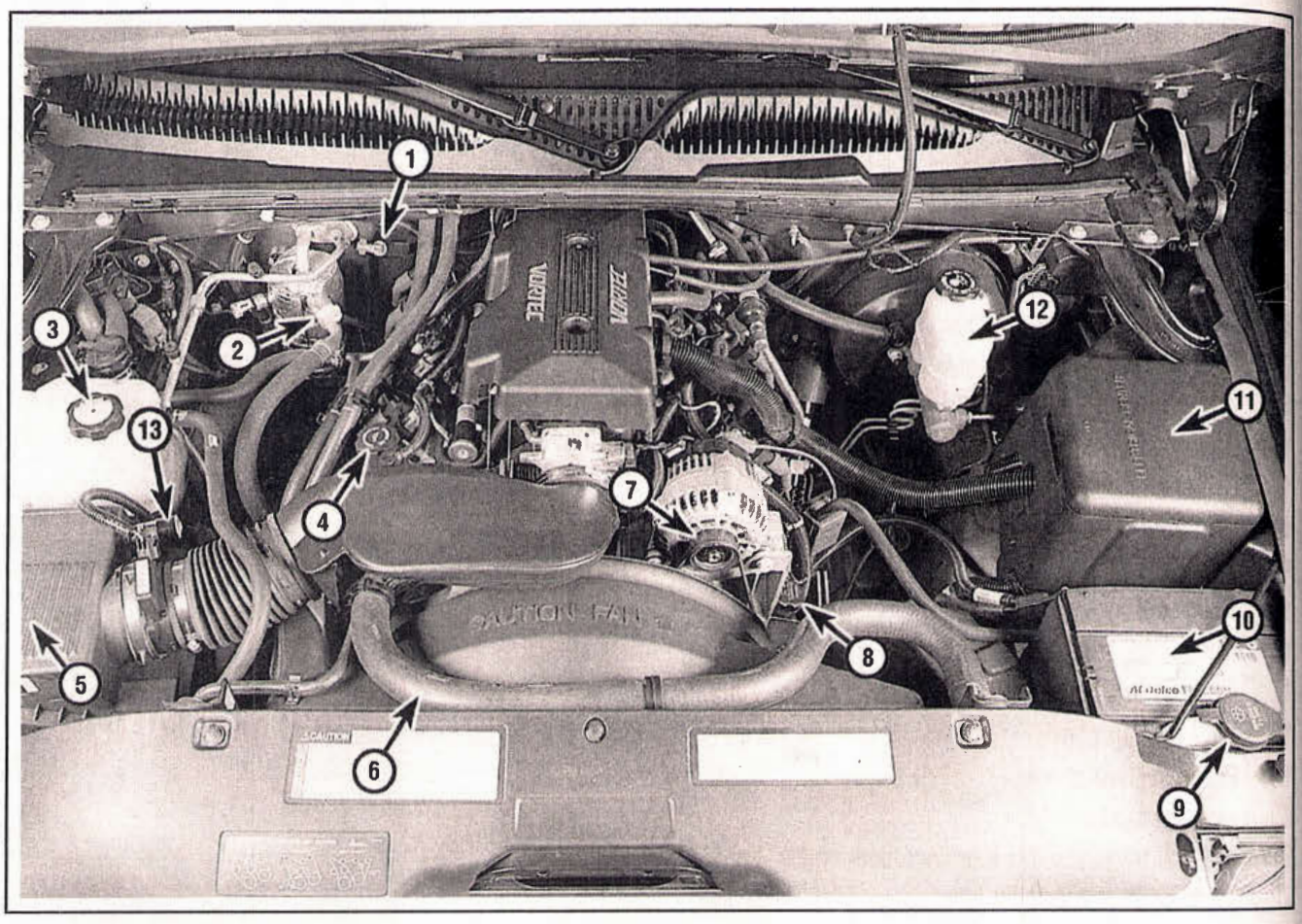
1

TUNE-UP AND ROUTINE MAINTENANCE

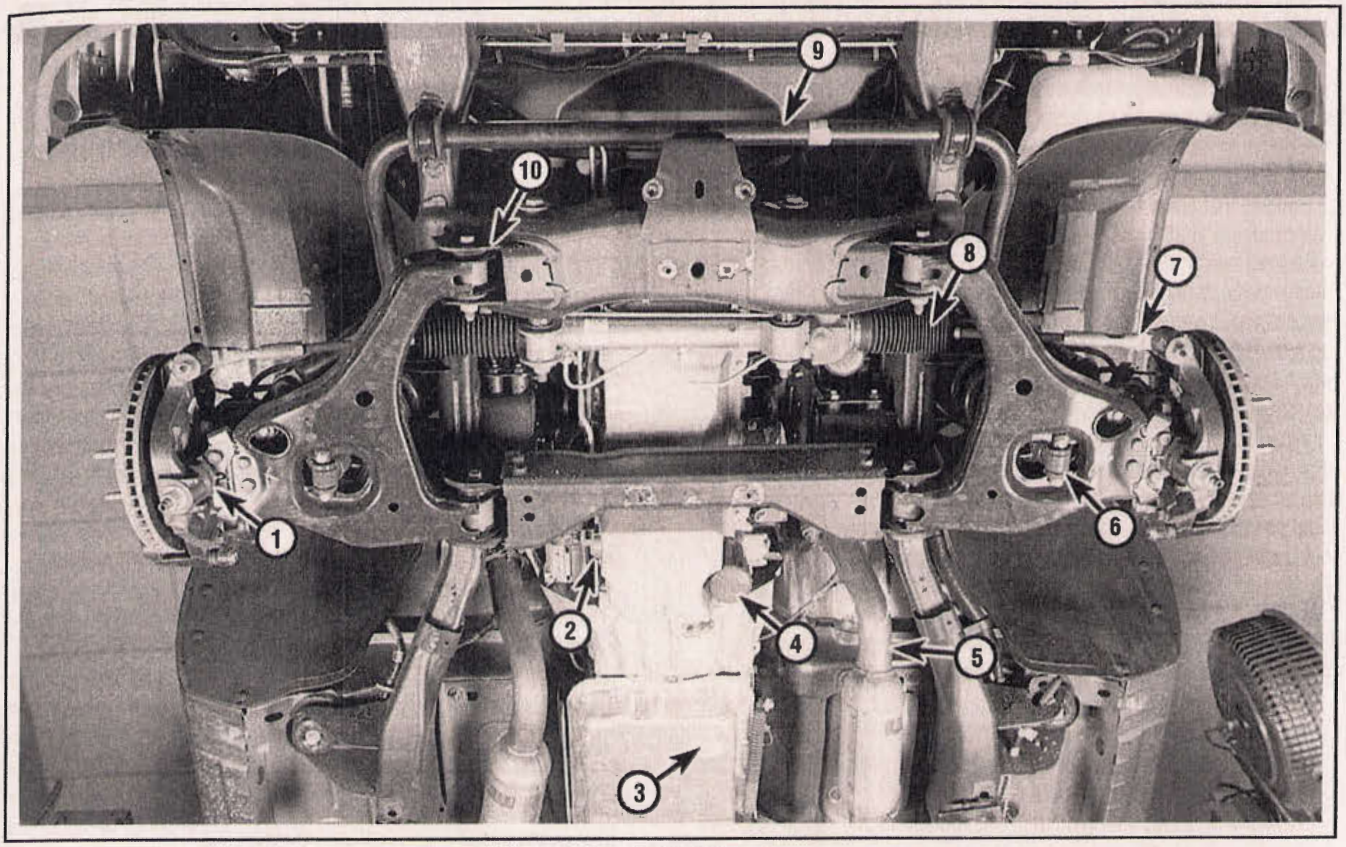
Section

1 Maintenance schedule
2 Introduction
3 Tune-up general information
4 Fluid level checks
5 Tire and tire pressure checks
6 Power steering fluid level check
7 Automatic transmission fluid level check
8 Engine oil and filter change
9 Seat belt check
10 Wiper blade inspection and replacement
11 Battery check, maintenance and charging
12 Drivebelt check, adjustment and replacement
13 Underhood hose check and replacement
14 Cooling system check
15 Tire rotation
16 Differential lubricant level check
17 Chassis lubrication
18 Fuel system check
19 Brake system check
20 Exhaust system check
21 Manual transmission lubricant level check
22 Transfer case lubricant level check (4WD models)
23 Interior ventilation filter replacement
24 Brake fluid change
25 Air filter replacement
26 Fuel filter replacement
27 Spark plug replacement
28 Cooling system servicing (draining, flushing and refilling)
29 Suspension, steering and driveaxle boot check
30 Automatic transmission fluid and filter change
31 Manual transmission lubricant change
32 Transfer case lubricant change (4WD models)
33 Exhaust Gas Recirculation (EGR) valve inspection
34 Differential lubricant change
35 Positive Crankcase Ventilation (PCV) valve replacement
36 Spark plug wires, distributor cap and rotor check and replacement



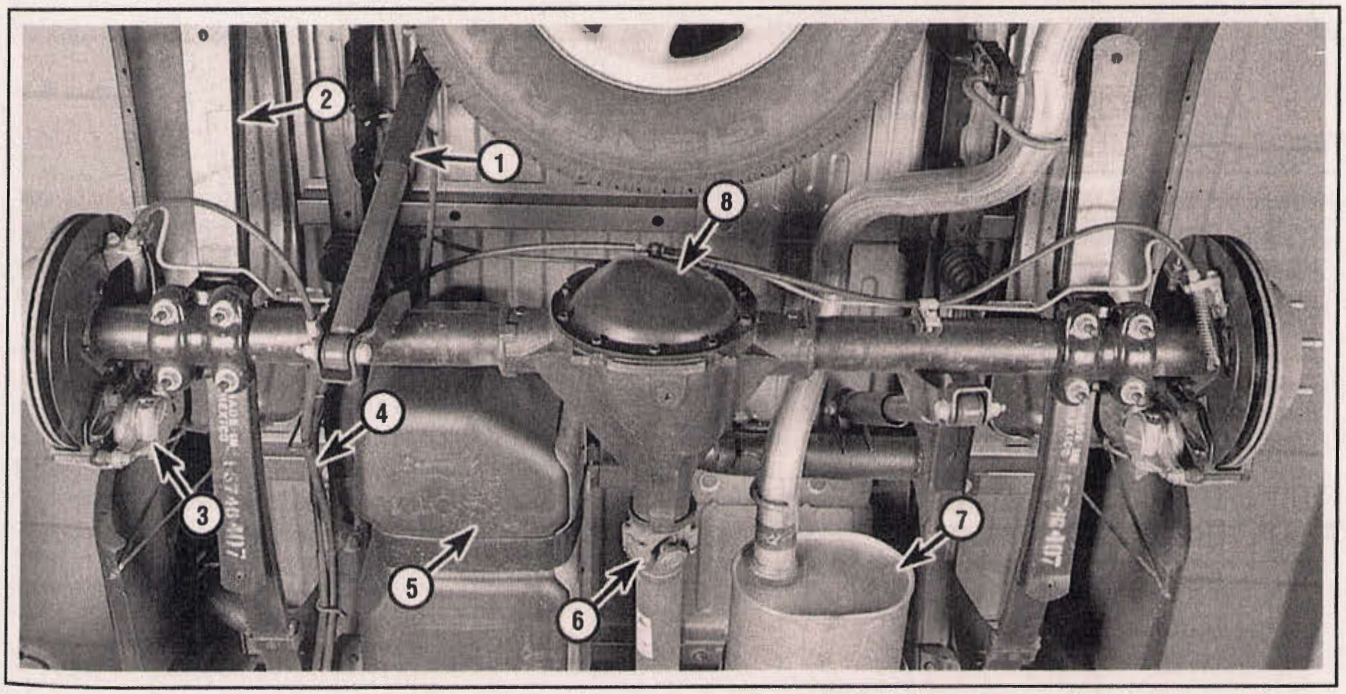
Engine compartment components (V8 shown, V6 similar)

1 *Automatic transmission fluid dipstick*
2 *Engine oil dipstick*
3 *Surge tank pressure cap*
4 *Oil filler cap*
5 *Air filter housing*
6 *Upper radiator hose*
7 *Drivebelt*
8 *Power steering fluid reservoir*
9 *Windshield washer fluid reservoir*
10 *Battery*
11 *Underhood fuse/relay box*
12 *Brake fluid reservoir*
13 *Air filter restriction indicator (2002)*



Typical engine compartment underside components (V8, 2WD 1500 pick-up)

1 *Balljoint*
2 *Engine oil pan drain plug*
3 *Automatic transmission fluid drain plug*
4 *Engine oil filter*
5 *Exhaust pipe*
6 *Shock absorber (lower mount shown)*
7 *Tie-rod end*
8 *Steering gear boot*
9 *Stabilizer bar*
10 *Lower control arm bushing*



Typical rear underside components

1 *Shock absorber*
2 *Leaf spring*
3 *Brake caliper*
4 *Parking brake cables*
5 *Fuel tank*
6 *Universal joint*
7 *Muffler*
8 *Differential cover*

1 Maintenance schedule

The following maintenance intervals are based on the assumption that the vehicle owner will be doing the maintenance or service work, as opposed to having a dealer service department do the work. These are the minimum maintenance intervals recommended by the factory for vehicles that are driven daily. If you wish to keep your vehicle in peak condition at all times, you may wish to perform some of these procedures even more often. Because frequent maintenance enhances the efficiency, performance and resale value of your car, we encourage you to do so. If you drive in dusty areas, tow a trailer, idle or drive at low speeds for extended periods or drive for short distances (less than four miles) in below freezing temperatures, shorter intervals are also recommended.

When the vehicle is new, follow the maintenance schedule to the letter, record the maintenance performed in your owners manual and keep all receipts to protect the new vehicle warranty. In many cases the initial maintenance check is done at no cost to the owner (check with your dealer service department for more information).

EVERY 250 MILES OR WEEKLY, WHICHEVER COMES FIRST

Check the engine oil level (Section 4)
Check the coolant level (Section 4)
Check the windshield washer fluid level (Section 4)
Check the brake and clutch fluid levels (Section 4)
Check the tires and tire pressures (Section 5)

EVERY 3000 MILES OR 3 MONTHS, WHICHEVER COMES FIRST

All items listed above, plus . . .

Check the power steering fluid level (Section 6)
Check the automatic transmission fluid level (Section 7)
Change the engine oil and filter (Section 8)

EVERY 6000 MILES OR 6 MONTHS, WHICHEVER COMES FIRST

All items listed above, plus . . .

Check the seat belts (Section 9)
Inspect the windshield wiper blades (Section 10)
Check and service the battery (Section 11)
Check the engine drivebelt (Section 12)
Inspect underhood hoses (Section 13)
Check the cooling system (Section 14)
Rotate the tires (Section 15)
Check the lubricant level in the front (4x4) and rear axles (Section 16)

EVERY 15,000 MILES OR 12 MONTHS, WHICHEVER COMES FIRST

All items listed above, plus . . .

Lubricate the chassis (Section 17)
Check the fuel system (Section 18)
Check the brake system (Section 19)*
Check the exhaust system (Section 20)
Check the manual transmission lubricant level (Section 21)
Check the transfer case lubricant level - 4WD (Section 22)
Replace the interior ventilation filter (Section 23)*

EVERY 30,000 MILES OR 30 MONTHS, WHICHEVER COMES FIRST

All items listed above, plus . . .

Change the brake fluid (Section 24)
Replace the air filter (Section 25)*
Replace the fuel filter (Section 26)
Replace the spark plugs (conventional, non-platinum or iridium) (Section 27)**
Service the cooling system (drain, flush and refill) (green-colored ethylene glycol anti-freeze only) (Section 28)
Check the steering, suspension and driveaxle boots (Section 29)
Change the automatic transmission fluid and filter (Section 30)**

EVERY 60,000 MILES OR 48 MONTHS, WHICHEVER COMES FIRST

Change the manual transmission lubricant (Section 31)
Change the transfer case lubricant (Section 32)
Inspect the Exhaust Gas Recirculation (EGR) valve (Section 33)
Change the differential lubricant (Section 34)**
Replace the Positive Crankcase Ventilation (PCV) valve (Section 35)

EVERY 100,000 MILES OR 60 MONTHS, WHICHEVER COMES FIRST

Inspect/replace the spark plug wires (Section 36)
Replace the spark plugs (platinum or iridium type) (Section 27)
Service the cooling system (drain, flush and refill) (orange-colored DEX-COOL anti-freeze only) (Section 28)

* *This item is affected by "severe" operating conditions, as described below. If the vehicle is operated under severe conditions, perform all maintenance indicated with an asterisk (*) at half the indicated intervals. Severe conditions exist if you mainly operate the vehicle . . .*

in dusty areas
towing a trailer
idling for extended periods
driving at low speeds when outside temperatures remain below freezing and most trips are less than four miles long

** *Perform this procedure at half the recommended interval if operated under one or more of the following conditions:*

in heavy city traffic where the outside temperature regularly reaches 90-degrees F or higher in hilly or mountainous terrain
frequent trailer towing
if the vehicle has been driven through deep water

2 Introduction

This Chapter is designed to help the home mechanic maintain the Chevrolet/GMC pickup or Tahoe/Yukon/Suburban vehicle with the goals of maximum performance, economy, safety and reliability in mind.

Included is a master maintenance schedule, followed by procedures dealing specifically with each item on the schedule. Visual checks, adjustments, component replacement and other helpful items are included. Refer to the accompanying illustrations of the engine compartment and the underside of the vehicle for the locations of various components.

Servicing your vehicle in accordance with the mileage/time maintenance schedule and the step-by-step procedures will result in a planned maintenance program that should produce a long and reliable service life. Keep in mind that it's a comprehensive plan, so maintaining some items but not others at the specified intervals will not produce the same results.

As you service your vehicle, you will discover that many of the procedures can - and should - be grouped together because of the nature of the particular procedure you're performing or because of the close proximity of two otherwise unrelated components to one another.

For example, if the vehicle is raised for chassis lubrication, you should inspect the exhaust, suspension, steering and fuel systems while you're under the vehicle. When you're rotating the tires, it makes good sense to check the brakes since the wheels are already removed. Finally, let's suppose you have to borrow or rent a torque wrench. Even if you only need it to tighten the spark plugs, you might as well check the torque of as many critical fasteners as time allows.

The first step in this maintenance program is to prepare yourself before the actual work begins. Read through all the procedures you're planning to do, then gather up all the parts and tools needed. If it looks like you might run into problems during a particular job, seek advice from a mechanic or an experienced do-it-yourselfer.

Owner's Manual and VECI label information

Your vehicle Owner's Manual was written for your year and model and contains very specific information on component locations, specifications, fuse ratings, part numbers, etc. The Owner's Manual is an important resource for the do-it-yourselfer to have; if one was not supplied with your vehicle, it can generally be ordered from a dealer parts department.

Among other important information, the Vehicle Emissions Control Information (VECI) label contains specifications and procedures for tune-up adjustments (if applicable) and spark plugs (see Chapter 6 for more information on the VECI label). The information on this label is the exact maintenance data recommended by the manufacturer. This data often varies by intended operating altitude, local emissions regulations, month of manufacture, etc.

This Chapter contains procedural details, safety information and more ambitious maintenance intervals than you might find in the manufacturer's literature. However, you may also find procedures and specifications in your Owner's Manual or VECI label that differ with what's printed here. In these cases, the Owner's Manual or VECI label can be considered correct, since it is specific to your particular vehicle.

3 Tune-up general information

The term tune-up is used in this manual to represent a combination of individual operations rather than one specific procedure that will maintain a gasoline engine in proper tune.

If, from the time the vehicle is new, the routine maintenance schedule is followed closely and frequent checks are made of fluid levels and high wear items, as suggested throughout this manual, the engine will be kept in relatively good running condition and the need for additional work will be minimized.

More likely than not, however, there may be times when the engine is running poorly due to lack of regular maintenance. This is even more likely if a used vehicle, which has not received regular and frequent maintenance checks, is purchased. In such cases, an engine tune-up will be needed outside of the regular routine maintenance intervals.

The first step in any tune-up or diagnostic procedure to help correct a poor running engine is a cylinder compression check. A compression check (see Chapter 2C) will help determine the condition of internal engine components and should be used as a guide for tune-up and repair procedures. If, for instance, the compression check indicates serious internal engine wear, a conventional tune-up won't improve the performance of the engine and would be a waste of time and money. Because of its importance, the compression check should be done by someone with the right equipment and the knowledge to use it properly.

The following procedures are those most often needed to bring a generally poor running engine back into a proper state of tune.

MINOR TUNE-UP

Check all engine related fluids (Section 4)
Clean, inspect and test the battery (Section 11)
Check and adjust the drivebelt (Section 12)
Check all underhood hoses (Section 13)
Check the cooling system (Section 14)
Check the air filter (Section 25)
Replace the spark plugs (Section 27)
Inspect the spark plug wires (Section 36)

MAJOR TUNE-UP

All items listed under Minor tune-up, plus . . .
Replace the air filter (Section 25)
Replace the spark plug wires (Section 36)
Check the ignition system (Chapter 5)
Check the charging system (Chapter 5)

4 Fluid level checks (every 250 miles or weekly)

➡Note: The following are fluid level checks to be done on a 250 mile or weekly basis. Additional fluid level checks can be found in specific maintenance procedures that follow. Regardless of intervals, be alert to fluid leaks under the vehicle, which would indicate a fault to be corrected immediately.

1 Fluids are an essential part of the lubrication, cooling, brake, clutch and windshield washer systems. Because the fluids gradually become depleted and/or contaminated during normal operation of the vehicle, they must be periodically replenished. See *Recommended lubricants and fluids* at the end of this Chapter before adding fluid to any of the following components.

