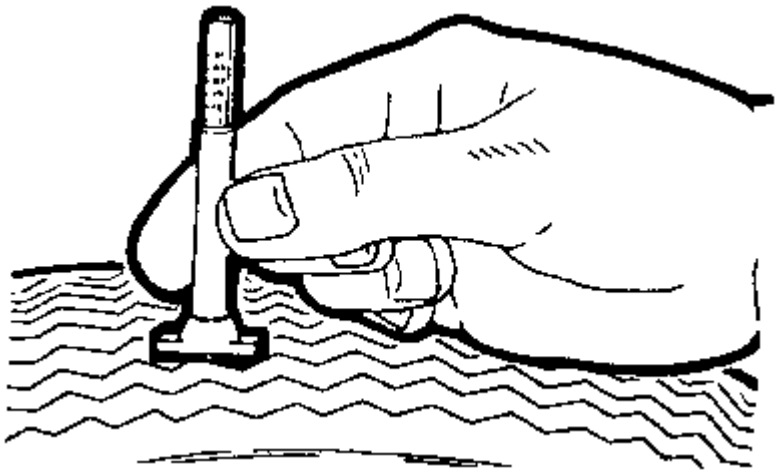
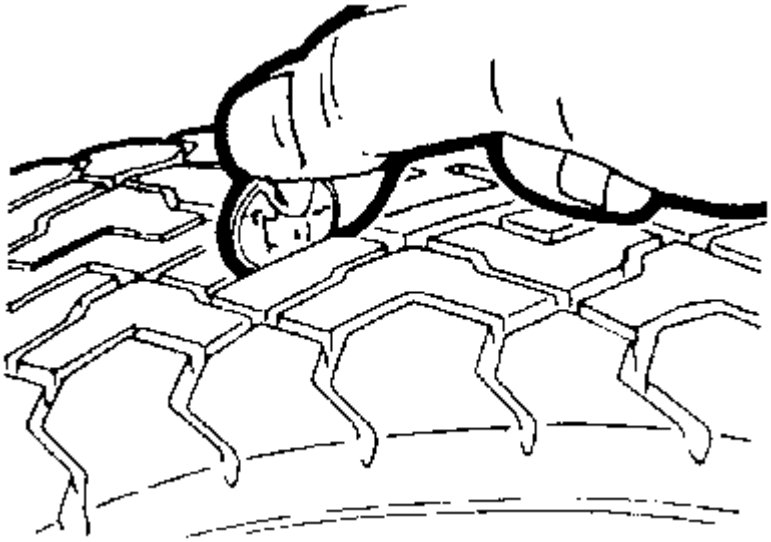
TIRE DESIGN

All tires made since 1968 have 8 built-in tread wear indicator bars that show up as $^{1}/_{2}$ in. (13mm) wide smooth bands across the tire when $^{1}/_{16}$ in. (1.6mm) of tread remains. The appearance of tread wear indicators means that the tires should be replaced. In fact, many states have laws prohibiting the use of tires with less than $^{1}/_{16}$ in. (1.6mm) of tread remaining. Tread thickness under $^{1}/_{16}$ in. (1.6mm) is very dangerous on wet roads due to hydroplaning.

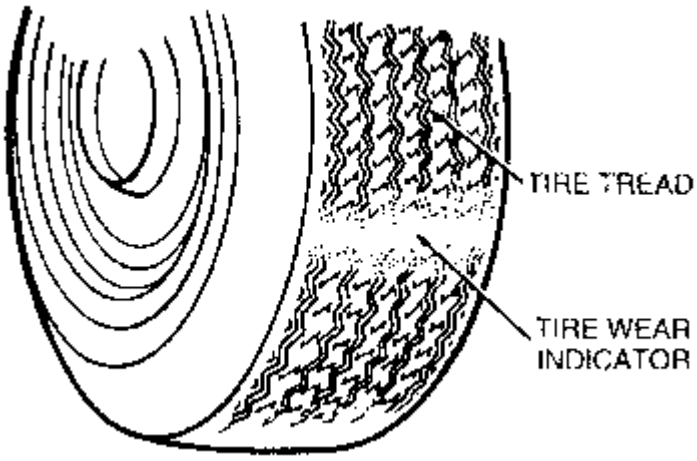


Tread depth can be checked using an inexpensive gauge



If a gauge is not available, a penny may be used to check for tire tread depth; when the top of Lincoln's head is visible, it is probably time for a new tire