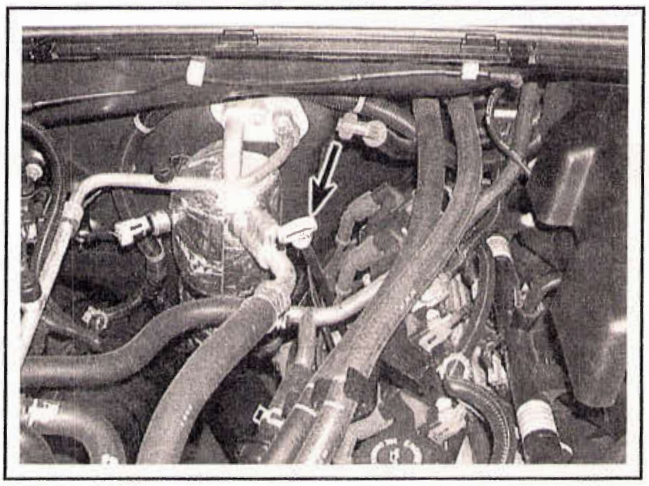
➡Note: The vehicle must be on level ground when fluid levels are checked.

ENGINE OIL

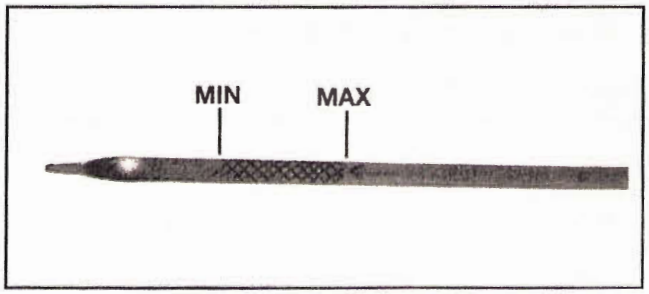
♦ Refer to illustrations 4.2, 4.4 and 4.6

2 The engine oil level is checked with a dipstick that extends through a tube and into the oil pan at the bottom of the engine (see illustration).

3 The oil level should be checked before the vehicle has been driven, or about 5 minutes after the engine has been shut off. If the oil is checked immediately after driving the vehicle, some of the oil will remain in the upper engine components, resulting in an inaccurate reading on the dipstick.



4.2 The engine oil dipstick (arrow) is clearly marked



4.4 The oil level must be maintained between the marks at all times - it takes one quart of oil to raise the level from the MIN to MAX mark

4 Pull the dipstick out of the tube and wipe all the oil from the end with a clean rag or paper towel. Insert the clean dipstick all the way back into the tube, then pull it out again. Note the oil at the end of the dipstick. Add oil as necessary to keep the level between the MIN and MAX marks or within the SAFE zone on the dipstick (see illustration).

5 Do not overfill the engine by adding too much oil since this may result in oil-fouled spark plugs, oil leaks or oil seal failures.

6 Oil is added to the engine after unscrewing a cap from the valve cover (see illustration). A funnel may help to reduce spills.

7 Checking the oil level is an important preventive maintenance step. A consistently low oil level indicates oil leakage through damaged seals, defective gaskets or past worn rings or valve guides. If the oil looks milky or has water droplets in it, the cylinder head gasket(s) may be blown or the head(s) or block may be cracked. The engine should be checked immediately. The condition of the oil should also be checked. Whenever you check the oil level, slide your thumb and index finger up the dipstick before wiping off the oil. If you see small dirt or metal particles clinging to the dipstick, the oil should be changed (see Section 8).

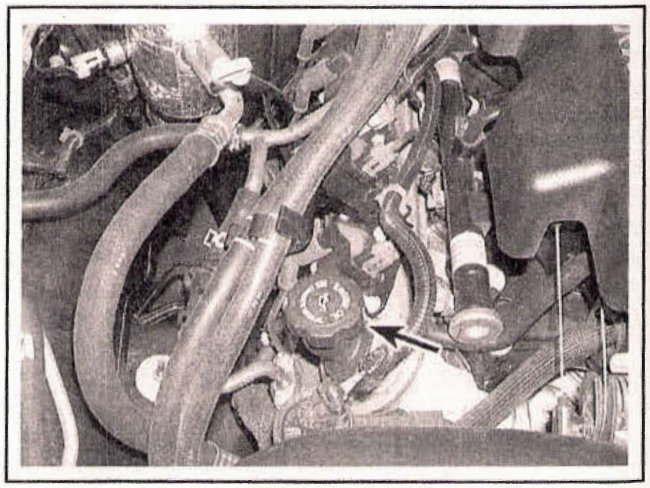
ENGINE COOLANT

♦ Refer to illustration 4.9

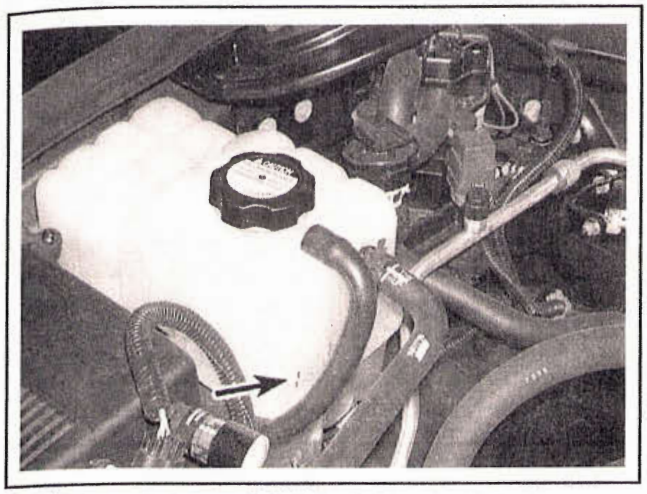
⁂ WARNING:

Do not allow antifreeze to come in contact with your skin or painted surfaces of the vehicle. Rinse off spills immediately with plenty of water. Antifreeze is highly toxic if ingested. Never leave antifreeze lying around in an open container or in puddles on the floor; children and pets are attracted by its sweet smell and may drink it. Check with local authorities on disposing of used anti-freeze. Many communities have collection centers that will see that antifreeze is disposed of safely.

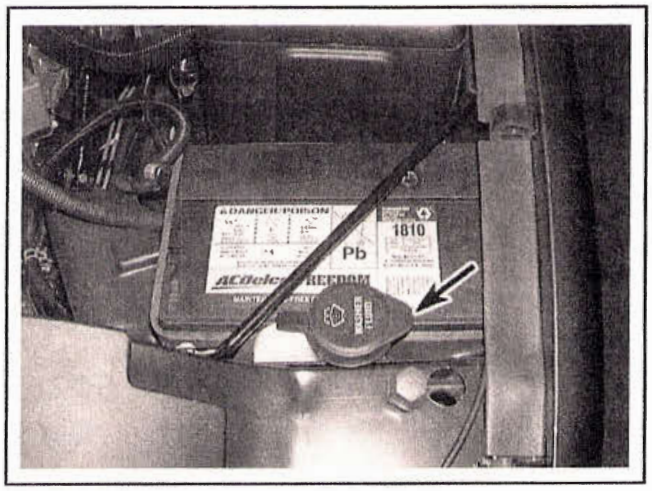
➡Note: Non-toxic antifreeze is now manufactured and available at local auto parts stores, but even this type should be disposed of properly.



4.6 Oil is added to the engine after unscrewing the oil filler cap (arrow) - always make sure the area around the opening is clean before removing the cap to prevent dirt from contaminating the engine



4.9 The coolant surge tank is located on the right side, near the air filter - keep the level near the Hot mark (arrow) or Cold mark on the side of the reservoir, depending on engine temperature



4.14 Flip open the cap (arrow) to check the fluid level in the windshield washer tank

CAUTION:

Never mix green-colored ethylene glycol anti-freeze and orange-colored "DEX-COOL" silicate-free coolant because doing so will destroy the efficiency of the "DEX-COOL" coolant which is designed to last for 100,000 miles or five years.

8 All vehicles covered by this manual are equipped with a pressurized coolant surge tank, located at the right side of the engine compartment, and connected by hoses to the radiator and cooling system.

9 The coolant level in the surge tank should be checked regularly.

WARNING:

Do not remove the pressure cap to check the coolant level when the engine is warm.

The level of coolant in the surge tank varies with the temperature of the engine. When the engine is cold, the coolant level should be at or slightly above the COLD mark on the surge tank (see illustration). Once the engine has warmed up, the level should be at or near the HOT mark. If it isn't, add coolant to the surge tank. To add coolant simply twist open the cap and add a 50/50 mixture of ethylene glycol based green-colored antifreeze or orange-colored "DEX-COOL" silicate-free coolant and water (see the **Caution** at the beginning of this Section).

10 Drive the vehicle and recheck the coolant level. If only a small amount of coolant is required to bring the system up to the proper level, water can be used. However, repeated additions of water will dilute the antifreeze and water solution. In order to maintain the proper ratio of antifreeze and water, always top up the coolant level with the correct mixture. An empty plastic milk jug or bleach bottle makes an excellent container for mixing coolant. Do not use rust inhibitors or additives.

11 If the coolant level drops consistently, there may be a leak in the system. Inspect the radiator, hoses, filler cap, drain plugs and water pump (see Section 14). If no leaks are noted, have the pressure cap tested by a service station.

12 If you have to remove the pressure cap, wait until the engine has cooled completely, then wrap a thick cloth around the cap and slowly unscrew it. If coolant or steam escapes, let the engine cool down longer, then remove the cap.

13 Check the condition of the coolant as well. It should be relatively clear. If it is brown or rust colored, the system should be drained, flushed and refilled. Even if the coolant appears to be normal, the corrosion inhibitors wear out, so it must be replaced at the specified intervals. If the system is filled with standard green coolant/water, it must be flushed and replaced more frequently than if the original "DEX-COOL" coolant is retained.

WINDSHIELD WASHER FLUID

Refer to illustration 4.14

14 Fluid for the windshield washer system is located in a plastic reservoir in the left side of the engine compartment (see illustration).

15 In milder climates, plain water can be used in the reservoir, but it should be kept no more than 2/3 full to allow for expansion if the water freezes. In colder climates, use windshield washer system antifreeze, available at any auto parts store, to lower the freezing point of the fluid. Mix the antifreeze with water in accordance with the manufacturer's directions on the container.

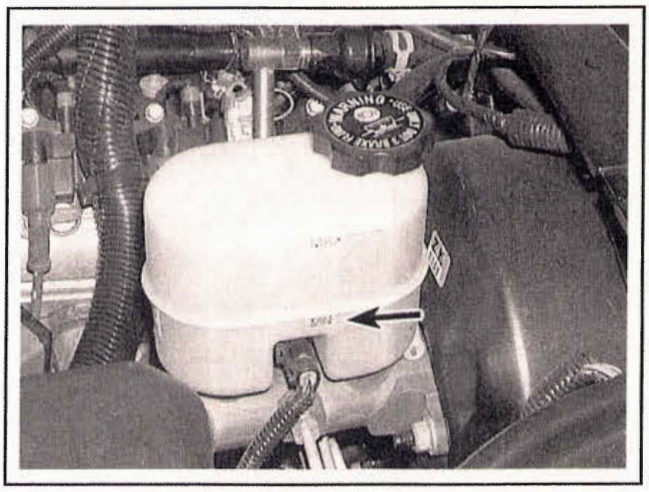
CAUTION:

Don't use cooling system antifreeze - it will damage the vehicle's paint.

16 To help prevent icing in cold weather, warm the windshield with the defroster before using the washer.

BATTERY ELECTROLYTE

17 These vehicles are equipped with a battery which is permanently sealed (except for vent holes) and has no filler caps. Water doesn't have to be added to these batteries at any time. If a maintenance-type battery is installed, the caps on the top of the battery should be removed periodically to check for a low electrolyte level. This check is most critical during the warm summer months. Add only distilled water to any battery.



4.19 Never let the brake fluid level drop below the MIN mark (arrow)

BRAKE AND CLUTCH FLUID

Refer to illustration 4.19

18 The brake master cylinder is mounted on the upper left of the engine compartment firewall. The clutch cylinder used on manual transmission models is mounted next to the master cylinder.

19 The translucent plastic reservoir allows the fluid inside to be checked without removing the cap (see illustration). Note that the clutch system is a sealed unit and it shouldn't be necessary to add fluid under most conditions (see Chapter 8 for more information). Be sure to wipe the top of either reservoir cap with a clean rag to prevent contamination of the brake and/or clutch system before removing the cover.

20 When adding fluid, pour it carefully into the reservoir to avoid spilling it on surrounding painted surfaces. Be sure the specified fluid is used, since mixing different types of brake fluid can cause damage to the system. See Recommended lubricants and fluids at the end of this Chapter or your owner's manual.

WARNING:

Brake fluid can harm your eyes and damage painted surfaces, so use extreme caution when handling or pouring it. Do not use brake fluid that has been standing open or is more than one year old. Brake fluid absorbs moisture from the air. Moisture in the system can cause a dangerous loss of brake performance.

21 At this time, the fluid and master cylinder can be inspected for contamination. The system should be drained and refilled if deposits, dirt particles or water droplets are seen in the fluid.

22 After filling the reservoir to the proper level, make sure the cover or cap is on tight to prevent fluid leakage.

23 The brake fluid level in the master cylinder will drop slightly as the pads at the front wheels wear down during normal operation. If the master cylinder requires repeated additions to keep it at the proper level, it's an indication of leakage in the brake system, which should be corrected immediately. Check all brake lines and connections (see Section 19 for more information).

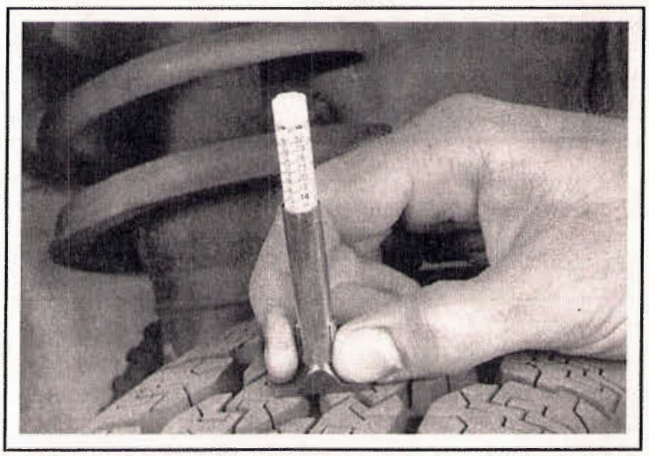
24 If, upon checking the master cylinder fluid level, you discover one or both reservoirs empty or nearly empty, the brake system should be bled and thoroughly inspected (see Chapter 9).

5 Tire and tire pressure checks (every 250 miles or weekly)

Refer to illustrations 5.2, 5.3, 5.4a, 5.4b and 5.8

1 Periodic inspection of the tires may spare you the inconvenience of being stranded with a flat tire. It can also provide you with vital information regarding possible problems in the steering and suspension systems before major damage occurs.

2 The original tires on this vehicle are equipped with 1/2-inch wide wear bands that will appear when tread depth reaches 1/16-inch, at which point the tires can be considered worn out. Tread wear can be monitored with a simple, inexpensive device known as a tread depth indicator (see illustration).



5.2 Use a tire tread depth indicator to monitor tire wear - they are available at auto parts stores and service stations and cost very little

3 Note any abnormal tread wear (see illustration). Tread pattern irregularities such as cupping, flat spots and more wear on one side than the other are indications of front end alignment and/or balance problems. If any of these conditions are noted, take the vehicle to a tire shop or service station to correct the problem.

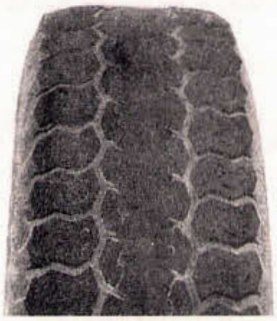
4 Look closely for cuts, punctures and embedded nails or tacks. Sometimes a tire will hold air pressure for a short time or leak down very slowly after a nail has embedded itself in the tread. If a slow leak persists, check the valve stem core to make sure it's tight (see illustration). Examine the tread for an object that may have embedded itself in the tire or for a "plug" that may have begun to leak (radial tire punctures are repaired with a plug that's installed in a puncture). If a puncture is suspected, it can be easily verified by spraying a solution of soapy water onto the puncture area (see illustration). The soapy solution will bubble if there's a leak. Unless the puncture is unusually large, a tire shop or service station can usually repair the tire.

5 Carefully inspect the inner sidewall of each tire for evidence of brake fluid leakage. If you see any, inspect the brakes immediately.

6 Correct air pressure adds miles to the lifespan of the tires, improves mileage and enhances overall ride quality. Tire pressure cannot be accurately estimated by looking at a tire, especially if it's a

UNDERINFLATION

CUPPING



OVERINFLATION

INCORRECT TOE-IN
OR EXTREME CAMBER

Cupping may be caused by:

- **Underinflation and/or mechanical irregularities such as out-of-balance condition of wheel and/or tire, and bent or damaged wheel.**
- **Loose or worn steering tie-rod or steering idler arm.**
- **Loose, damaged or worn front suspension parts.**

FEATHERING DUE
TO MISALIGNMENT

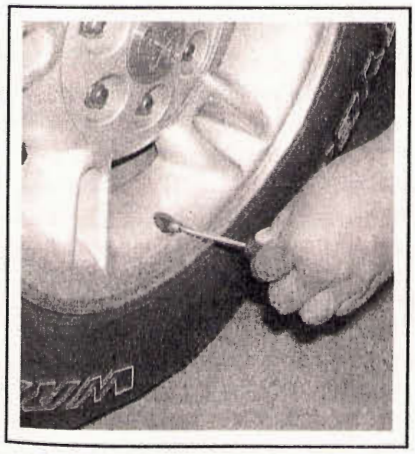
5.3 This chart will help you determine the condition of the tires and the probable cause(s) of abnormal wear

radial. A tire pressure gauge is essential. Keep an accurate gauge in the vehicle. The pressure gauges attached to the nozzles of air hoses at gas stations are often inaccurate.

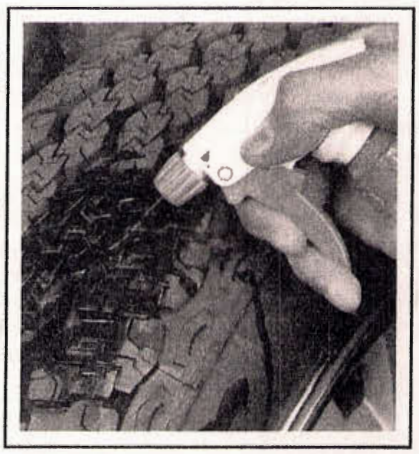
7 Always check tire pressure when the tires are cold. Cold, in this case, means the vehicle has not been driven over a mile in the three hours preceding a tire pressure check. A pressure rise of four to eight pounds is not uncommon once the tires are warm.

8 Unscrew the valve cap protruding from the wheel or hubcap and push the gauge firmly onto the valve stem (see illustration). Note the reading on the gauge and compare the figure to the recommended tire pressure shown on the placard on the driver's side door pillar. Be sure to reinstall the valve cap to keep dirt and moisture out of the valve stem mechanism. Check all four tires and, if necessary, add enough air to bring them up to the recommended pressure.

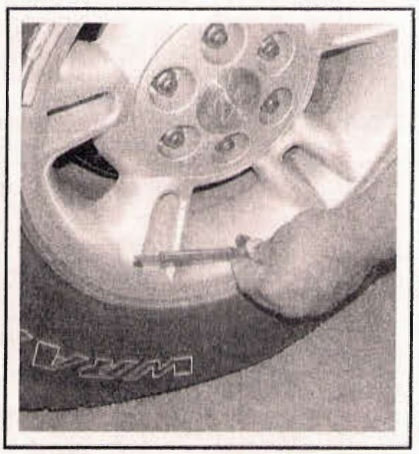
9 Don't forget to keep the spare tire inflated to the specified pressure (refer to your owner's manual or the tire sidewall).



5.4a If a tire loses air on a steady basis, check the valve stem core first to make sure it's snug (special inexpensive wrenches are commonly available at auto parts stores)



5.4b If the valve stem core is tight, raise the corner of the vehicle with the low tire and spray a soapy water solution onto the tread as the tire is turned slowly - leaks will cause small bubbles to appear



5.8 To extend the life of the tires, check the air pressure at least once a week with an accurate gauge (don't forget the spare!)

6 Power steering fluid level check (every 3000 miles or 3 months)

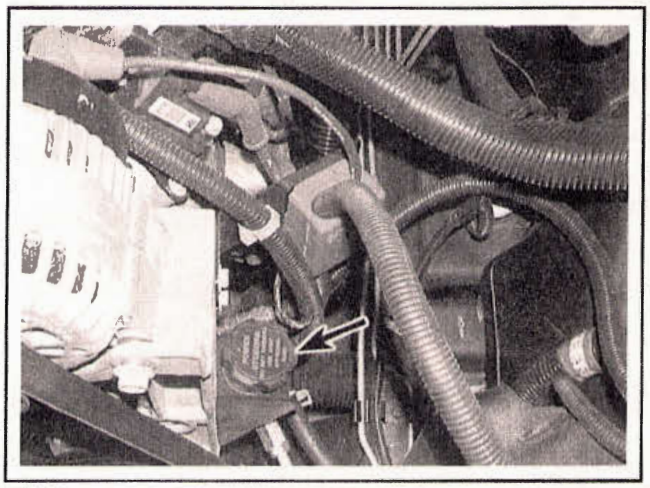
Refer to illustrations 6.2 and 6.6

1 Unlike manual steering, the power steering system relies on fluid which may, over a period of time, require replenishing.

2 On all models, the fluid reservoir for the power steering pump is located on the pump body at the front of the engine (see illustration).

3 For the check, the front wheels should be pointed straight ahead and the engine should be off.

4 Use a clean rag to wipe off the reservoir cap and the area around the cap. This will help prevent any foreign matter from entering the reservoir during the check.



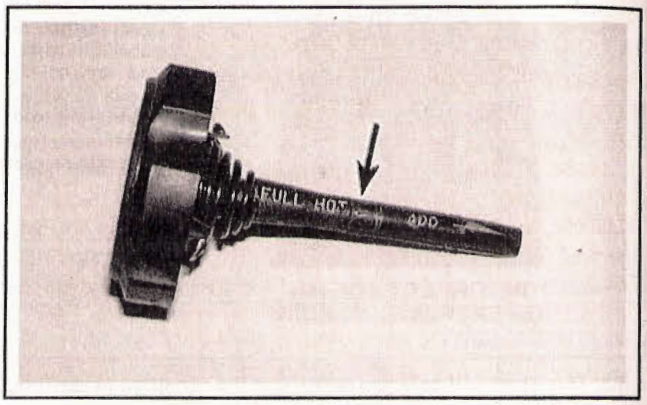
6.2 The power steering fluid dipstick on V6 and V8 models (arrow) is located in the power steering pump reservoir - turn the cap counterclockwise to remove it

5 Twist off the cap and check the temperature of the fluid at the end of the dipstick with your finger.

6 Wipe off the fluid with a clean rag, reinsert the dipstick, then withdraw it and read the fluid level. The fluid should be at the proper level, depending on whether it was checked hot or cold (see illustration). Never allow the fluid level to drop below the lower mark on the dipstick.

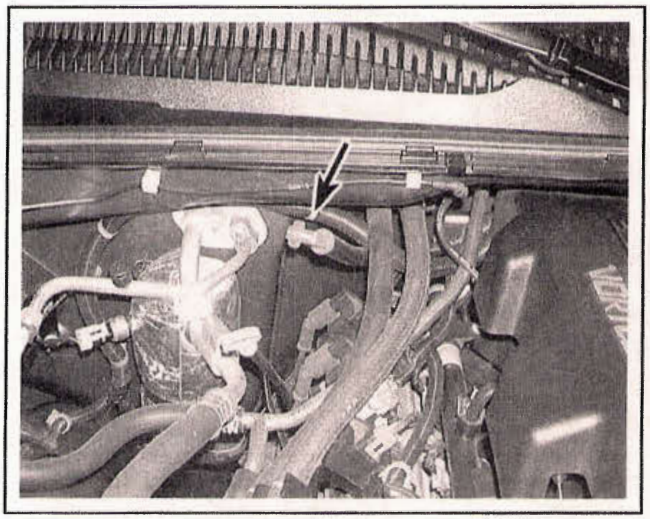
7 If additional fluid is required, pour the specified type directly into the reservoir, using a funnel to prevent spills.

8 If the reservoir requires frequent fluid additions, all power steering hoses, hose connections, steering gear and the power steering pump should be carefully checked for leaks.



6.6 The power steering fluid dipstick has marks on it so the fluid can be checked hot (arrow) or cold

7 Automatic transmission fluid level check (every 3000 miles or 3 months)



7.3 The automatic transmission dipstick (arrow) is located at the right rear of the engine compartment - flip up the handle before pulling out the dipstick

Refer to illustrations 7.3 and 7.6

1 The automatic transmission fluid level should be carefully maintained. Low fluid level can lead to slipping or loss of drive, while overfilling can cause foaming and loss of fluid.

2 With the parking brake set, start the engine, then move the shift lever through all the gear ranges, ending in Park. The fluid level must be checked with the vehicle level and the engine running at idle.

Note: Incorrect fluid level readings will result if the vehicle has just been driven at high speeds for an extended period, in hot weather in city traffic, or if it has been pulling a trailer. If any of these conditions apply, wait until the fluid has cooled (about 30 minutes).

3 With the transmission at normal operating temperature, remove the dipstick from the filler tube. The dipstick is located at the rear of the engine compartment on the passenger's side (see illustration).

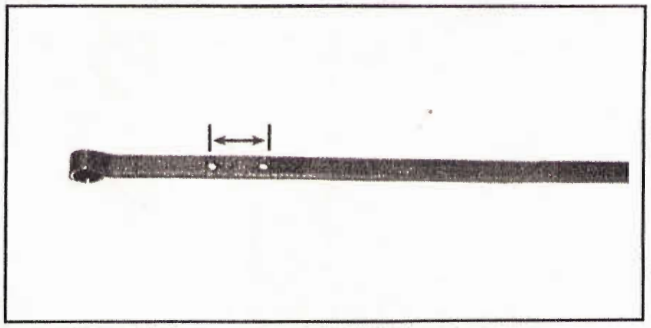
4 Wipe the fluid from the dipstick with a clean rag and push it back into the filler tube until the cap seats.

5 Pull the dipstick out again and note the fluid level.

6 If the fluid is warm, the level should be between the two dimples (see illustration). If it's hot, the level should be in the crosshatched

area, near the MAX line. If additional fluid is required, add it directly into the tube using a funnel. It takes about one pint to raise the level from the bottom of the crosshatched area to the MAX line with a hot transmission, so add the fluid a little at a time and keep checking the level until it's correct.

7 The condition of the fluid should also be checked along with the level. If the fluid at the end of the dipstick is a dark reddish-brown color, or if it smells burned, it should be changed. If you are in doubt about the condition of the fluid, purchase some new fluid and compare the two for color and smell.



7.6 The automatic transmission fluid must be kept in the regions marked, depending on the fluid temperature

8 Engine oil and filter change (every 3000 miles or 3 months)

Refer to illustrations 8.3, 8.9, 8.14 and 8.18

Note: These vehicles are equipped with an oil life indicator system that illuminates a light or message on the instrument panel when the system deems it necessary to change the oil. A number of factors are taken into consideration to determine when the oil should be considered "worn out." Generally, this system will allow the vehicle to accumulate more miles between oil changes than the traditional 3000 mile interval, but we believe that frequent oil changes are "cheap insurance" and will prolong engine life. If you do decide not to change your oil every 3000 miles and rely on the oil life indicator instead, make sure you don't exceed 7,500 miles before the oil is changed, regardless of what the oil life indicator shows.

1 Frequent oil changes are the most important preventive maintenance procedures that can be done by the home mechanic. As engine oil ages, it becomes diluted and contaminated, which leads to premature engine wear.

2 Although some sources recommend oil filter changes every other oil change, we feel that the minimal cost of an oil filter and the relative ease with which it is installed dictate that a new filter be installed every time the oil is changed.

3 Gather together all necessary tools and materials before beginning this procedure (see illustration).

4 You should have plenty of clean rags and newspapers handy to mop up any spills. Access to the under side of the vehicle may be improved if the vehicle can be lifted on a hoist, driven onto ramps or supported by jackstands.

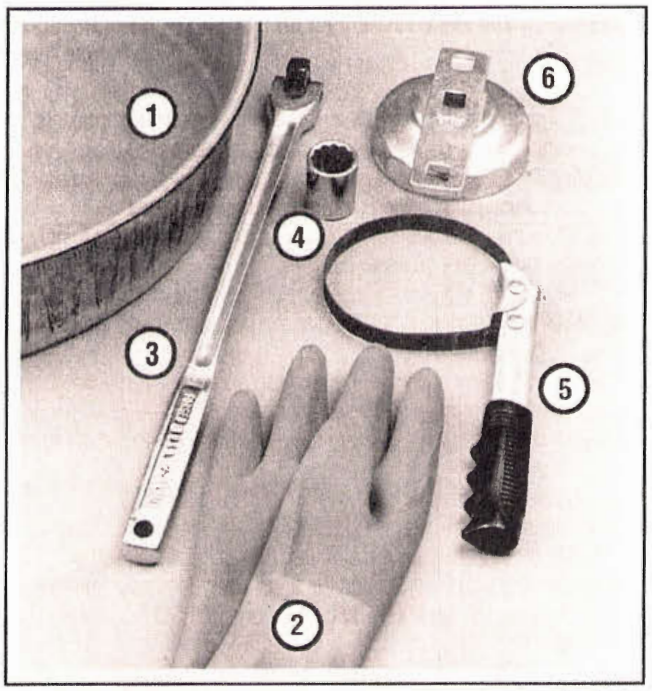
WARNING:

Do not work under a vehicle which is supported only by a bumper, hydraulic or scissors-type jack.

5 If this is your first oil change, familiarize yourself with the locations of the oil drain plug and the oil filter.

6 Warm the engine to normal operating temperature. If the new oil or any tools are needed, use this warm-up time to gather everything necessary for the job. The correct type of oil for your application can be found in Recommended lubricants and fluids at the end of this Chapter.

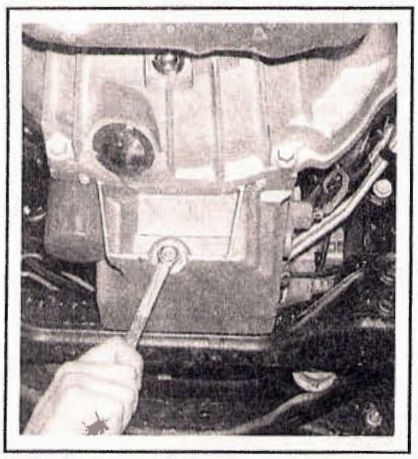
7 With the engine oil warm (warm engine oil will drain better and more built-up sludge will be removed with it), raise and support the vehicle. Make sure it's safely supported!



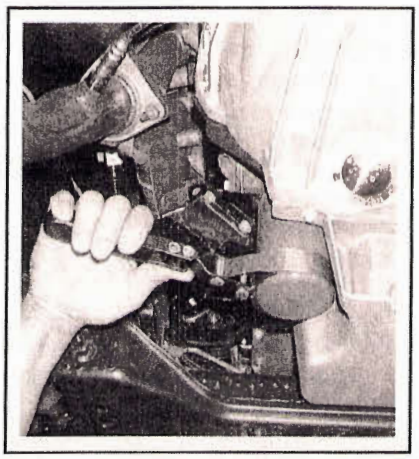
8.3 These tools are required when changing the engine oil and filter

1 ***Drain pan*** *- It should be fairly shallow in depth, but wide to prevent spills*
2 ***Rubber gloves*** *- When removing the drain plug and filter, you will get oil on your hands (the gloves will prevent burns)*
3 ***Breaker bar*** *- Sometimes the oil drain plug is tight, and a long breaker bar is needed to loosen it*
4 ***Socket*** *- To be used with the breaker bar or a ratchet (must be the correct size to fit the drain plug - six-point preferred)*
5 ***Filter wrench*** *- This is a metal band-type wrench, which requires clearance around the filter to be effective*
6 ***Filter wrench*** *- This type fits on the bottom of the filter and can be turned with a ratchet or breaker bar (different-size wrenches are available for different types of filters)*

8 Move all necessary tools, rags and newspapers under the vehicle. Set the drain pan under the drain plug. Keep in mind that the oil will initially flow from the pan with some force; position the pan accordingly.



8.9 Use a proper size box-end wrench or socket to remove the oil drain plug and avoid rounding it off



8.14 Since the oil filter is on very tight, you'll need a special wrench for removal - DO NOT use the wrench to tighten the new filter

8.18 Lubricate the oil filter gasket with clean engine oil before installing the filter on the engine

9 Being careful not to touch any of the hot exhaust components, use a wrench to remove the drain plug near the bottom of the oil pan (see illustration). Depending on how hot the oil is, you may want to wear gloves while unscrewing the plug the final few turns.

10 Allow the oil to drain into the pan. It may be necessary to move the pan as the oil flow slows to a trickle.

11 After all the oil has drained, wipe off the drain plug with a clean rag. Small metal particles may cling to the plug and would immediately contaminate the new oil.

12 Clean the area around the drain plug opening and reinstall the plug. Tighten the plug securely with the wrench. If a torque wrench is available, use it to tighten the plug to the torque listed in this Chapter's Specifications.

13 Move the drain pan into position under the oil filter.

14 Use the oil filter wrench to loosen the oil filter (see illustration).

15 Completely unscrew the old filter. Be careful: it's full of oil. Empty the oil inside the filter into the drain pan, then lower the filter.

16 Compare the old filter with the new one to make sure they're the same type.

17 Use a clean rag to remove all oil, dirt and sludge from the area where the oil filter mounts to the engine. Check the old filter to make sure the rubber gasket isn't stuck to the engine. If the gasket is stuck to the engine (use a flashlight if necessary), remove it.

18 Apply a light coat of clean oil to the rubber gasket on the new oil filter (see illustration).

19 Attach the new filter to the engine, following the tightening directions printed on the filter canister or packing box. Most filter manufacturers recommend against using a filter wrench due to the possibility of overtightening and damage to the seal.

20 Remove all tools, rags, etc. from under the vehicle, being careful not to spill the oil in the drain pan, then lower the vehicle.

21 Move to the engine compartment and locate the oil filler cap.

22 Pour the fresh oil through the filler opening. A funnel may be helpful.

23 Refer to the engine oil capacity in this Chapter's Specifications and add the proper amount of fresh oil into the engine. Wait a few minutes to allow the oil to drain into the pan, then check the level on the oil dipstick (see Section 4 if necessary). If the oil level is above the hatched area, start the engine and allow the new oil to circulate.

24 Run the engine for only about a minute and then shut it off. Immediately look under the vehicle and check for leaks at the oil pan drain plug and around the oil filter.

25 With the new oil circulated and the filter now completely full, recheck the level on the dipstick and add more oil as necessary.

26 During the first few trips after an oil change, make it a point to check frequently for leaks and proper oil level.

27 The old oil drained from the engine cannot be reused in its present state and should be disposed of. Check with your local auto parts store, disposal facility or environmental agency to see if they will accept the oil for recycling. After the oil has cooled it can be drained into a container (capped plastic jugs, topped bottles, milk cartons, etc.) for transport to one of these disposal sites. Don't dispose of the oil by pouring it on the ground or down a drain!

OIL LIFE MONITOR

28 The Oil Life Monitor is a function of the PCM that tracks engine operating temperature and rpm. If the PCM determines that your engine's oil has been used long enough, an indicator that shows "Change Engine Oil" will light on the instrument panel.

29 When you change your engine oil and filter, whether you change it at the interval recommended in this Chapter or only when the light comes on, you will have to reset the system to make the indicator go out.

30 To reset, switch the ignition key to Run (engine not running) and depress/let up the throttle pedal quickly three times. The light should flash for five seconds, to let you know the system is reset properly.

9 Seat belt check (every 6000 miles or 6 months)

1 Check seat belts, buckles, latch plates and guide loops for obvious damage and signs of wear.

2 Where the seat belt receptacle bolts to the floor of the vehicle, check that the bolts are secure.

3 See if the seat belt reminder light comes on when the key is turned to the Run or Start position. A chime should also sound.

10 Wiper blade inspection and replacement (every 6000 miles or 6 months)

Refer to illustration 10.3

1 The windshield wiper blade elements should be checked periodically for cracks and deterioration.

2 Lift the wiper blade assembly away from the glass.

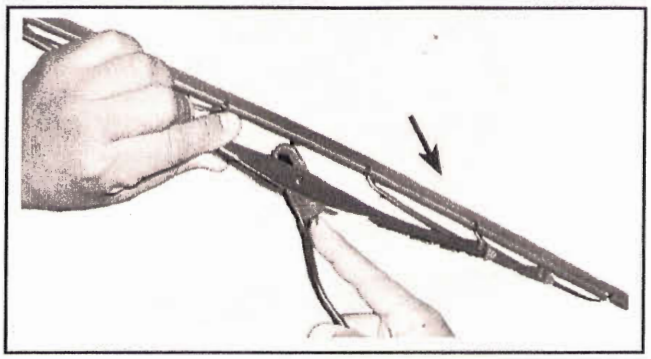
3 Press the release lever and slide the blade assembly out of the hook in the end of the wiper arm (see illustration).

4 Squeeze the two rubber prongs at the end of the blade element, then slide the element out of the frame.

Note: These elements can be replaced by hand, without pliers.

5 Compare the new element with the old for length, design, etc. Some replacement elements come in a three-piece design (two metal strips, one on either side of the rubber) that is held together by several small plastic sleeves. Keep the sleeves in place on this design until you start sliding the element into the frame. Remove each of the plastic sleeves as needed when they reach the frame.

6 Slide the new element into the frame, notched end last and secure the clips into the notches of the frame.



10.3 Depress the release lever (finger is on it here) and slide the wiper assembly down the wiper arm and out of the hook in the end of the arm

7 Reinstall the blade assembly on the arm, wet the windshield and test for proper operation.

11 Battery check, maintenance and charging (every 6000 miles or 6 months)

Refer to illustrations 11.1, 11.5, 11.7a, 11.7b and 11.7c

WARNING:

Refer to the Warning and Caution in Chapter 5, Section 1 under "Battery disconnection" before proceeding with the following Steps.

WARNING:

Certain precautions must be followed when checking and servicing the battery. Hydrogen gas, which is highly flammable, is always present in the battery cells, so keep lighted tobacco and all other open flames and sparks away from the battery. The electrolyte inside the battery is actually dilute sulfuric acid, which will cause injury if splashed on your skin or in your eyes. It will also ruin clothes and painted surfaces. When removing the battery cables, always detach the negative cable first and hook it up last!

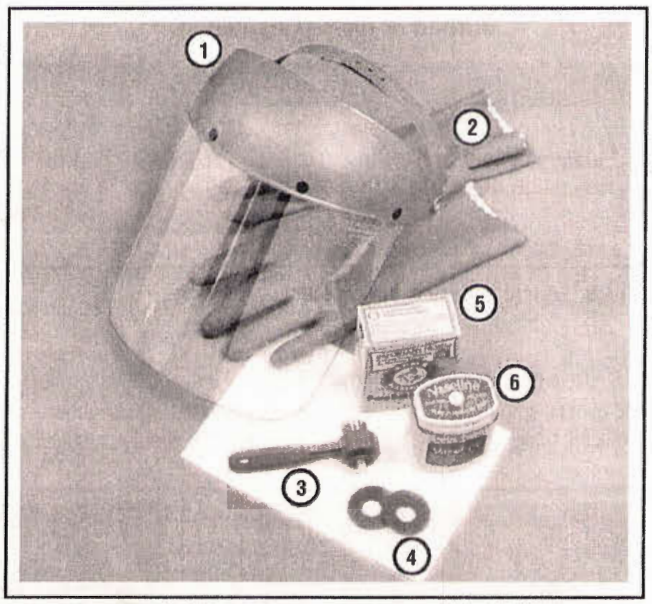
1 A routine preventive maintenance program for the battery in your vehicle is the only way to ensure quick and reliable starts. But before performing any battery maintenance, make sure that you have the proper equipment necessary to work safely around the battery (see illustration).

Note: Some of the covered models have an auxiliary battery in addition to the standard battery. All of the following care and maintenance should be applied to both batteries.

2 There are also several precautions that should be taken whenever battery maintenance is performed. Before servicing the battery, always turn the engine and all accessories off and disconnect the cable from the negative terminal of the battery.

3 The battery produces hydrogen gas, which is both flammable and explosive. Never create a spark, smoke or light a match around the battery. Always charge the battery in a ventilated area.

4 Electrolyte contains poisonous and corrosive sulfuric acid. Do not allow it to get in your eyes, on your skin or on your clothes. Never ingest it. Wear protective safety glasses when working near the battery. Keep children away from the battery.



11.1 Tools and materials required for battery maintenance

1 ***Face shield/safety goggles*** *- When removing corrosion with a brush, the acidic particles can easily fly up into your eyes*

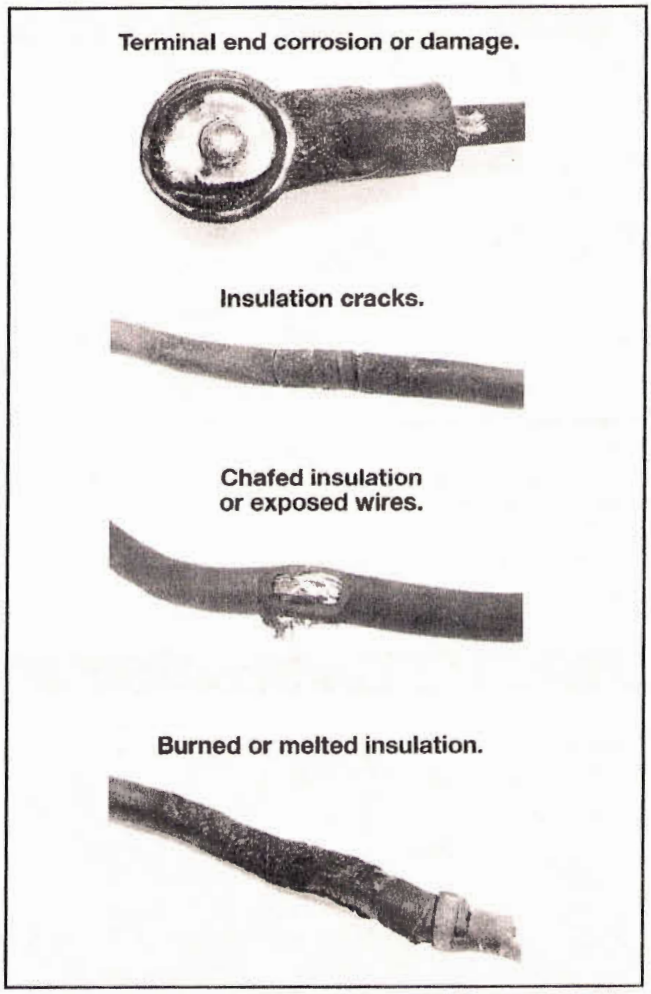
2 ***Rubber gloves*** *- Another safety item to consider when servicing the battery - remember that's acid inside the battery!*

3 ***Battery terminal/cable cleaner*** *- This wire brush cleaning tool will remove all traces of corrosion from the battery posts and cable clamps*

4 ***Treated felt washers*** *- Placing one of these on each post, directly under the cable clamps, will help prevent corrosion*

5 ***Baking soda*** *- A solution of baking soda and water can be used to neutralize corrosion*

6 ***Petroleum jelly*** *- A layer of this on the battery posts will help prevent corrosion*



11.5 Typical battery cable problems

5 Note the external condition of the battery. If the positive terminal and cable clamp on your vehicle's battery is equipped with a rubber protector, make sure that it's not torn or damaged. It should completely cover the terminal. Look for any corroded or loose connections, cracks in the case or cover or loose hold-down clamps. Also check the entire length of each cable for cracks and frayed conductors (see illustration).