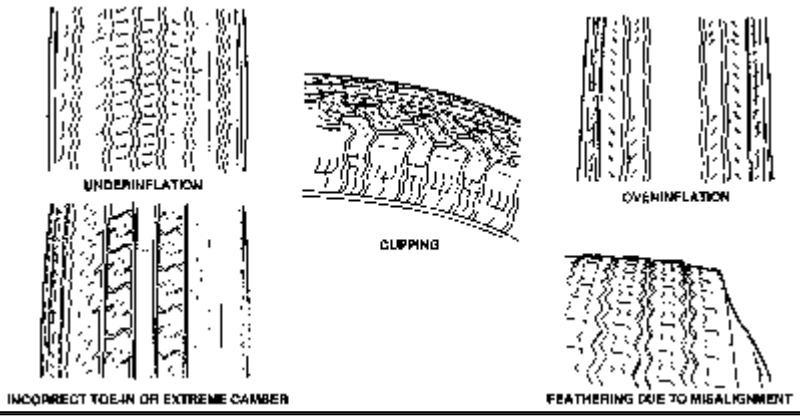
You can check your own tread depth with an inexpensive gauge or by using a Lincoln head penny. Slip the Lincoln penny into several tread grooves. If you can see the top of Lincoln's head in 2 adjacent grooves, the tires have less than $^{1}/_{16}$ in. (1.6mm) of tread left and should be replaced. You can measure snow tires in the same manner by using the tail side of the Lincoln penny. If you see the top of the Lincoln memorial, it's time to replace the snow tires.



If tires are used beyond the point of tread life, built-in wear indicators will begin to appear as lines perpendicular to the tread

Click to enlarge

Wear that occurs only on certain portions of the tire may indicate a particular problem which, when corrected or avoided, may significantly extend tire life. Wear that occurs only in the center of the tire indicates either overinflation or heavy acceleration on a drive wheel. Wear occurring at the outer edges of the tire, and not at the center may indicate underinflation, excessively hard cornering or a lack of rotation. Wear occurring at only the outer edge of the tire, may indicate a problem with wheel alignment or, perhaps, a non-uniformity defect in the tire.



Uneven tire wear can be caused by variables from tire/vehicle condition to driving style

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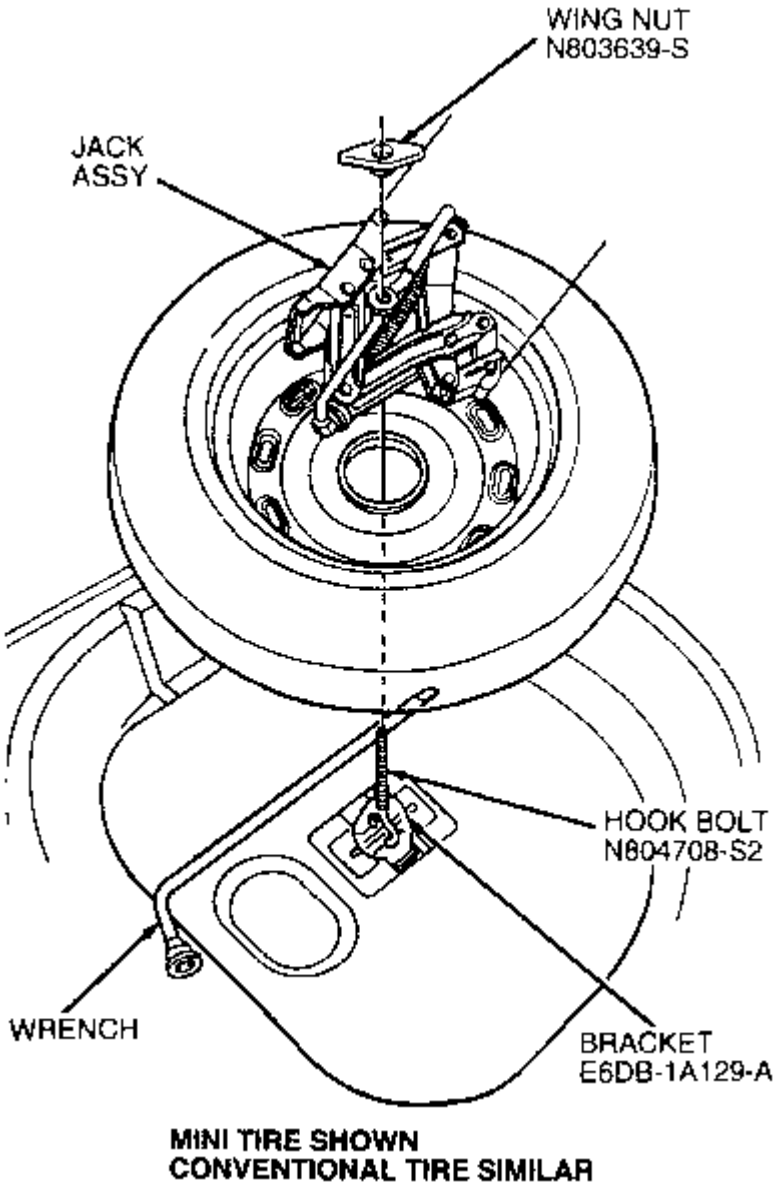
When you replace tires, never mix radial, bias-belted or bias type tires. Use only the tire sizes listed on the tire decal attached to your vehicle on the driver's side door post. Make sure that all tires are the same size, speed rating and load carrying capacity. Use only tire and wheel combinations as recommended on the tire decal or by your dealer. Failure to follow these precautions can adversely affect the safety and handling of your vehicle.

TIRE STORAGE

Store the tires at their recommended inflation pressures if they are mounted on wheels. All tires should be kept in a cool, dry place. If they are stored in the garage or basement, do not let them stand on a concrete floor; set them on strips of wood.