6 If corrosion, which looks like white, fluffy deposits is evident, particularly around the terminals, the battery should be removed for cleaning. Loosen the cable bolts with a wrench, being careful to remove the ground cable first, and slide them off the terminals. Then disconnect the hold-down clamp bolt and nut, remove the clamp and lift the battery from the engine compartment.

7 Clean the cable ends thoroughly with a battery brush or a terminal cleaner and a solution of warm water and baking soda. Wash the terminals and the side of the battery case with the same solution but make sure that the solution doesn't get into the battery. When cleaning the cables, terminals and battery case, wear safety goggles and rubber gloves to prevent any solution from coming in contact with your eyes or hands. Wear old clothes too - even diluted, sulfuric acid splashed onto clothes will burn holes in them. If the terminals have been corroded, clean them up with a terminal cleaner (see illustrations). Thoroughly wash all cleaned areas with plain water.

8 Make sure that the battery tray is in good condition and the hold-down clamp bolts are tight. If the battery is removed from the tray, make sure no parts remain in the bottom of the tray when the battery is reinstalled. When reinstalling the hold-down clamp bolts, do not overtighten them.

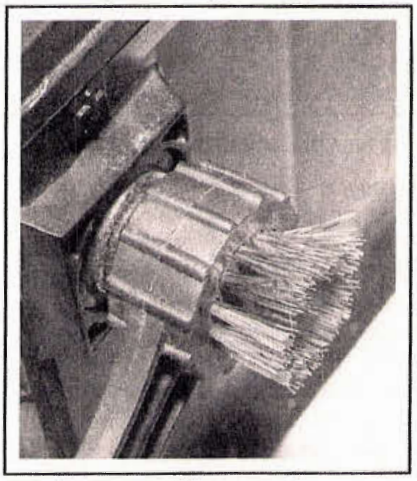
9 Any metal parts of the vehicle damaged by corrosion should be covered with a zinc-based primer, then painted.

10 Information on removing and installing the battery can be found in Chapter 5. Information on jump starting can be found at the front of this manual.

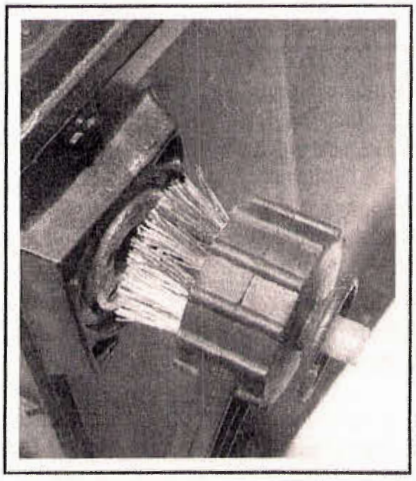
CHARGING

WARNING:

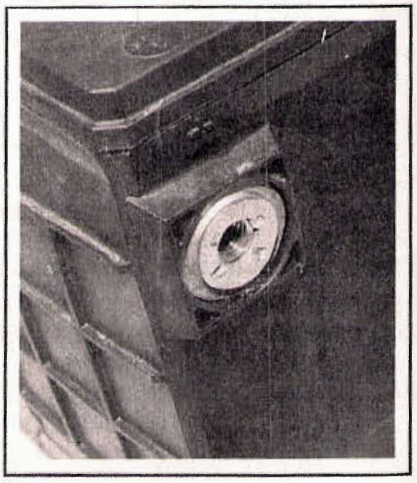
When batteries are being charged, hydrogen gas, which is very explosive and flammable, is produced. Do not smoke or allow open flames near a charging or a recently charged battery. Wear eye protection when near the battery during charging. Also, make sure the charger is unplugged before connecting or disconnecting the battery from the charger.



11.7a A tool like this one (available at auto parts stores) is used to clean the side-terminal type battery-cable contact area



11.7b Use the brush side of the tool to finish the job



11.7c Regardless of the type of tool used on the battery and cables, a clean, shiny surface should be the result

➡Note: The manufacturer recommends the battery be removed from the vehicle for charging because the gas that escapes during this procedure can damage the paint. Fast charging with the battery cables connected can result in damage to the electrical system.

11 Slow-rate charging is the best way to restore a battery that's discharged to the point where it will not start the engine. It's also a good way to maintain the battery charge in a vehicle that's only driven a few miles between starts. Maintaining the battery charge is particularly important in the winter when the battery must work harder to start the engine and electrical accessories that drain the battery are in greater use.

12 It's best to use a one or two-amp battery charger (sometimes called a "trickle" charger). They are the safest and put the least strain on the battery. They are also the least expensive. For a faster charge, you can use a higher amperage charger, but don't use one rated more than 1/10th the amp/hour rating of the battery. Rapid boost charges that claim to restore the power of the battery in one to two hours are hardest on the battery and can damage batteries not in good condition. This type of charging should only be used in emergency situations.

13 The average time necessary to charge a battery should be listed in the instructions that come with the charger. As a general rule, a trickle charger will charge a battery in 12 to 16 hours.

14 Remove all the cell caps (if equipped) and cover the holes with a clean cloth to prevent spattering electrolyte. Disconnect the negative battery cable and hook the battery charger cable clamps up to the battery posts (positive to positive, negative to negative), then plug in the charger. Make sure it is set at 12-volts if it has a selector switch.

15 If you're using a charger with a rate higher than two amps, check the battery regularly during charging to make sure it doesn't overheat. If you're using a trickle charger, you can safely let the battery charge overnight after you've checked it regularly for the first couple of hours.

16 If the battery has removable cell caps, measure the specific gravity with a hydrometer every hour during the last few hours of the charging cycle. Hydrometers are available inexpensively from auto parts stores - follow the instructions that come with the hydrometer. Consider the battery charged when there's no change in the specific gravity reading for two hours and the electrolyte in the cells is gassing (bubbling) freely. The specific gravity reading from each cell should be very close to the others. If not, the battery probably has a bad cell(s).

17 Some batteries with sealed tops have built-in hydrometers on the top that indicate the state of charge by the color displayed in the hydrometer window. Normally, a bright-colored hydrometer indicates a full charge and a dark hydrometer indicates the battery still needs charging.

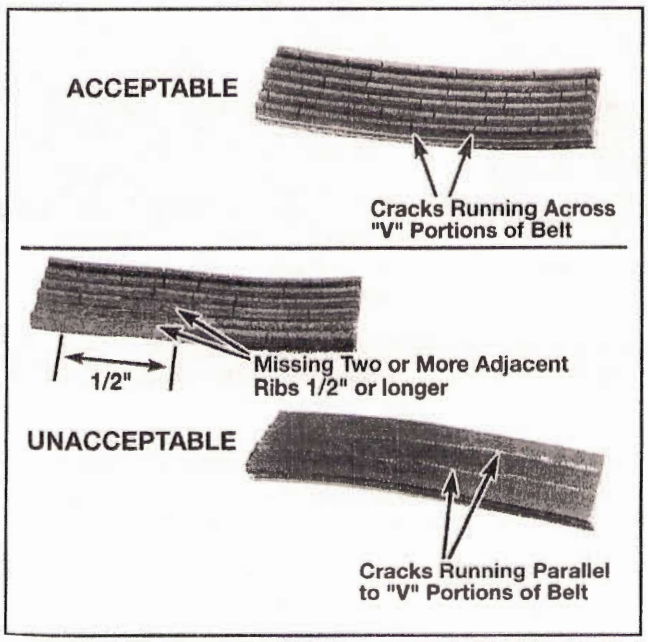
18 If the battery has a sealed top and no built-in hydrometer, you can hook up a digital voltmeter across the battery terminals to check the charge. A fully charged battery should read 12.5 volts or higher.

19 Further information on the battery and jump-starting can be found in Chapter 5 and at the front of this manual.

12 Drivebelt check, adjustment and replacement (every 6000 miles or 6 months)

♦ Refer to illustrations 12.2, 12.4a, 12.4b, 12.5 and 12.7

1 A serpentine drivebelt is located at the front of the engine and plays an important role in the overall operation of the engine and its components. Due to its function and material make up, the belt is prone to wear and should be periodically inspected. The serpentine belt drives the alternator, power steering pump, water pump and air conditioning compressor.



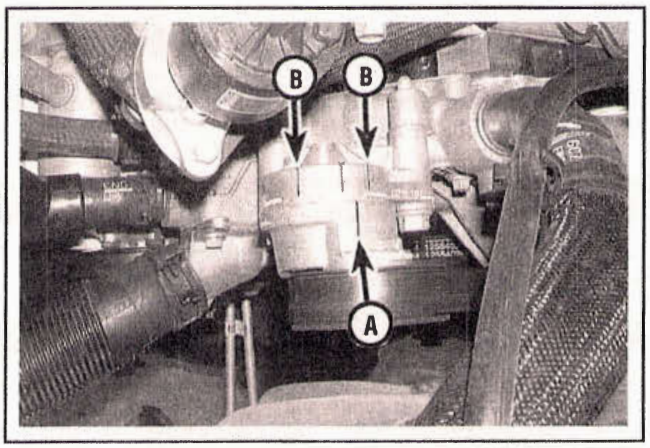
12.2 Check ribbed (serpentine) belts for signs of wear like these - if it looks worn, replace it

➡Note: V6 models have one belt. V8 models have one main belt and a second, inner belt just for the air conditioning compressor (if equipped).

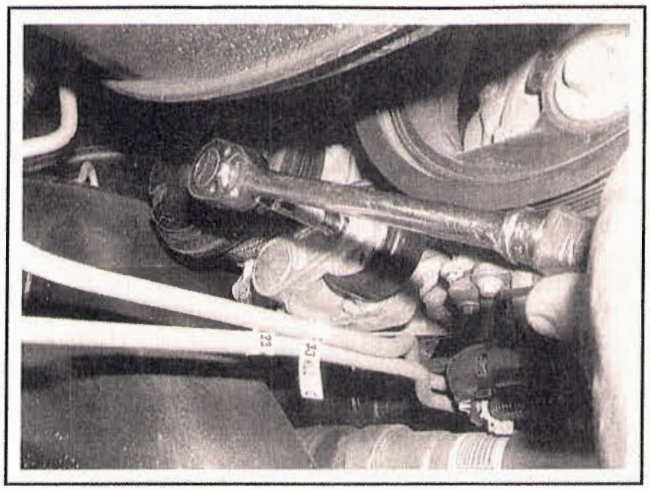
2 With the engine off, open the hood and use your fingers (and a flashlight, if necessary), to move along the belt checking for cracks and separation of the belt plies. Also check for fraying and glazing, which gives the belt a shiny appearance (see illustration). Both sides of the belt should be inspected, which means you will have to twist the belt to check the underside.

3 Check the ribs on the underside of the belt. They should all be the same depth, with none of the surface uneven.

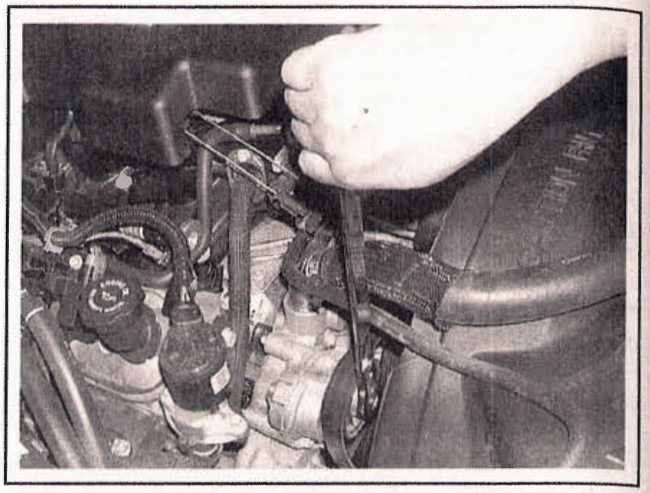
4 The tension of the belt is maintained by a spring-loaded tensioner assembly and isn't adjustable. The belt should be replaced when



12.4a The indexing arrow (A) on the main belt's tensioner must remain between the marks (B) on the tensioner assembly (V8 shown, main belt)



12.4b On V8 models with air conditioning, the inner belt tensioner (arrow) is best accessed from below - use a 3/8-inch-drive tool in the tensioner's square hole to rotate it for belt removal



12.5 Use a drivebelt tool to turn the tensioner bolt for belt removal - there may not be room for a standard socket and breaker bar

the indexing arrow is lined up with the indexing mark on the tensioner assembly (see illustrations).

5 To replace the belt, rotate the tensioner to release belt tension (see illustration).

6 Remove the belt from the tensioner and auxiliary components and slowly release the tensioner.

7 Route the new belt over the various pulleys, again rotating the tensioner to allow the belt to be installed, then release the belt tensioner.

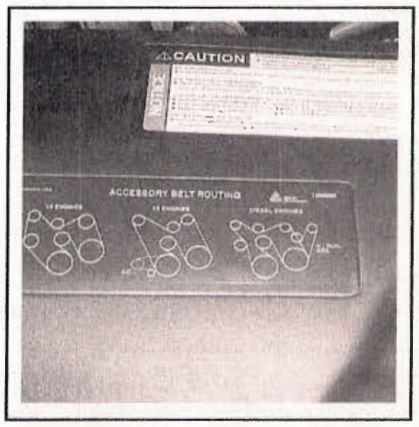
➡Note: A drivebelt routing decal is located on the radiator support to help during drivebelt installation (see illustration).

TENSIONER REPLACEMENT

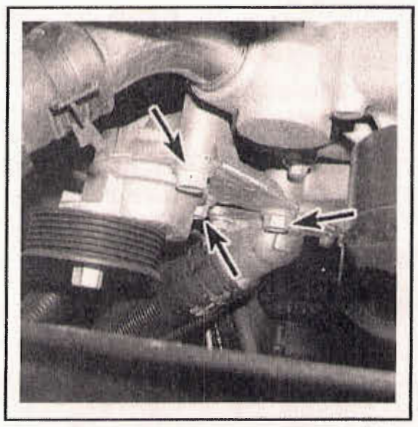
♦ Refer to illustrations 12.8a and 12.8b

8 To replace a tensioner that doesn't fall into the proper tension range, even with a new belt, or that exhibits binding or a worn-out pulley/bearing, remove the mounting bolts (see illustrations).

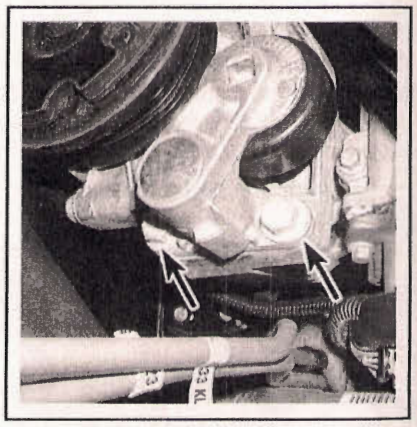
9 Installation is the reverse of the removal procedure.



12.7 The drivebelt routing diagram is found on the radiator support (V8 shown)



12.8a Main belt tensioner mounting bolts (arrows)



12.8b Mounting bolts (arrow) for V8 air-conditioning belt tensioner

13 Underhood hose check and replacement (every 6000 miles or 6 months)

GENERAL

⁂ CAUTION:

Replacement of air conditioning hoses must be left to a dealer service department or air conditioning shop that has the equipment to depressurize the system safely and recover the refrigerant. Never remove air conditioning components or hoses until the system has been depressurized.

1 High temperatures in the engine compartment can cause the deterioration of the rubber and plastic hoses used for engine, accessory and emission systems operation. Periodic inspection should be made for cracks, loose clamps, material hardening and leaks. Information specific to the cooling system hoses can be found in Section 14.

2 Some, but not all, hoses are secured to their fittings with clamps. Where clamps are used, check to be sure they haven't lost their tension, allowing the hose to leak. If clamps aren't used, make sure the hose has not expanded and/or hardened where it slips over the fitting, allowing it to leak.

VACUUM HOSES

3 It's quite common for vacuum hoses, especially those in the emissions system, to be color-coded or identified by colored stripes molded into them. Various systems require hoses with different wall thickness, collapse resistance and temperature resistance. When replacing hoses, be sure the new ones are made of the same material.

4 Often the only effective way to check a hose is to remove it completely from the vehicle. If more than one hose is removed, be sure to label the hoses and fittings to ensure correct installation.

5 When checking vacuum hoses, be sure to include any plastic T-fittings in the check. Inspect the fittings for cracks and the hose where it fits over the fitting for distortion, which could cause leakage.

6 A small piece of vacuum hose (1/4-inch inside diameter) can be used as a stethoscope to detect vacuum leaks. Hold one end of the hose to your ear and probe around vacuum hoses and fittings, listening for the "hissing" sound characteristic of a vacuum leak.

WARNING:

When probing with the vacuum hose stethoscope, be very careful not to come into contact with moving engine components such as the drivebelt, cooling fan, etc.

FUEL HOSE

WARNING:

Gasoline is extremely flammable, so take extra precautions when you work on any part of the fuel system. Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance (such as a water heater or clothes dryer) is present. Since gasoline is carcinogenic, wear latex gloves when there's a possibility of being exposed to fuel, and, if you spill any fuel on your skin, rinse it off immediately with soap and water. Mop up any spills immediately and do not store fuel-soaked rags where they could ignite. When you perform any kind of work on the fuel system, wear safety glasses and have a Class B type fire extinguisher on hand. The fuel system is under pressure, so if any lines must be disconnected, the pressure in the system must be relieved first (see Chapter 4 for more information).

7 Check all rubber fuel lines for deterioration and chafing. Check especially for cracks in areas where the hose bends and just before fittings, such as where a hose attaches to the fuel filter and fuel injection unit.

8 High quality fuel line, specifically designed for high-pressure fuel injection applications, must be used for fuel line replacement. Never, under any circumstances, use regular fuel line, unreinforced vacuum line, clear plastic tubing or water hose for fuel lines.

9 Spring-type (pinch) clamps are commonly used on fuel lines. These clamps often lose their tension over a period of time, and can be "sprung" during removal. Replace all spring-type clamps with screw clamps whenever a hose is replaced.

METAL LINES

10 Sections of metal line are routed along the frame, between the fuel tank and the engine. Check carefully to be sure the line has not been bent or crimped and no cracks have started in the line.

11 If a section of metal fuel line must be replaced, only seamless steel tubing should be used, since copper and aluminum tubing don't have the strength necessary to withstand normal engine vibration.

12 Check the metal brake lines where they enter the master cylinder and brake proportioning unit for cracks in the lines or loose fittings. Any sign of brake fluid leakage calls for an immediate and thorough inspection of the brake system.

14 Cooling system check (every 6000 miles or 6 months)

Refer to illustration 14.4

WARNING:

Wait until the engine is completely cool before beginning this procedure.

CAUTION:

Never mix green-colored ethylene glycol anti-freeze and orange-colored "DEX-COOL" silicate-free coolant because doing so will destroy the efficiency of the "DEX-COOL" coolant which is designed to last for 100,000 miles or five years.

1 Many major engine failures can be attributed to a faulty cooling system. If the vehicle is equipped with an automatic transmission, the cooling system also cools the transmission fluid and thus plays an important role in prolonging transmission life.

2 The cooling system should be checked with the engine cold. Do this before the vehicle is driven for the day or after it has been shut off for at least three hours.

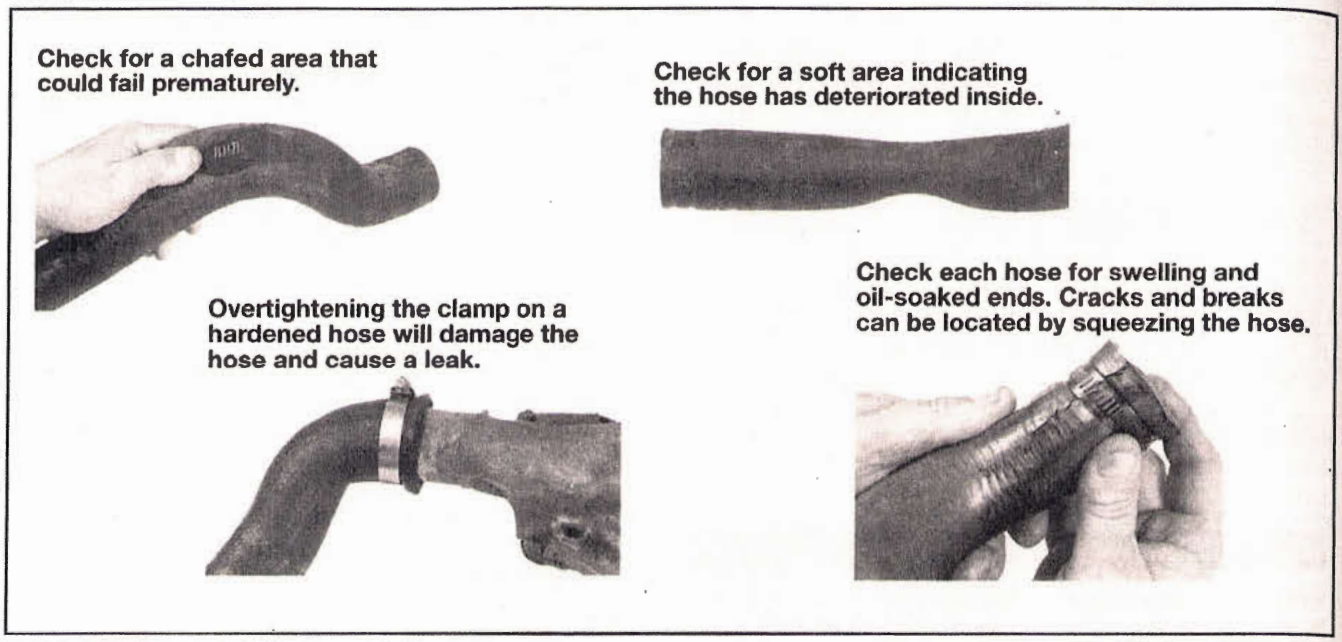
3 Remove the coolant pressure cap on the surge tank by slowly unscrewing it. If you hear any hissing sounds (indicating there is still pressure in the system), wait until it stops. Thoroughly clean the cap, inside and out, with clean water. Also clean the filler neck on the surge tank. All traces of corrosion should be removed. The coolant inside the surge tank should be relatively transparent. If it is rust colored, the system should be drained and refilled (see Section 28). If the coolant level is not up to the Cold mark, add additional antifreeze/coolant mixture (see Section 4).

4 Carefully check the large upper and lower radiator hoses along with any smaller diameter heater hoses that run from the engine to the firewall. Inspect each hose along its entire length, replacing any hose that is cracked, swollen or shows signs of deterioration. Cracks may become more apparent if the hose is squeezed (see illustration on next page).

5 Make sure all hose connections are tight. A leak in the cooling system will usually show up as white or rust-colored deposits on the areas adjoining the leak. If wire-type clamps are used at the ends of the hoses, it may be wise to replace them with more secure, screw-type clamps.

6 Use compressed air or a soft brush to remove bugs, leaves, etc. from the front of the radiator or air conditioning condenser. Be careful not to damage the delicate cooling fins or cut yourself on them.

7 Every other inspection, or at the first indication of cooling system problems, have the cap and system pressure tested. If you don't have a pressure tester, most gas stations and repair shops will do this for a minimal charge.



14.4 Hoses, like drivebelts, have a habit of failing at the worst possible time - to prevent the inconvenience of a blown radiator or heater hose, inspect them carefully as shown here

OVERHEAT PROTECTION OPERATING MODE

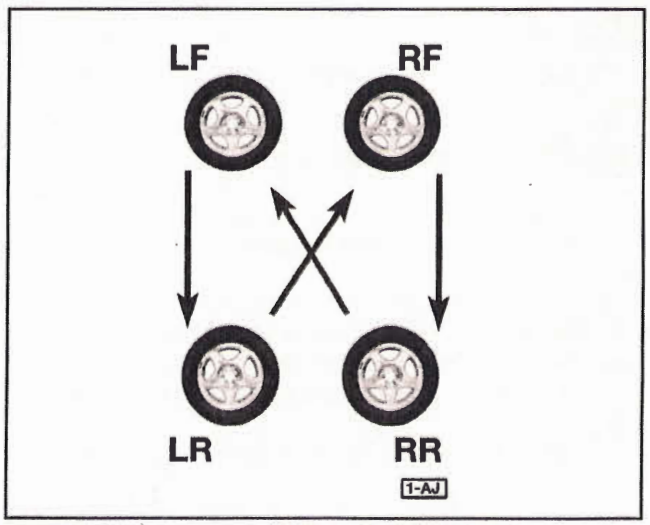
8 Models with V8 engines have a system to protect the engine from damage caused by severe overheating. When the computer senses an overheat condition, an instrument panel warning light comes on that says "reduced power." In this mode, the computer switches the firing of the individual coils On and Off at each cylinder to allow cooling cycles between the firing cycles. The engine will have a dramatic loss of power, but will allow vehicle operation in an emergency.

9 If this light is On, find a safe place to get off the road as soon as possible, and allow the engine to cool thoroughly.

10 Check the coolant level and inspect for a split hose or other obvious signs of coolant leakage.

11 The engine oil will be ruined after this mode has operated, since unburned fuel will get into the oil. After fixing the overheating problem, change the oil and filter right away and reset the Oil Life Monitor (see Section 8).

15 Tire rotation (every 6000 miles or 6 months)



15.2 The recommended four-tire rotation pattern for non-directional radial tires

▶ Refer to illustration 15.2

1 The tires should be rotated at the specified intervals and whenever uneven wear is noticed.

2 Tires must be rotated in the recommended pattern (see illustration).

3 Refer to the information in Jacking and towing at the front of this manual for the proper procedures to follow when raising the vehicle and changing a tire. If the brakes are to be checked, don't apply the parking brake as stated. Make sure the tires are blocked to prevent the vehicle from rolling as it's raised.

4 Preferably, the entire vehicle should be raised at the same time. This can be done on a hoist or by jacking up each corner and then lowering the vehicle onto jackstands placed under the frame rails. Always use four jackstands and make sure the vehicle is safely supported.

5 After rotation, check and adjust the tire pressures as necessary. Tighten the lug nuts to the torque listed in this Chapter's Specifications.

16 Differential lubricant level check (every 6,000 miles or 6 months)

Refer to illustrations 16.2a and 16.2b

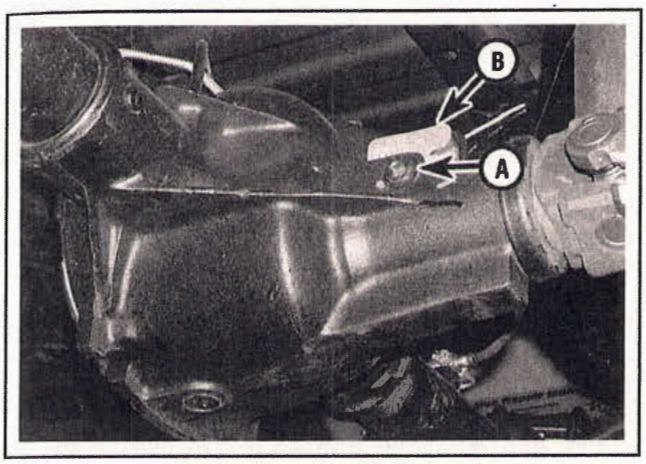
Note: 4WD vehicles have two differentials - one in the center of each axle. 2WD vehicles have one differential - in the center of the rear axle. On 4WD vehicles, be sure to check the lubricant level in both differentials.

1 The filler plug on all front and most rear differentials is a threaded metal type. If the vehicle is raised to gain access to the plug, be sure to support it safely on jackstands - DO NOT crawl under the vehicle when it's supported only by the jack. Be sure the vehicle is level or the check may not be accurate.

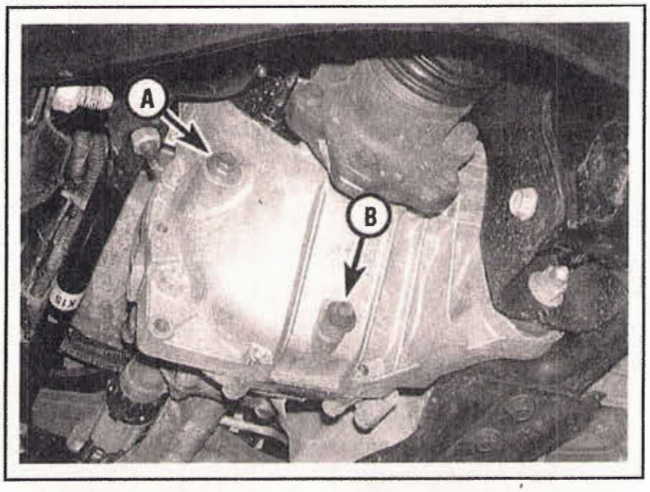
2 Remove the plug from the filler hole in the differential housing or cover (see illustrations).

3 The lubricant level should be at the bottom of the filler hole If you're checking the rear differential and it is filled with synthetic lubricant, the level should be below the fill-plug opening by 1-5/8 inch on 1500 Series models, but no more than 3/8-inch lower than the hole on 2500 Series models. If not, use a pump or squeeze bottle to add the recommended lubricant until it just starts to run out of the opening. On some models a tag is located in the area of the plug which gives information regarding lubricant type.

4 Install the plug securely into the filler hole.



16.2a Remove the rear axle filler plug (A) to check the differential lubricant level - some models may have a tag with specific information about the required lubricant (B)

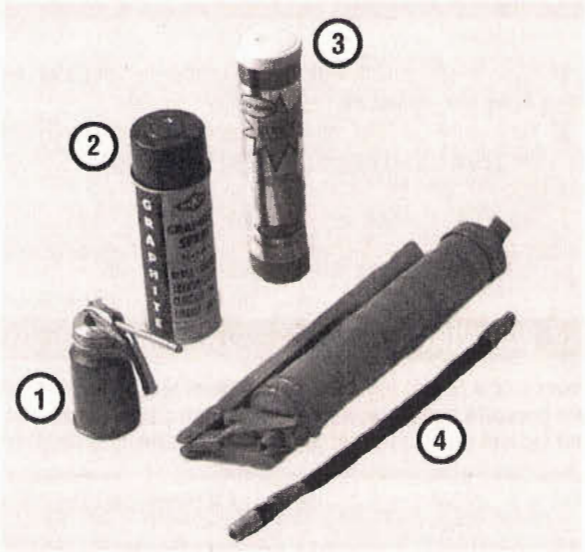


16.2b Remove the front (4WD) axle filler plug (A) to check the differential lubricant level - B is the drain plug

17 Chassis lubrication (every 15,000 miles or 12 months)

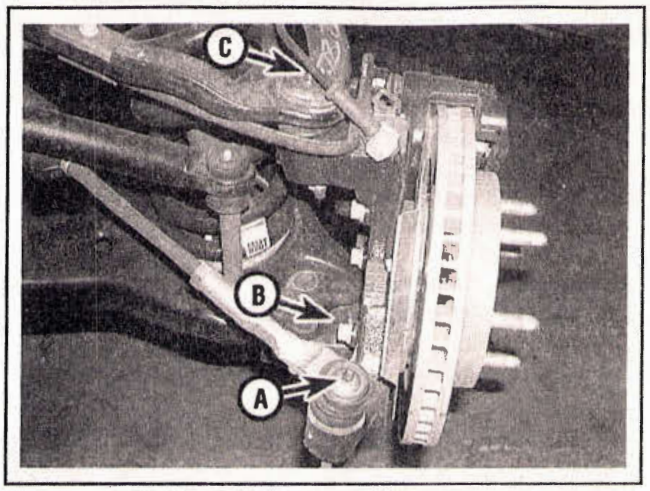
Refer to illustration 17.1, 17.2a and 17.2b

1 Refer to Recommended lubricants and fluids at the end of this Chapter to obtain the necessary grease, etc. You'll also need a grease gun (see illustration). If a suspension component has no grease fitting in place, this indicates the part is sealed and doesn't require periodic lubrication. Some components on 4WD models have fittings that aren't on 2WD versions, and vice versa. On 2002 models with Quadrasteer™ four-wheel steering option, lubricate the rear balljoints and rear steering components equipped with grease fittings.

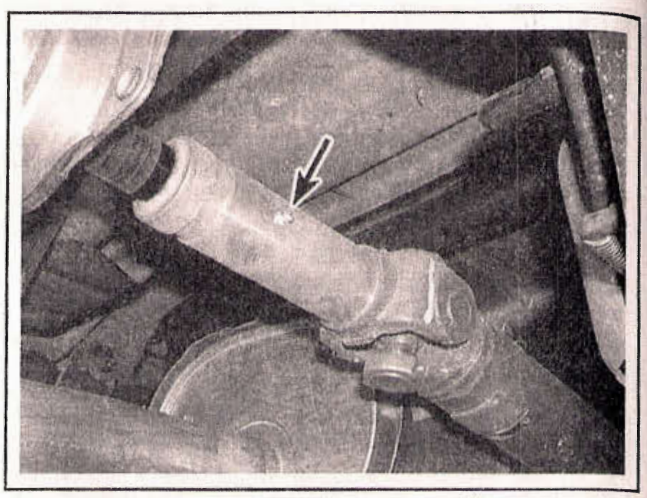


17.1 Materials required for chassis and body lubrication

1 ***Engine oil*** *- Light engine oil in a can like this can be used for door and hood hinges*
2 ***Graphite spray*** *- Used to lubricate lock cylinders*
3 ***Grease*** *- Grease, in a variety of types and weights, is available for use in a grease gun. Check the Specifications for your requirements*
4 ***Grease gun*** *- A common grease gun, shown here with a detachable hose and nozzle, is needed for chassis lubrication. After use, clean it thoroughly!*



17.2a Wipe the dirt from the grease fittings before pushing the grease gun nozzle onto the fitting - lube the tie-rod end (A), the lower balljoint (B) and the upper balljoint (C)



17.2b On driveshafts with a sliding joint, lube the fitting (arrow) during chassis lubrication

2 Look under the vehicle and locate the grease fittings (see illustrations).

3 For easier access under the vehicle, raise it with a jack and place jackstands under the frame. Make sure it's safely supported by the stands. If the wheels are to be removed at this interval for tire rotation or brake inspection, loosen the lug nuts slightly while the vehicle is still on the ground.

4 Before beginning, force a little grease out of the nozzle to remove any dirt from the end of the gun. Wipe the nozzle clean with a rag.

5 With the grease gun and plenty of clean rags, crawl under the vehicle and begin lubricating the components.

6 Wipe one of the grease fittings clean and push the nozzle firmly over it. Pump the gun until the component is completely lubricated. On balljoints, stop pumping when the rubber seal is firm to the touch. Do not pump too much grease into the fitting as it could rupture the seal. For all other suspension and steering components, continue pumping grease into the fitting until it oozes out of the joint between the two components. If it escapes around the grease gun nozzle, the fitting is clogged or the nozzle is not completely seated on the fitting. Resecure the gun nozzle to the fitting and try again. If necessary, replace the fitting with a new one.

7 Wipe the excess grease from the components and the grease fitting. Repeat the procedure for the remaining fittings.

8 Clean the fitting and pump grease into the driveline universal joints until the grease can be seen coming out of the contact points. The other U-joints are sealed and do not require lubrication.

➡Note: Most replacement driveshaft U-joints aren't permanently sealed, and are sold with grease fittings. If your U-joints have been replaced, make sure you include them in your routine chassis lubrication.

9 Also clean and lubricate the parking brake cable guides and levers.

CAUTION:

Do not use chassis lubrication on the brake cables themselves. The grease will cause the cable housings to deteriorate.

18 Fuel system check (every 15,000 miles or 12 months)

Refer to illustration 18.7

WARNING:

Gasoline is extremely flammable, so take extra precautions when you work on any part of the fuel system. Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance (such as a water heater or clothes dryer) is present. Since gasoline is carcinogenic, wear latex gloves when there's a possibility of being exposed to fuel, and, if you spill any fuel on your skin, rinse it off immediately with soap and water. Mop up any spills immediately and do not store fuel-soaked rags where they could ignite. When you perform any kind of work on the fuel system, wear safety glasses and have a Class B type fire extinguisher on hand. The fuel system is under constant pressure, so, before any lines are disconnected, the fuel system pressure must be relieved (see Chapter 4).

1 If you smell gasoline while driving or after the vehicle has been sitting in the sun, inspect the fuel system immediately.

2 Remove the gas filler cap and inspect if for damage and corrosion. The gasket should have an unbroken sealing imprint. If the gasket is damaged or corroded, install a new cap.

3 Inspect the fuel feed and return lines for cracks. Make sure that the connections between the fuel lines and the fuel injection system are tight.

WARNING:

Your vehicle is fuel injected, so you must relieve the fuel system pressure before servicing fuel system components. The fuel system pressure relief procedure is outlined in Chapter 4.

4 If the fuel injectors are visible, look for signs of fuel leakage (wet spots) around any of the injectors, they may need new O-rings (see

Chapter 4).

5 Since some components of the fuel system - the fuel tank and part of the fuel feed and return lines, for example - are underneath the vehicle, they can be inspected more easily with the vehicle raised on a hoist. If that's not possible, raise the vehicle and support it on jackstands.

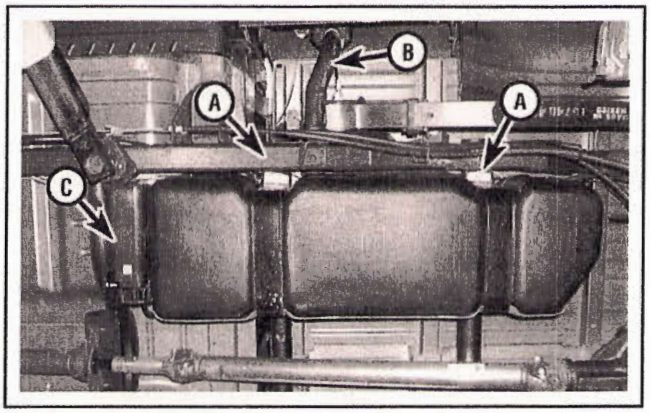
6 With the vehicle raised and safely supported, inspect the gas tank and filler neck for punctures, cracks and other damage. The connection between the filler neck and the tank is particularly critical. Sometimes a rubber filler neck will leak because of loose clamps or deteriorated rubber. Inspect all fuel tank mounting brackets and straps to be sure that the tank is securely attached to the vehicle.

WARNING:

Do not, under any circumstances, try to repair a fuel tank (except rubber components). A welding torch or any open flame can easily cause fuel vapors inside the tank to explode.

7 Carefully check all rubber hoses and metal lines leading away from the fuel tank (see illustration). Check for loose connections, deteriorated hoses, crimped lines and other damage. Repair or replace damaged sections as necessary (see Chapter 4).

8 The evaporative emissions control system can also be a source of fuel odors. The function of the system is to store fuel vapors from the fuel tank in a charcoal canister until they can be routed to the intake manifold where they mix with incoming air before being burned in the combustion chambers.



18.7 Inspect the fuel tank mounting straps (A), the various fuel and vapor lines (B indicates the filler hose), and the evaporative emissions canister (C)

9 The most common symptom of a faulty evaporative emissions system is a strong odor of fuel in the engine compartment. If a fuel odor has been detected, and you have already checked the areas described above, check the charcoal canister, located under the rear of the vehicle, and the hoses connected to it (see illustration 18.7).

19 Brake system check (every 15,000 miles or 12 months)

WARNING:

The dust created by the brake system is harmful to your health. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. Do not, under any circumstances, use petroleum-based solvents to clean brake parts. Use brake system cleaner only! Try to use non-asbestos replacement parts whenever possible.

➡Note: For detailed photographs of the brake system, refer to Chapter 9.

1 In addition to the specified intervals, the brakes should be inspected every time the wheels are removed or whenever a defect is suspected.

2 Any of the following symptoms could indicate a potential brake system defect: The vehicle pulls to one side when the brake pedal is depressed; the brakes make squealing or dragging noises when applied; brake pedal travel is excessive; the pedal pulsates; or brake fluid leaks, usually onto the inside of the tire or wheel.

3 Loosen the wheel lug nuts.

4 Raise the vehicle and place it securely on jackstands.

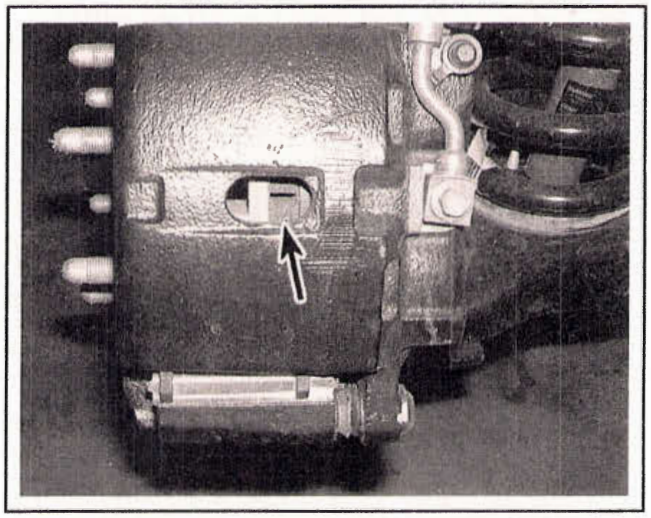
5 Remove the wheels (see Jacking and towing at the front of this book, or your owner's manual, if necessary).

DISC BRAKES

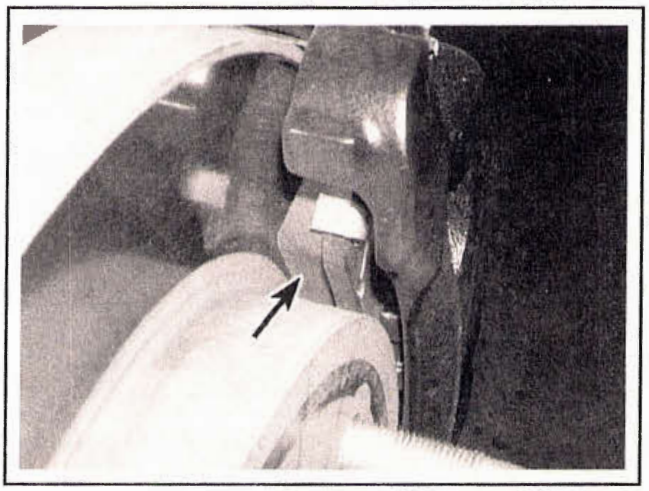
Refer to illustrations 19.7a, 19.7b, 19.9 and 19.11

6 There are two pads (an outer and an inner) in each caliper. The pads are visible with the wheels removed. The vehicles covered by this manual have disc brakes front and rear, with a mechanical, drum-type parking brake mechanism inside the rear discs.

7 Check the pad thickness by looking at each end of the caliper and through the inspection window in the caliper body (see illustrations). If the lining material is less than the thickness listed in this Chapter's Specifications, replace the pads.



19.7a With the wheel off, check the thickness of the inner pad (arrow) through the inspection hole (front caliper shown, rear caliper similar)



19.7b The outer pad (arrow) is more easily checked at the edge of the caliper

➡Note: Keep in mind that the lining material is riveted or bonded to a metal backing plate and the metal portion is not included in this measurement.

8 If it is difficult to determine the exact thickness of the remaining pad material by the above method, or if you are at all concerned about the condition of the pads, remove the caliper(s), then remove the pads from the calipers for further inspection (refer to Chapter 9).