Spare tire assembly and related components-sedan

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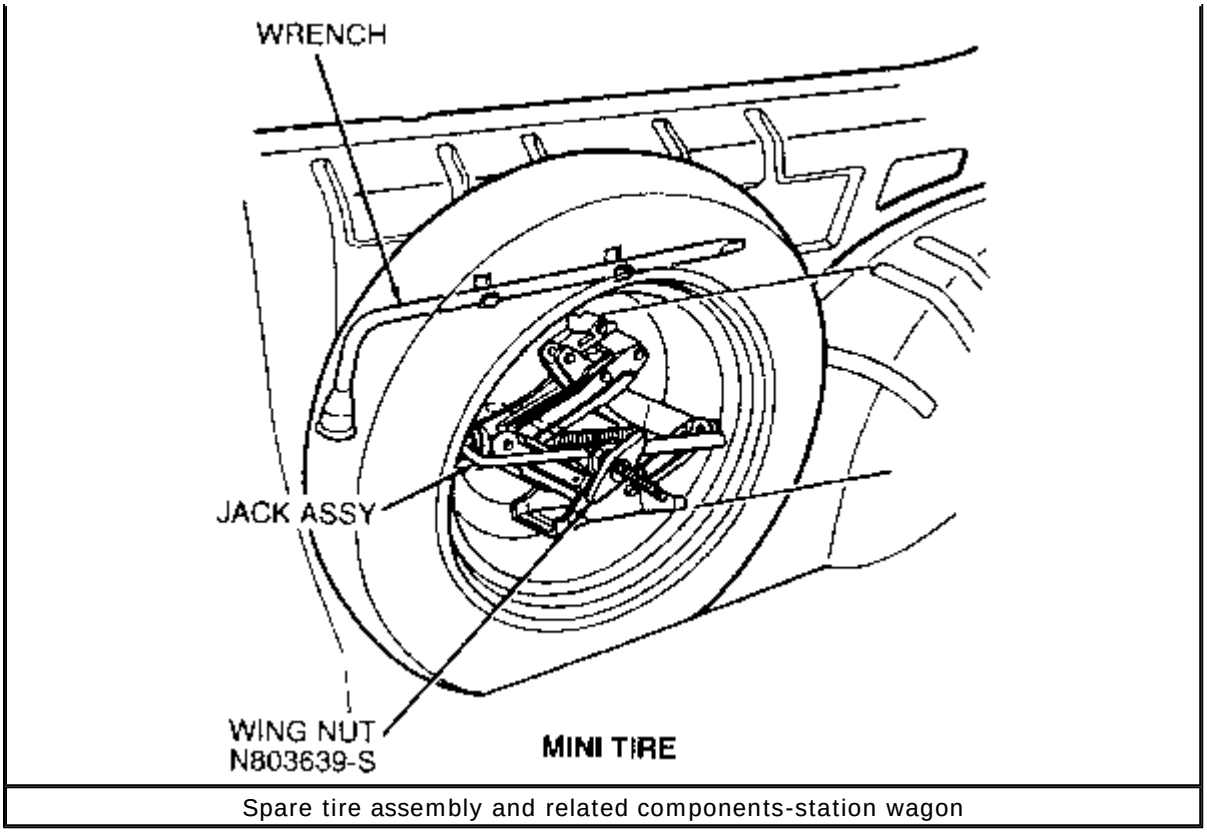

Spare tire assembly and related components-station wagon

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TIRE INFLATION

Tire inflation is the most ignored item of auto maintenance. Gasoline mileage can drop as much as 0.8% for every 1 pound per square inch (psi) of underinflation.

Two items should be a permanent fixture in every glove compartment: a tire pressure gauge and a tread depth gauge. Check the tire air pressure (including the spare) regularly with a pocket type gauge. Kicking the tires won't tell you a thing, and the gauge on the service station air hose is notoriously inaccurate. Also, just looking at the tire does not indicate if it is underinflated.

The tire pressures recommended for your car are usually found on a label attached to the door pillar, on the glove compartment's inner cover and in the owner's manual. Ideally, inflation pressure should be checked when the tires are cool. When the air becomes heated; it expands and the pressure increases. Every 10°F (-12°C) rise (or drop) in temperature means a difference of 1 psi (7 kPa), which also explains why the tire appears to lose air on a very cold night. When it is impossible to check the tires cold, allow for pressure build-up due to heat. If the hot pressure exceeds the cold pressure by more than 15 psi (103 kPa), reduce your speed. Otherwise internal heat is created in the tire. When the heat approaches the temperature at which the tire was cured during manufacture, the tread can separate from the body.

WARNING

Never counteract excessive pressure build-up by bleeding off air pressure (letting some air out). This will only further raise the tire operating temperature.

CARE OF WHEEL COVERS AND ALUMINUM WHEELS

To clean the wheels, wheel covers and wheel ornamentation, use a mild soap solution and thoroughly rinse with clean water. Do not use steel wool, abrasive type cleaner or strong detergents containing high alkaline or caustic agents, as damage to the protective coating and discoloration may result.