9 Once the pads are removed from the calipers, clean them with brake cleaner and re-measure them with a ruler or a vernier caliper (see illustration).

10 Measure the disc thickness with a micrometer to make sure that it still has service life remaining. If any disc is thinner than the specified minimum thickness, replace it (refer to Chapter 9). Even if the disc has service life remaining, check its condition. Look for scoring, gouging and burned spots. If these conditions exist, remove the disc and have it resurfaced (see Chapter 9).

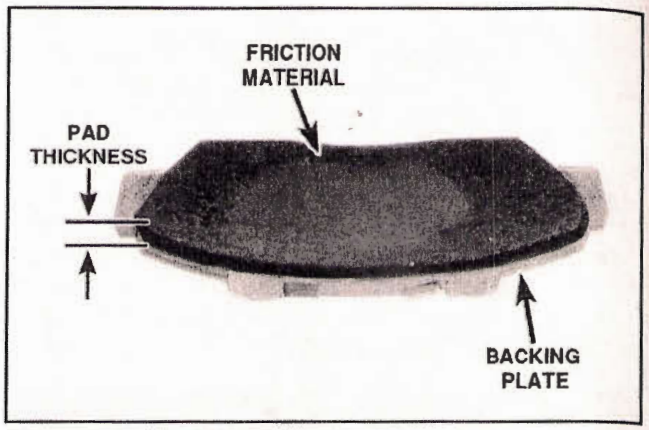
11 Before installing the wheels, check all brake lines and hoses for damage, wear, deformation, cracks, corrosion, leakage, bends and twists, particularly in the vicinity of the rubber hoses at the calipers (see illustration). Check the clamps for tightness and the connections for leakage. Make sure that all hoses and lines are clear of sharp edges, moving parts and the exhaust system. If any of the above conditions are noted, repair, reroute or replace the lines and/or fittings as necessary (see Chapter 9).

BRAKE BOOSTER CHECK

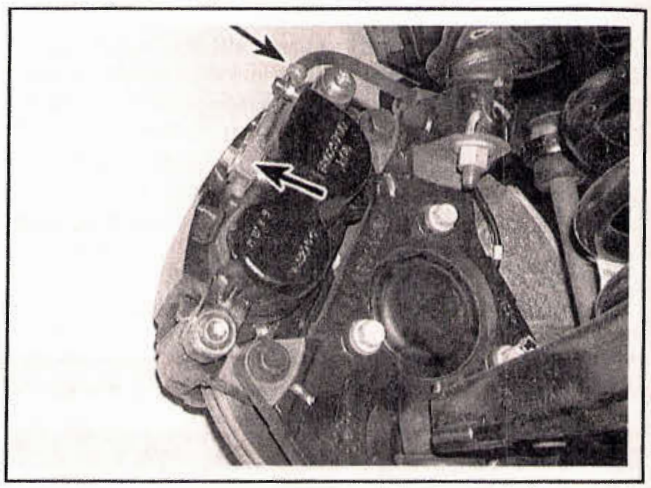
12 Sit in the driver's seat and perform the following sequence of tests.

13 With the brake fully depressed, start the engine - the pedal should move down a little when the engine starts.

14 With the engine running, depress the brake pedal several times - the travel distance should not change.



19.9 If a more precise measurement of pad thickness is necessary, remove the pads and measure the remaining friction material



19.11 Check along the brake hoses and at each fitting (arrows) for deterioration, cracks and leakage

15 Depress the brake, stop the engine and hold the pedal in for about 30 seconds - the pedal should neither sink nor rise.

16 Restart the engine, run it for about a minute and turn it off. Then firmly depress the brake several times - the pedal travel should decrease with each application.

17 If your brakes do not operate as described, the brake booster has failed. Refer to Chapter 9 for the replacement procedure.

PARKING BRAKE

18 One method of checking the parking brake is to park the vehicle on a steep hill with the parking brake set and the transmission in Neutral (be sure to stay in the vehicle for this check). If the parking brake cannot prevent the vehicle from rolling, it's in need of attention (see Chapter 9).

20 Exhaust system check (every 15,000 miles or 12 months)

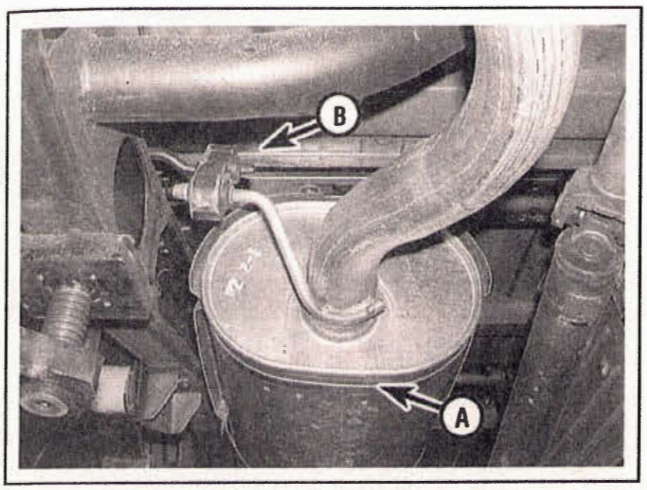
Refer to illustrations 20.2a and 20.2b

1 With the engine cold (at least three hours after the vehicle has been driven), check the complete exhaust system from the manifold to the end of the tailpipe. Be careful around the catalytic converter, which may be hot even after three hours. The inspection should be done with the vehicle on a hoist to permit unrestricted access. If a hoist isn't available, raise the vehicle and support it securely on jackstands.

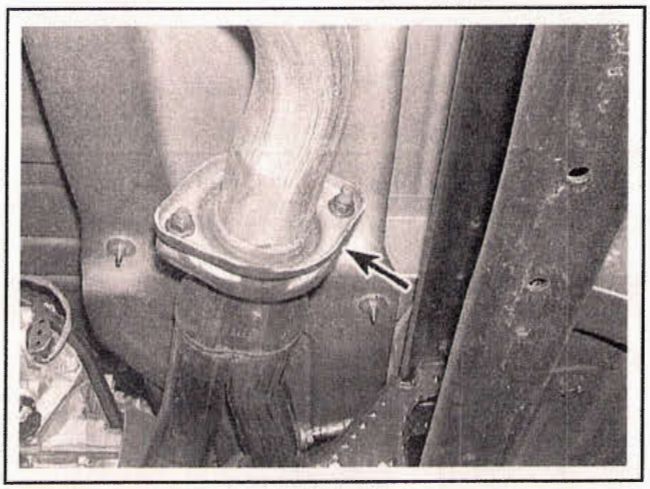
2 Check the exhaust pipes and connections for signs of leakage and/or corrosion indicating a potential failure. Make sure that all brackets and hangers are in good condition and tight (see illustrations).

3 Inspect the underside of the body for holes, corrosion, open seams, etc. which may allow exhaust gasses to enter the passenger compartment. Seal all body openings with silicone sealant or body putty.

4 Rattles and other noises can often be traced to the exhaust system, especially the hangers, mounts and heat shields. Try to move the pipes, mufflers and catalytic converter. If the components can come in contact with the body or suspension parts, secure the exhaust system with new brackets and hangers.



20.2a Inspect the muffler (A) for signs of deterioration, and all hangers (B)



20.2b Inspect all flanged joints (arrow indicates front exhaust pipe joint) for signs of exhaust gas leakage

21 Manual transmission lubricant level check (every 15,000 miles or 12 months)

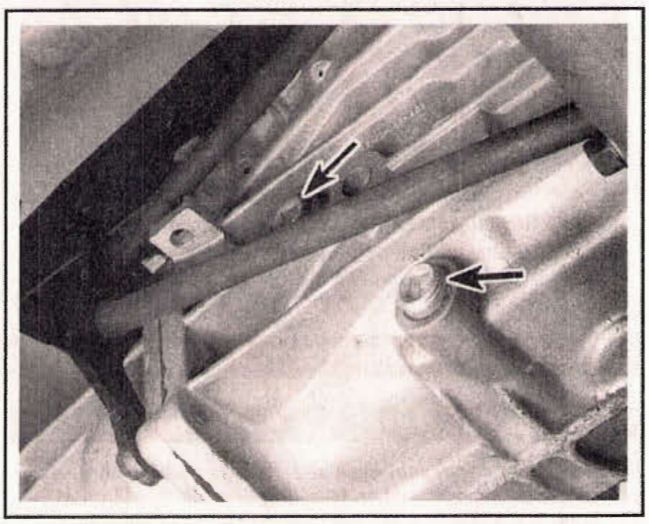
Refer to illustration 21.2

1 The manual transmission has a filler plug which must be removed to check the lubricant level. If the vehicle is raised to gain access to the plug, be sure to support it safely on jackstands - DO NOT crawl under a vehicle that is supported only by a jack! Be sure the vehicle is level or the check may be inaccurate.

2 Using the appropriate wrench, unscrew the plug from the transmission (see illustration).

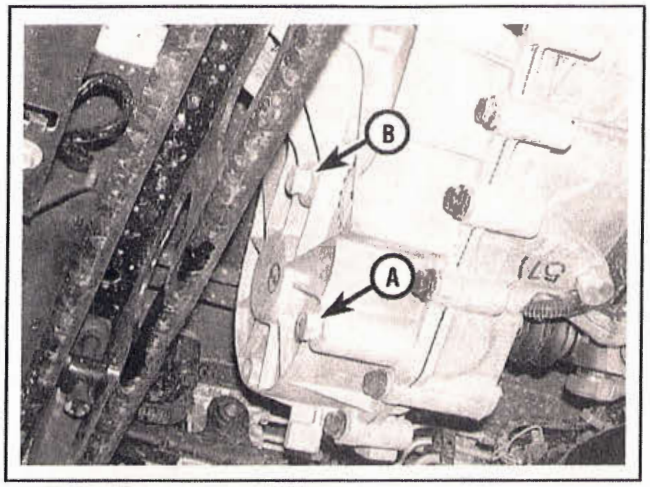
3 Use your little finger to reach inside the housing to feel the lubricant level. The level should be at or near the bottom of the plug hole. If it isn't, add the recommended lubricant through the plug hole with a syringe or squeeze bottle.

4 Install and tighten the plug. Check for leaks after the first few miles of driving.



21.2 Manual transmission drain (on bottom) and fill plug (on passenger side) locations

22 Transfer case lubricant level check (4WD models) (every 15,000 miles or 12 months)



22.1 The drain plug (A) and fill plug (B) are on the rear cover of the transfer case

Refer to illustration 22.1

1 The transfer case lubricant level is checked by removing the upper plug located at the rear of the case (see illustration).

2 After removing the plug, reach inside the hole. The lubricant level should be just at the bottom of the hole. If not, add the appropriate lubricant through the opening.

23 Interior ventilation filter replacement (every 15,000 miles or 12 months)

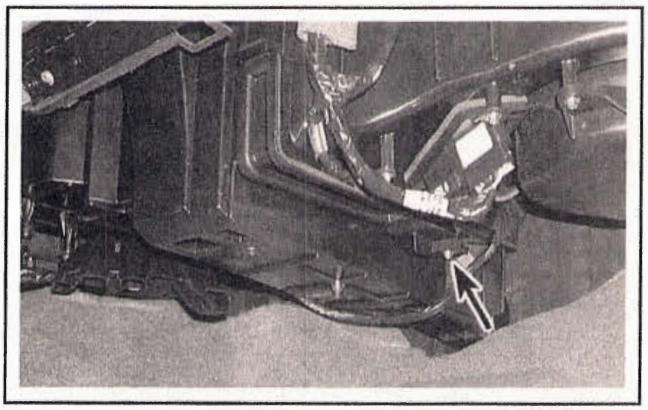
Refer to illustrations 23.2 and 23.3

1 Some of these models are equipped with a pair of air filters under the dash that clean the air entering the vehicle through the ventilation system, as well as recirculated air.

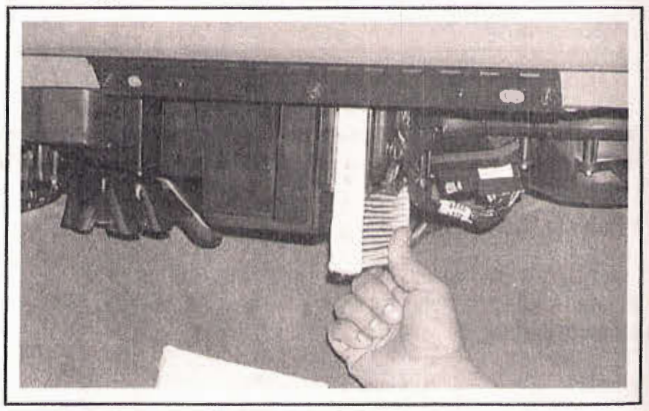
2 Reach under the center of the instrument panel and remove the screw securing the cover, then pull down the access cover at the bottom-right of the housing surrounding the evaporator core (see illustration).

3 Slide the filters down out of the housing and replace with new ones at the specified interval (see illustration).

4 The remainder of the installation is the reverse of the removal procedure.



23.2 Remove the screw (arrow) and pull down the access door below the ventilation filters



23.3 Slide the filters down out of the HVAC housing - when the first filter is pulled out, the second will come down

24 Brake fluid change (every 30,000 miles or 24 months)

WARNING:

Brake fluid can harm your eyes and damage painted surfaces, so use extreme caution when handling or pouring it. Do not use brake fluid that has been standing open or is more than one year old. Brake fluid absorbs moisture from the air. Excess moisture can cause a dangerous loss of braking effectiveness.

1 At the specified intervals, the brake fluid should be drained and replaced. Since the brake fluid may drip or splash when pouring it, place plenty of rags around the master cylinder to protect any surrounding painted surfaces.

2 Before beginning work, purchase the specified brake fluid (see Recommended lubricants and fluids at the end of this Chapter).

3 Remove the cap from the master cylinder reservoir.

4 Using a hand suction pump or similar device, withdraw the fluid from the master cylinder reservoir.

5 Add new fluid to the master cylinder until it rises to the line indicated on the reservoir.

6 Bleed the brake system as described in Chapter 9 at all four brakes until new and uncontaminated fluid is expelled from the bleeder screw. Be sure to maintain the fluid level in the master cylinder as you perform the bleeding process. If you allow the master cylinder to run dry, air will enter the system.

7 Refill the master cylinder with fluid and check the operation of the brakes. The pedal should feel solid when depressed, with no sponginess.

WARNING:

Do not operate the vehicle if you are in doubt about the effectiveness of the brake system.

25 Air filter replacement (every 30,000 miles or 24 months)

Refer to illustrations 25.3a and 25.3b

1 At the specified intervals, the air filter element should be replaced with a new one.

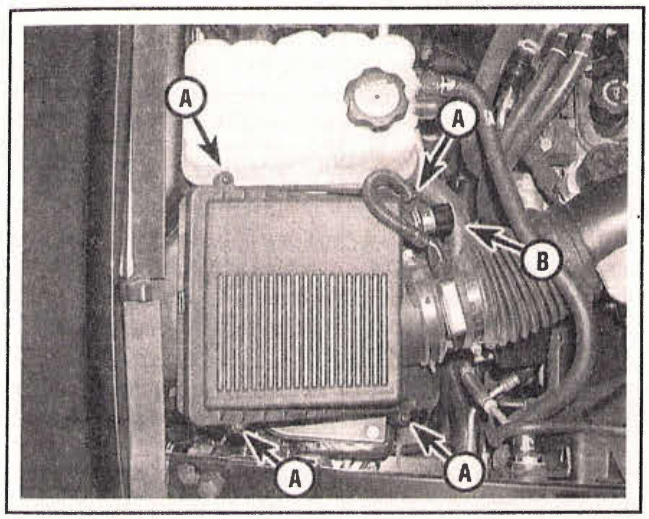
2 On all models, the air filter is housed in a black plastic box mounted on the inner fenderwell on the right side of the engine compartment. Attached to the box is a plastic gauge that measures the airflow through the filter and indicates when the filter should be changed. If you drive in conditions that are particularly dusty, the gauge may indicate the need for a filter change before the normally-recommended mileage interval.

3 Loosen the captive screws and pull the housing cover up, then lift the air filter element out of the housing (see illustrations). Wipe out the inside of the air filter housing with a clean rag.

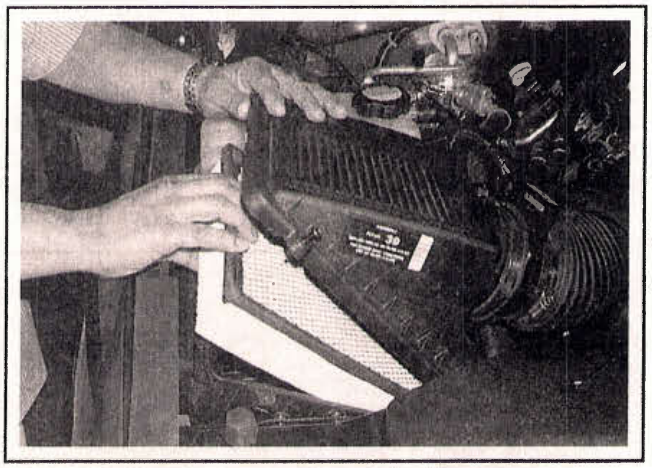
4 While the cover is off, be careful not to drop anything down into the air filter housing.

5 Place the new filter element in the air filter housing. Make sure it seats properly in the groove of the housing.

6 Installation is the reverse of removal. After installing the new filter, push in on the top of the filter indicator to reset it.



25.3a Loosen the screws (A) and lift the air filter housing cover, (B) is the air filter condition indicator



25.3b Holding the cover up, slip out the filter element

26 Fuel filter replacement (every 30,000 miles or 30 months)

Refer to illustration 26.5

WARNING:

Gasoline is extremely flammable, so take extra precautions when you work on any part of the fuel system. Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance (such as a water heater or clothes dryer) is present. Since gasoline is carcinogenic, wear latex gloves when there's a possibility of being exposed to fuel, and, if you spill any fuel on your skin, rinse it off immediately with soap and water. Mop up any spills immediately and do not store fuel-soaked rags where they could ignite. The fuel system is under constant pressure, so, if any fuel lines are to be disconnected, the fuel pressure in the system must be relieved first (see Chapter 4 for more information). When you perform any kind of work on the fuel system, wear safety glasses and have a Class B type fire extinguisher on hand.

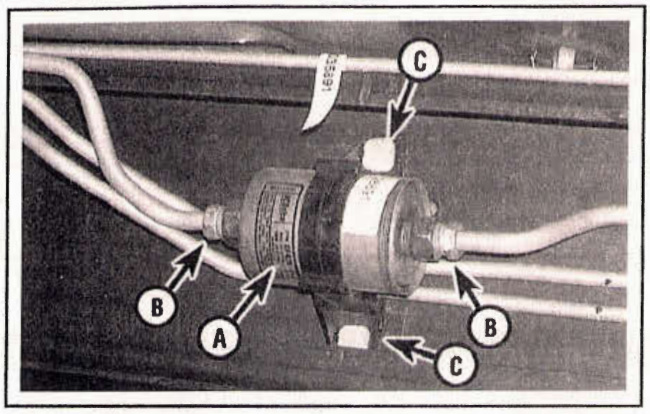
Note: 2005 and later models are equipped with a non-replaceable fuel filter built into the fuel sender assembly.

1 Relieve the fuel system pressure (see Chapter 4).

2 Raise the vehicle and support it securely on jackstands.

3 The fuel filter is mounted to the right frame rail, near the fuel tank.

4 Use compressed air or carburetor cleaner to clean any dirt surrounding the fuel inlet and outlet line fittings.



26.5 When changing the fuel filter (A), use a flare-nut wrench to disconnect the fittings (B) - remove the nuts on these carriage bolts (C) to remove the filter and bracket

5 There are screw-in fittings at each end of the filter, requiring two wrenches to loosen each fitting (see illustration).

➡Note: Have spare rags or a small container to catch or wipe up extra gasoline that will spill from the filter assembly.

6 Use an open end wrench to steady the hex on the filter and a flare-nut wrench to unscrew the fuel line nut, then separate the line from the filter. Using a flare-nut wrench will help to avoid rounding the corners off of the fuel line nuts.

7 Detach the fuel filter mounting bracket nuts and remove the fuel filter.

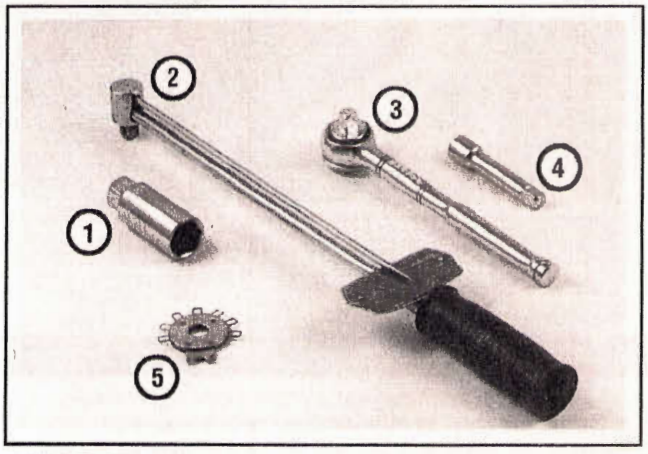
8 Installation is the reverse of removal.

27 Spark plug replacement (see maintenance schedule for service intervals)

◗ Refer to illustrations 27.2, 27.5a, 27.5b, 27.6, 27.8, 27.9a, 27.9b and 27.10

1 The spark plugs are threaded into the sides of the cylinder heads, adjacent to the exhaust ports.

2 In most cases, the tools necessary for spark plug replacement include a spark plug socket which fits onto a ratchet (spark plug sockets are padded inside to prevent damage to the porcelain insulators on the new plugs), various extensions and a gap gauge to check and adjust the gaps on the new plugs (see illustration). A special plug wire removal tool is available for separating the wire boots from the spark plugs, but it isn't absolutely necessary. A torque wrench should be used to tighten the new plugs.



27.2 Tools required for changing spark plugs

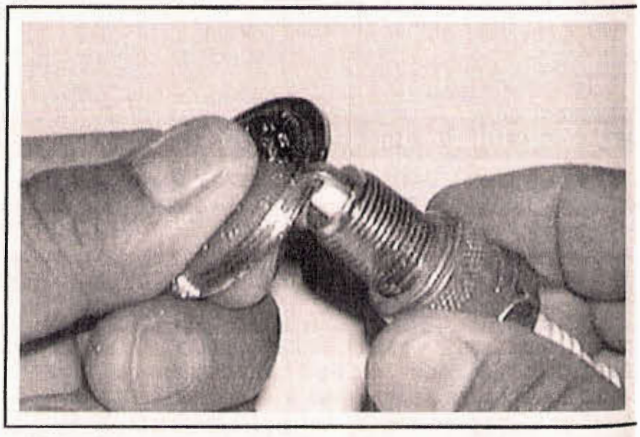
1 ***Spark plug socket*** *- This will have special padding inside to protect the spark plug's porcelain insulator*
2 ***Torque wrench*** *- Although not mandatory, using this tool is the best way to ensure the plugs are tightened properly*
3 ***Ratchet*** *- Standard hand tool to fit the spark plug socket*
4 ***Extension*** *- Depending on model and accessories, you may need special extensions and universal joints to reach one or more of the plugs*
5 ***Spark plug gap gauge*** *- This gauge for checking the gap comes in a variety of styles. Make sure the gap for your engine is included*

➡Note: The spark plugs on these models are 1/8-inch longer than standard plugs previously used. Make sure your spark plug socket doesn't bottom-out on the longer plugs, which could crack the insulators.

3 The best approach when replacing the spark plugs is to purchase the new ones in advance, adjust them to the proper gap and replace them one at a time. When buying the new spark plugs, be sure to obtain the correct plug type for your particular engine. This information can be found in the factory owner's manual and the Specifications at the front of this Chapter.

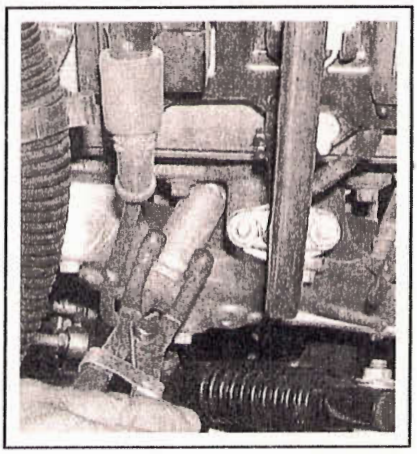
4 Allow the engine to cool completely before attempting to remove any of the plugs. While you're waiting for the engine to cool, check the new plugs for defects and adjust the gaps.

5 The gap is checked by inserting the proper-thickness gauge between the electrodes at the tip of the plug (see illustration). The gap between the electrodes should be the same as the one specified on the Emissions Control Information label or in this Chapter's Specifications. The wire should just slide between the electrodes with a slight amount of drag. If the gap is incorrect, use the adjuster on the gauge body to bend the curved side electrode slightly until the proper gap is obtained

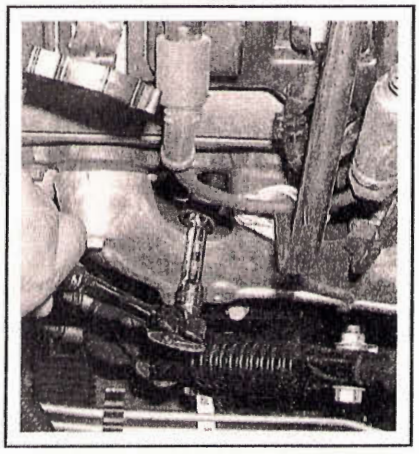


27.5a Spark plug manufacturers recommend using a tapered thickness gauge when checking the gap - slide the thin side into the gap and turn until the gauge just fills the gap, then read the thickness on the gauge - do not force the tool into the gap or use the tapered portion to widen a gap

27.5b To change the gap, bend the side electrode only, using the adjuster hole in the tool, and be very careful not to crack or chip the porcelain insulator surrounding the center electrode



27.6 A tool like this one makes the job of removing the spark plug boot easier - twist it back-and-forth and pull only on the boot



27.8 Use a socket and extension to unscrew the spark plugs - various length extensions and perhaps a flex-joint may be required to reach some plugs

(see illustration). If the side electrode is not exactly over the center electrode, bend it with the adjuster until it is. Check for cracks in the porcelain insulator (if any are found, the plug should not be used).

➡Note: Manufacturers recommend using a tapered thickness gauge when checking platinum-type spark plugs. Other types of gauges may scrape the thin platinum coating from the electrodes, thus dramatically shortening the life of the plugs.

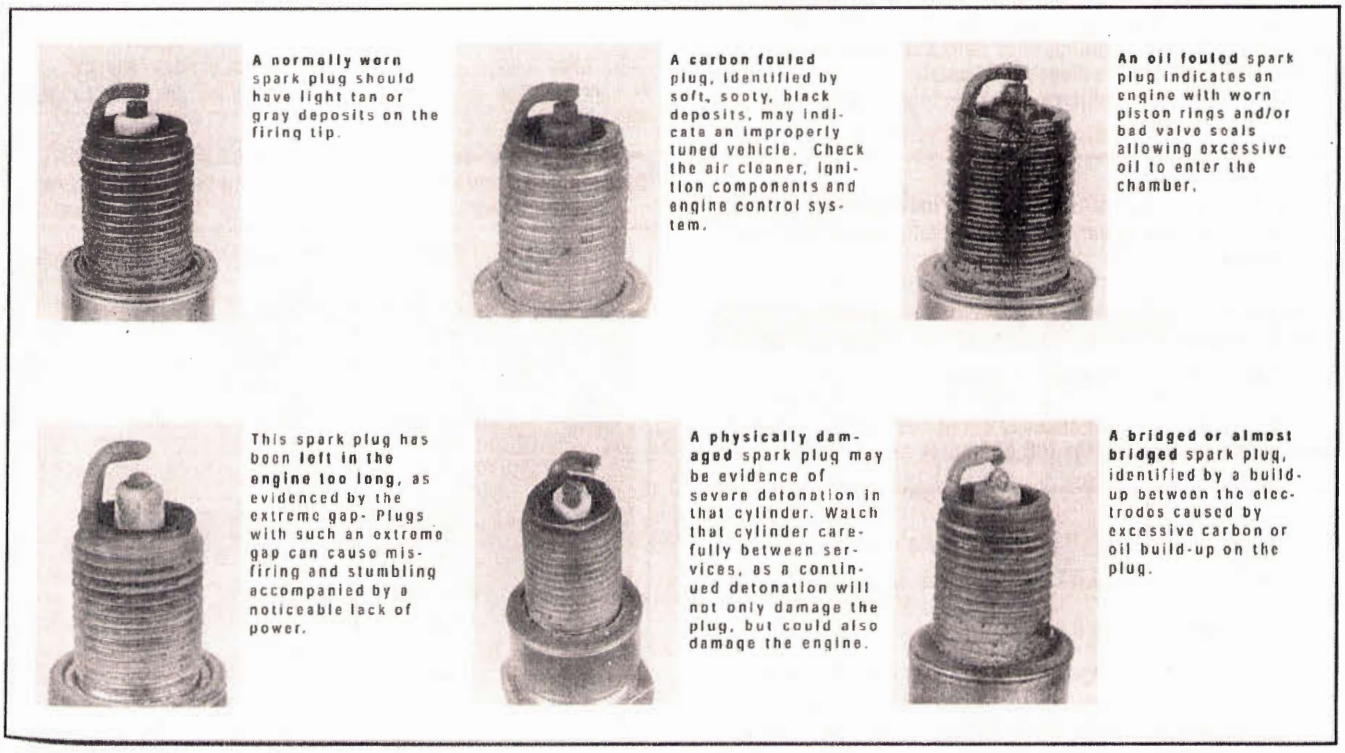
6 With the engine cool, remove the spark plug wire from one spark plug. Pull only on the boot at the end of the wire - do not pull on the wire. A plug wire removal tool should be used if available (see illustration).

7 If compressed air is available, use it to blow any dirt or foreign material away from the spark plug hole. The idea here is to eliminate the possibility of debris falling into the cylinder as the spark plug is removed.

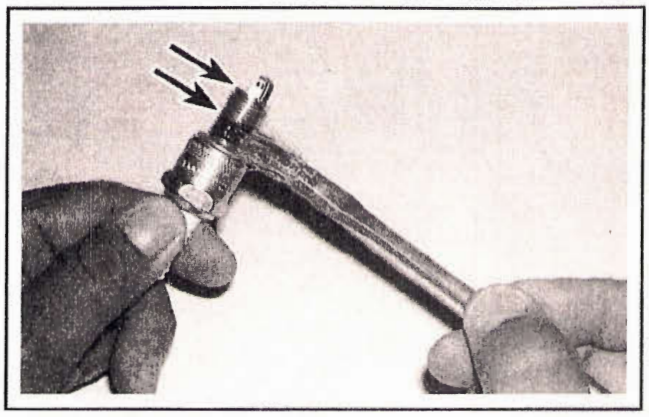
8 Place the spark plug socket over the plug and remove it from the engine by turning it in a counterclockwise direction (see illustration).

9 Compare the spark plug with the illustration to get an indication of the general running condition of the engine. Before installing the new plugs, it is a good idea to apply a thin coat of anti-seize compound to the threads (see illustration).

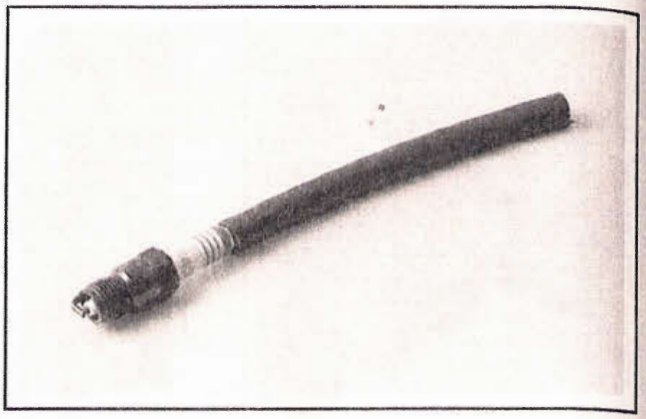
10 Thread one of the new plugs into the hole until you can no



27.9a Inspect the spark plug to determine engine running conditions



27.9b Apply a thin coat of anti-seize compound to the spark plug threads, being careful not to get any near the lower threads (arrows)



27.10 A length of snug-fitting rubber hose will save time and prevent damaged threads when installing the spark plugs

longer turn it with your fingers, then tighten it with a torque wrench (if available) or the ratchet. Where plugs are at the rear of the engine and harder to reach, it might be a good idea to slip a short length of rubber hose over the end of the plug to use as a tool to thread it into place (see illustration). The hose will grip the plug well enough to turn it, but will start to slip if the plug begins to cross-thread in the hole - this will prevent damaged threads and the accompanying repair costs.

11 Attach the plug wire to the new spark plug, again using a twisting motion on the boot until it's seated on the spark plug.

12 Repeat the procedure for the remaining spark plugs, replacing them one at a time to prevent mixing up the spark plug wires.

28 Cooling system servicing (draining, flushing and refilling) (see maintenance schedule for interval)

WARNING:

Do not allow antifreeze to come in contact with your skin or painted surfaces of the vehicle. Rinse off spills immediately with plenty of water. Antifreeze is highly toxic if ingested. Never leave antifreeze lying around in an open container or in puddles on the floor; children and pets are attracted by its sweet smell and may drink it. Check with local authorities on disposing of used antifreeze. Many communities have collection centers that will see that antifreeze is disposed of safely. Antifreeze is flammable under certain conditions - be sure to read the precautions on the container.

➡Note: Non-toxic coolant is available at local auto parts stores. Although the coolant is non-toxic when fresh, proper disposal is still required.

CAUTION:

Never mix green-colored ethylene glycol anti-freeze and orange-colored "DEX-COOL" silicate-free coolant because doing so will destroy the efficiency of the "DEX-COOL" coolant, which is designed to last for 100,000 miles or five years.

DRAINING

◗ Refer to illustrations 28.3 and 28.4

1 Periodically, the cooling system should be drained, flushed and refilled to replenish the antifreeze mixture and prevent formation of rust and corrosion, which can impair the performance of the cooling system and cause engine damage. When the cooling system is serviced, all hoses and the surge tank cap should be checked and replaced if necessary.

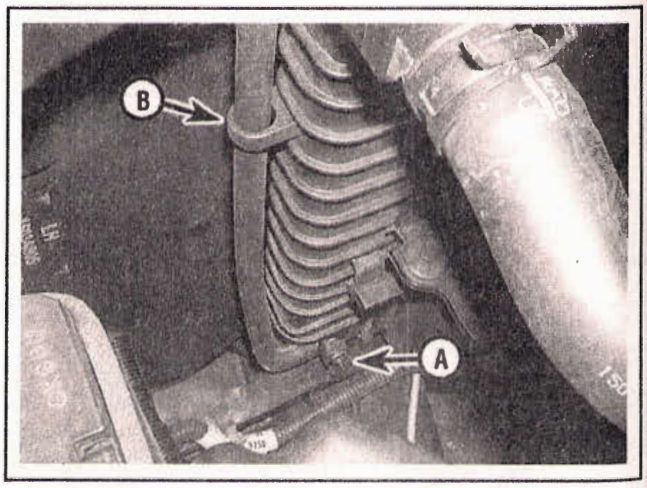
2 Apply the parking brake and block the wheels.

WARNING:

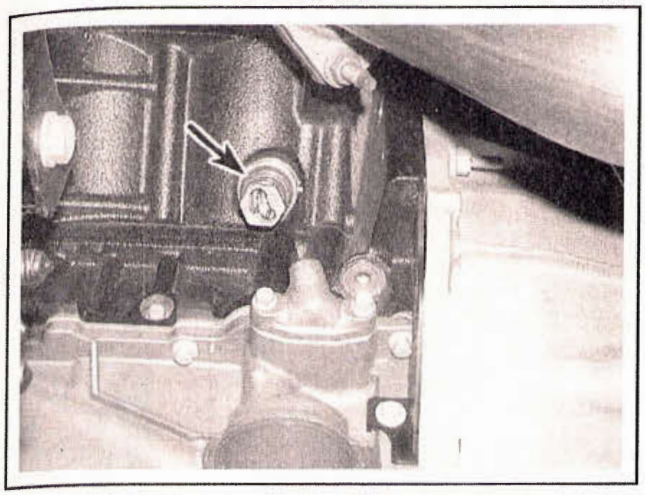
If the vehicle has just been driven, wait several hours to allow the engine to cool down before beginning this procedure.

3 Move a large container under the radiator drain to catch the coolant. The drain valve is located on the lower left side of the radiator (see illustration).

➡Note: Some models may not be equipped with a drain valve. Disconnect the lower radiator hose to drain the cooling system.



28.3 The radiator drain valve (A) is located at the left corner of the radiator - before draining, pull the rubber drain hose out of its support (B) and aim it down into your drain pan



28.4 Cylinder block drain (arrow, this one is a block heater, not a standard plug) - there is one on each side of the block

Remove the drain hose from its support and direct it into the container, then open the drain fitting (a pair of pliers may be required to turn it). Remove the surge tank cap.

4 After coolant stops flowing out of the radiator, move the container under the engine block drain plugs - there's one on each side of the block (see illustration). Remove the plugs and allow the coolant in the block to drain.

➡Note: Frequently, the coolant will not drain from the block after the plug is removed. This is due to a rust layer that has built up behind the plug. Insert a Phillips screwdriver into the hole to break the rust barrier.

5 While the coolant is draining, check the condition of the radiator hoses, heater hoses and clamps (refer to Section 14 if necessary).

6 Replace any damaged clamps or hoses. Reinstall the drain plugs and tighten them securely, using Permatex #2 sealant on the threads of the plugs.

FLUSHING

▶ Refer to illustration 28.9

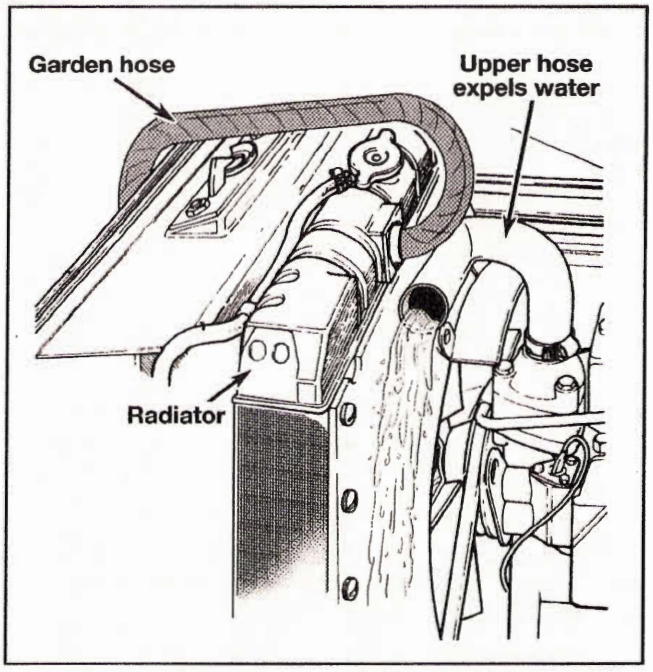
7 Once the system is completely drained, remove the thermostat from the engine (see Chapter 3). Then reinstall the thermostat housing without the thermostat. This will allow the system to be thoroughly flushed.

8 Reinstall the lower radiator hose and tighten the radiator drain plug. Turn your heating system controls to Hot, so that the heater core will be flushed at the same time as the rest of the cooling system.

9 Disconnect the upper radiator hose, then place a garden hose in the upper radiator inlet and flush the system until the water runs clear at the upper radiator hose (see illustration).

10 In severe cases of contamination or clogging of the radiator, remove the radiator (see Chapter 3) and have a radiator repair facility clean and repair it if necessary.

11 Many deposits can be removed by the chemical action of a cleaner available at auto parts stores. Follow the procedure outlined in the manufacturer's instructions.



28.9 With the thermostat removed, disconnect the upper radiator hose and flush the radiator and engine block with a garden hose

➡Note: When the coolant is regularly drained and the system refilled with the correct antifreeze/water mixture, there should be no need to use chemical cleaners or descalers.

REFILLING

12 To refill the system, install the thermostat and reconnect any radiator hoses.

13 Place the heater temperature control in the maximum heat position.

14 Be sure to use the proper coolant listed in this Chapter's Specifications. Slowly fill the surge tank with the recommended mixture of antifreeze and water to the FILL COLD mark.

15 With the surge tank cap off, start the engine and let it idle for about a minute.

16 Install the cap on the surge tank, but don't tighten it down (pressure must be able to escape). Raise the engine speed to approximately 3000 rpm in 30-second cycles until the engine reaches normal operating temperature and the thermostat opens.

17 Turn the engine off and remove the surge tank cap. If there is any hissing noise coming from the tank, wait until it stops then remove the cap.

18 Start the engine and let it idle for one minute. Add coolant to the tank until the level is 1/2-inch above the FILL COLD mark, repeat Step 16, then turn the engine off.

19 Add coolant as necessary to bring the level to 1/2-inch above the FILL COLD mark on the tank. Install the surge tank cap securely.

20 Check the cooling system for leaks.

29 Suspension, steering and driveaxle boot check (every 30,000 miles or 30 months)

➡Note: The steering linkage and suspension components should be checked periodically. Worn or damaged suspension and steering linkage components can result in excessive and abnormal tire wear, poor ride quality and vehicle handling and reduced fuel economy. For detailed illustrations of the steering and suspension components, refer to Chapter 10.

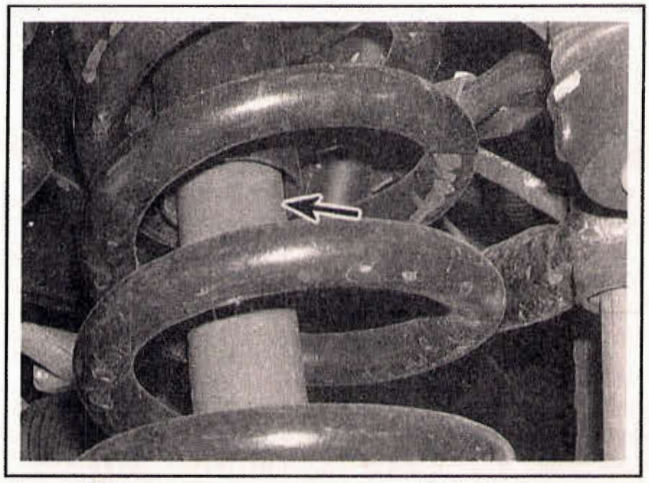
SHOCK ABSORBER CHECK

◗ Refer to illustration 29.6

1 Park the vehicle on level ground, turn the engine off and set the parking brake. Check the tire pressures.

2 Push down at one corner of the vehicle, then release it while noting the movement of the body. It should stop moving and come to rest in a level position within one or two bounces.

3 If the vehicle continues to move up-and-down or if it fails to return to its original position, a worn or weak shock absorber is probably the reason.



29.6 Check for signs of fluid leakage at this point (arrow) on shock absorbers (front shock shown)

4 Repeat the above check at each of the three remaining corners of the vehicle.

5 Raise the vehicle and support it securely on jackstands.

6 Check the shock absorbers for evidence of fluid leakage (see illustration). A light film of fluid is no cause for concern. Make sure that any fluid noted is from the shocks and not from some other source. If leakage is noted, replace the shocks as a set.

7 Check the shocks to be sure that they are securely mounted and undamaged. Check the upper mounts for damage and wear. If damage or wear is noted, replace the shocks as a set (front or rear).

8 If the shocks must be replaced, refer to Chapter 10 for the procedure.

STEERING AND SUSPENSION CHECK

◗ Refer to illustrations 29.9a, 29.9b, 29.9c, 29.9d and 29.11

9 Visually inspect the steering and suspension components (front and rear) for damage and distortion. Look for damaged seals, boots and bushings and leaks of any kind. Examine the bushings where the control arms meet the chassis (see illustrations).

10 Clean the lower end of the steering knuckle. Have an assistant grasp the lower edge of the tire and move the wheel in-and-out while you look for movement at the steering knuckle-to-control arm balljoint. If there is any movement the suspension balljoint(s) must be replaced.

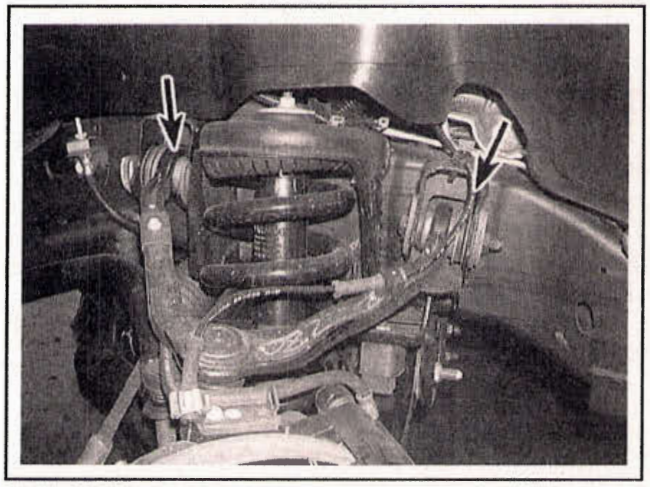
11 Grasp each front tire at the front and rear edges, push in at the front, pull out at the rear and feel for play in the steering system components. If any freeplay is noted, check the idler arm and the tie-rod ends for looseness (see illustration).

12 Additional steering and suspension system information and illustrations can be found in Chapter 10.

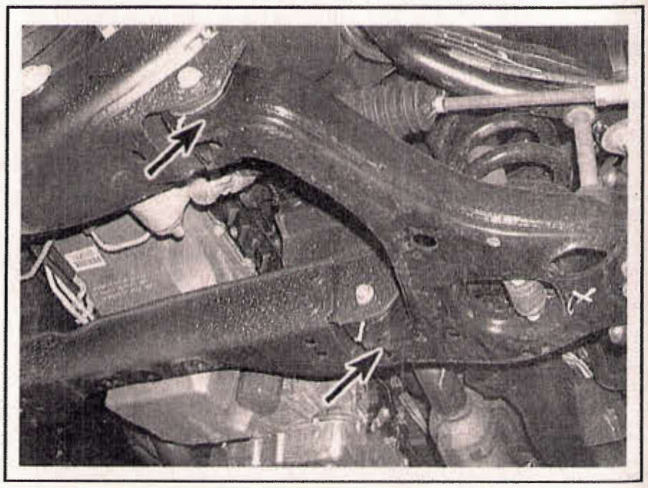
DRIVEAXLE BOOT CHECK (4WD MODELS)

◗ Refer to illustration 29.14

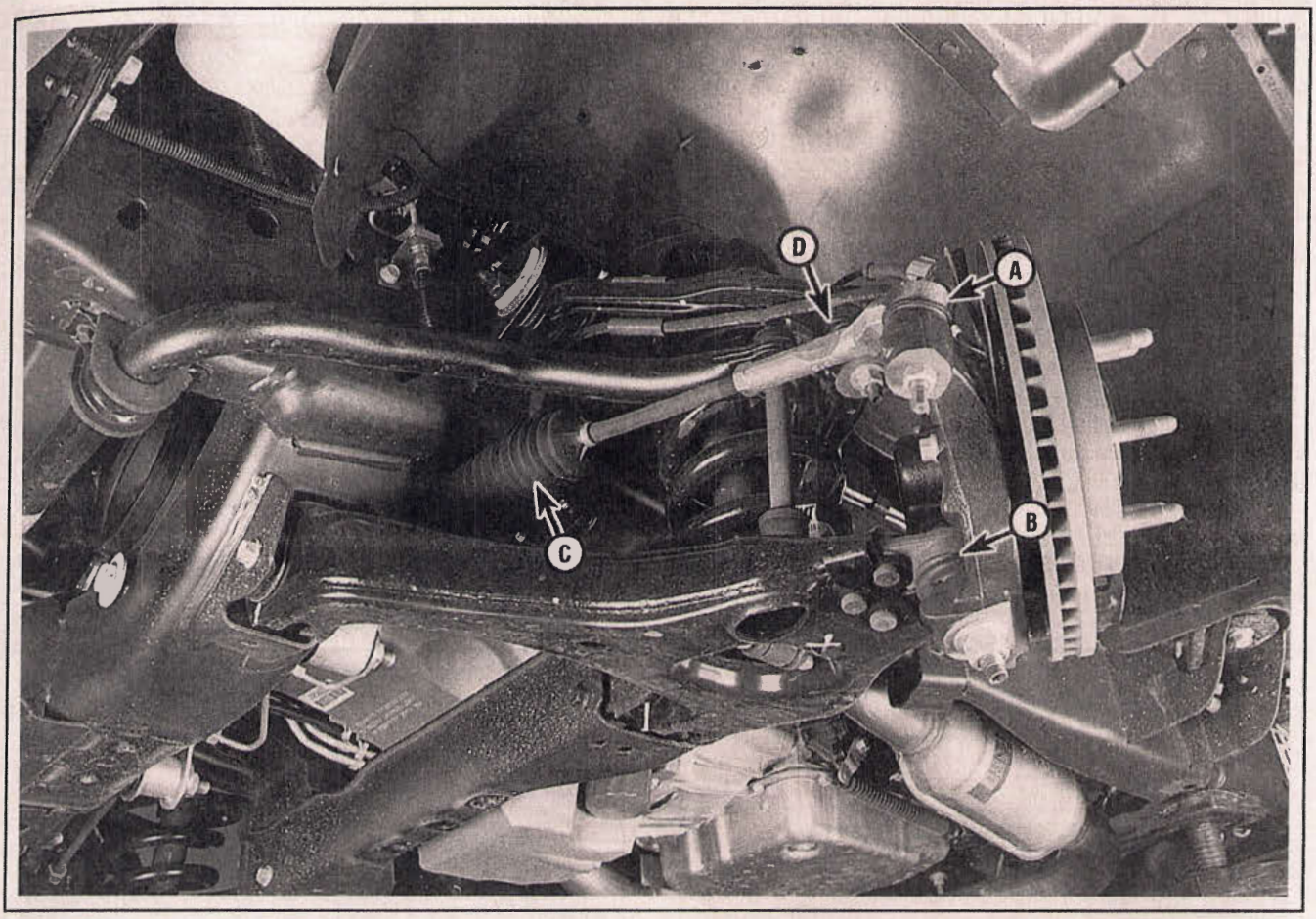
13 The driveaxle boots are very important because they prevent dirt, water and foreign material from entering and damaging the constant velocity (CV) joints. Oil and grease can cause the boot material to dete-



29.9a Examine the mounting points (arrows) for the upper . . .



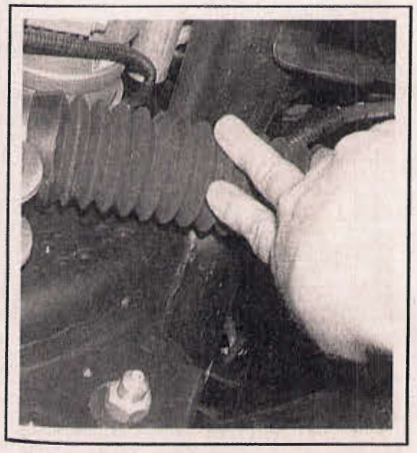
29.9b . . . and lower control arms on the front suspension (arrows)



29.9c Inspect the tie-rod ends (A), the lower balljoints (B), the steering gear boots (C), (2WD 1500 pick-ups) and the upper balljoints (D)

riorate prematurely, so it's a good idea to wash the boots with soap and water. Because it constantly pivots back and forth following the steering action of the front hub, the outer CV boot wears out sooner and should be inspected regularly.

14 Inspect the boots for tears and cracks as well as loose clamps (see illustration). If there is any evidence of cracks or leaking lubricant, they must be replaced as described in Chapter 8.



29.9d On 2WD 1500 pick-up models, inspect the steering gear boots (shown) for signs of cracking or lubricant leakage

29.11 With the steering wheel in the locked position and the vehicle raised, grasp the front tire as shown and try to move it back-and-forth - if any play is noted, check the steering gear mounts and tie-rod ends for looseness

29.14 Inspect the inner and outer driveaxle boots on 4WD models for loose clamps, cracks or signs of leaking lubricant (inner boot shown)

30 Automatic transmission fluid and filter change (every 30,000 miles or 30 months)

Refer to illustrations 30.5, 30.6, 30.7, 30.11, 30.12 and 30.13

1 At the specified intervals, the transmission fluid should be drained and replaced. Since the fluid will remain hot long after driving, perform this procedure only after the engine has cooled down completely.

2 Before beginning work, purchase the specified transmission fluid (see Recommended lubricants and fluids at the end of this Chapter) and a new filter and pan gasket.

3 Other tools necessary for this job include a floor jack, jackstands to support the vehicle in a raised position, a drain pan capable of holding at least eight quarts, newspapers and clean rags.

4 Raise the vehicle and support it securely on jackstands.

5 Place the drain pan underneath the transmission pan. Remove the drain plug and allow the fluid to drain until it barely comes out, then reinsert the drain plug (see illustration).

6 To access the pan bolts on the right side of the vehicle, remove the heat shield next to the catalytic converter (see illustration).

7 On the driver's side of the transmission, the shift linkage must be removed to access the pan bolts (see illustration).

8 Remove the transmission pan mounting bolts, then carefully pry the transmission pan loose with a screwdriver.

WARNING:

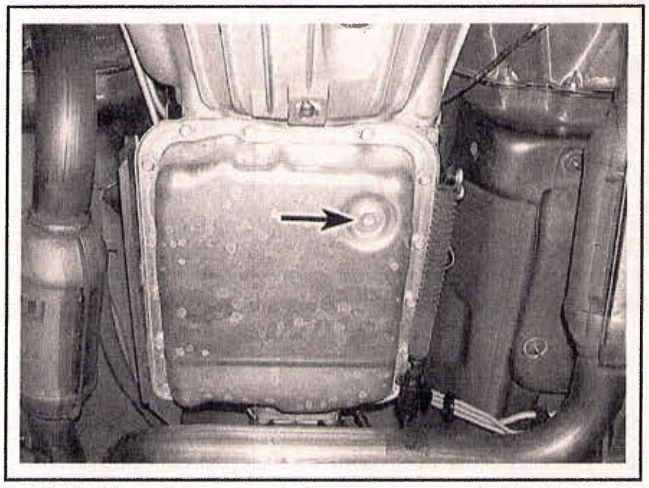
There is still some transmission fluid in the pan.

9 Carefully clean the gasket surface of the transmission to remove all traces of the old gasket and sealant.

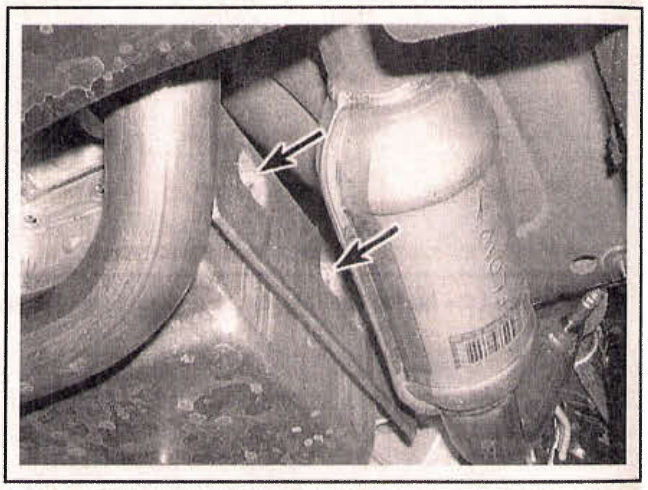
10 Clean the pan with solvent and dry it with compressed air, if available.

Note: Some models are equipped with magnets in the transmission pan to catch metal debris. Clean the magnet thoroughly. A small amount of metal material is normal at the magnet. If there is considerable debris, consult a dealer or transmission specialist.

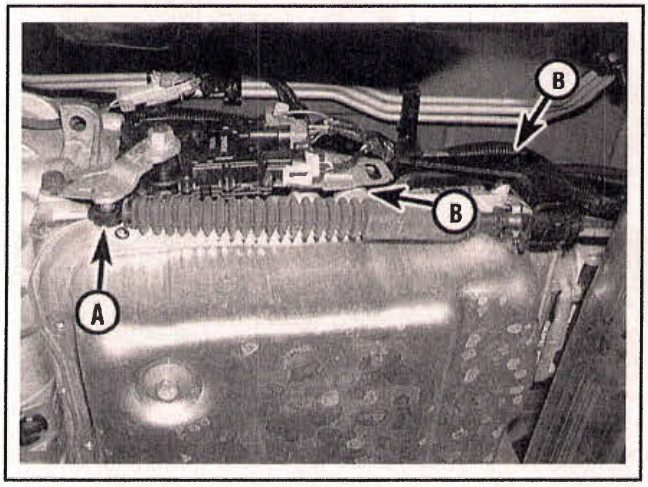
11 Remove the filter from the valve body inside the transmission (see illustration).



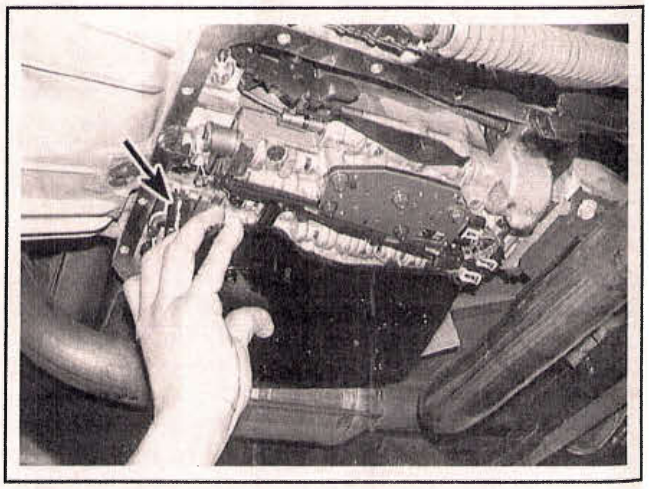
30.5 Drain the transmission fluid pan by removing the drain plug (arrow)



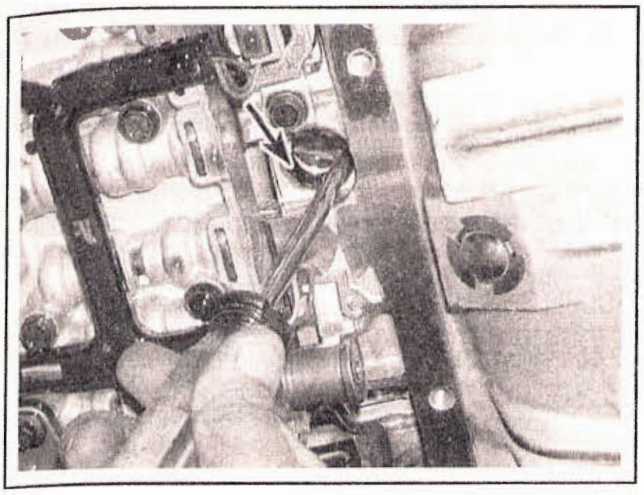
30.6 Remove the two bolts (arrows) and the heat shield at the right side of the transmission



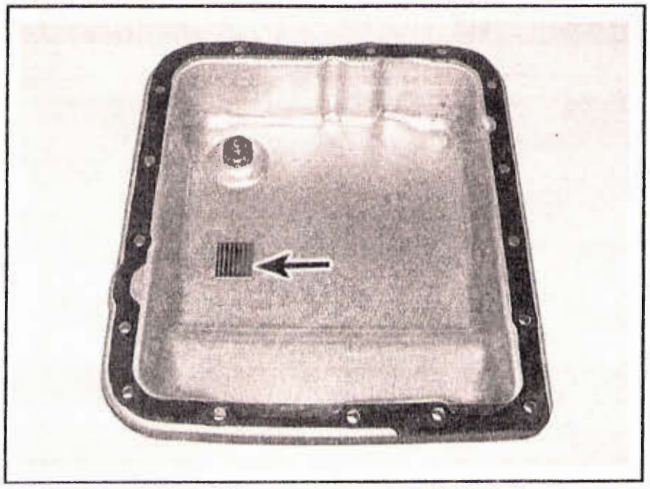
30.7 Disconnect the shift cable end from the ball-stud (A), then remove the two bolts securing the shift cable bracket to the transmission (B) (this allows room to access the oil pan bolts)



30.11 Remove the filter from the transmission by pulling it straight down



30.12 Use a seal removal tool to remove the transmission filter seal (arrow) from the valve body, then replace it with a new seal - be careful not to scratch the aluminum cavity



30.13 Clean the transmission pan, position the magnet (arrow) back in place, and install the new pan gasket

➡Note: Be very careful not to gouge the delicate aluminum gasket surface on the valve body.

12 Install a new seal and filter. On many replacement filters, the seal is attached to the filter to simplify installation (see illustration).

13 Make sure the gasket surface on the transmission pan is clean, then install a new gasket on the pan (see illustration). Put the pan in place against the transmission and install all of the bolts. Working around the pan, tighten each bolt a little at a time to the torque listed in this Chapter's Specifications.

14 Reinstall the components removed for access to the pan bolts.

15 Lower the vehicle and add approximately 4 quarts of the specified type of automatic transmission fluid through the filler tube (see Section 7).

16 With the transmission in Park and the parking brake set, run the engine at a fast idle, but don't race it.

17 Move the gear selector through each range and back to Park, then let the engine idle for a few minutes. Check the fluid level. It will probably be low. Add enough fluid to bring the level to the proper mark on the dipstick. Be careful not to overfill.

18 Check under the vehicle for leaks during the first few trips. Check the fluid level again when the transmission is hot (see Section 7).

31 Manual transmission lubricant change (every 60,000 miles or 48 months)

1 This procedure should be performed after the vehicle has been driven so the lubricant will be warm and therefore will flow out of the transmission more easily. Raise the vehicle and support it securely on jackstands.

2 Move a drain pan, rags, newspapers and wrenches under the transmission.

3 Remove the transmission drain plug at the bottom of the case and allow the lubricant to drain into the pan (see Section 21).

4 After the lubricant has drained completely, reinstall the plug and tighten it securely.

5 Remove the fill plug from the side of the transmission case. Using a hand pump, syringe or squeeze bottle, fill the transmission with the specified lubricant until it just reaches the bottom edge of the hole. Reinstall the fill plug and tighten it securely.

6 Lower the vehicle.

7 Drive the vehicle for a short distance, then check the drain and fill plugs for leakage.

32 Transfer case lubricant change (4WD models) (every 60,000 miles or 48 months)

1 This procedure should be performed after the vehicle has been driven so the lubricant will be warm and therefore will flow out of the transfer case more easily.

2 Raise the vehicle and support it securely on jackstands.

3 Remove the filler plug from the case (see illustration 22.1).

4 Remove the drain plug from the lower part of the case and allow the lubricant to drain completely.

5 After the case is completely drained, carefully clean and install the drain plug. Tighten the plug securely.

6 Fill the case with the specified lubricant until it is level with the lower edge of the filler hole.

7 Install the filler plug and tighten it securely.

8 Drive the vehicle for a short distance and recheck the lubricant level. In some instances a small amount of additional lubricant will have to be added.

33 Exhaust Gas Recirculation (EGR) valve inspection (every 60,000 miles or 48 months)

1 The factory recommends having the EGR valve checked at the specified interval.

CLEANING

Refer to illustrations 33.2 and 33.3

2 Disconnect the electrical connector, then remove the two bolts and take the EGR valve off for examination (see illustration).

WARNING:

The engine should be cool for this procedure.

3 Look closely at the pintle on the bottom of the valve (see illustration). Look for accumulated deposits on the pintle and its seat. Clean the area with a soft cloth.

CAUTION:

Do not use any chemicals or wire brushes to clean the EGR.

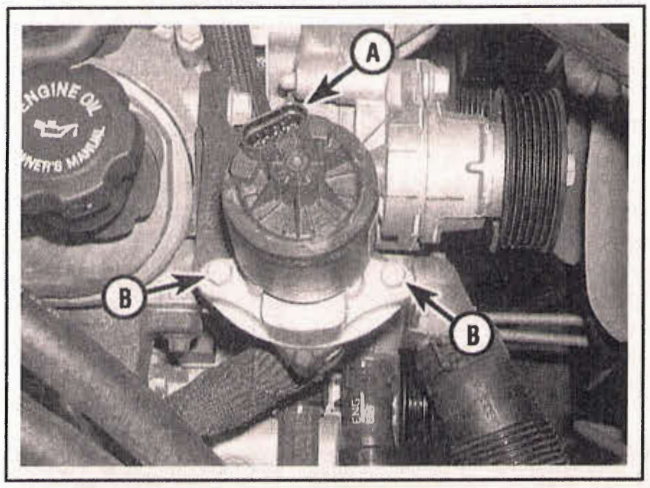
4 Use the eraser end of a pencil to push the pintle in and out of the EGR valve. If the pintle doesn't move freely, replace the EGR valve.

TROUBLESHOOTING

5 Symptoms of an EGR valve that is flowing too much exhaust gas include: stalling, surging, and misfiring at idle.

6 Symptoms of an EGR valve that is not flowing enough exhaust gas include: poor fuel economy, overheating and detonation.

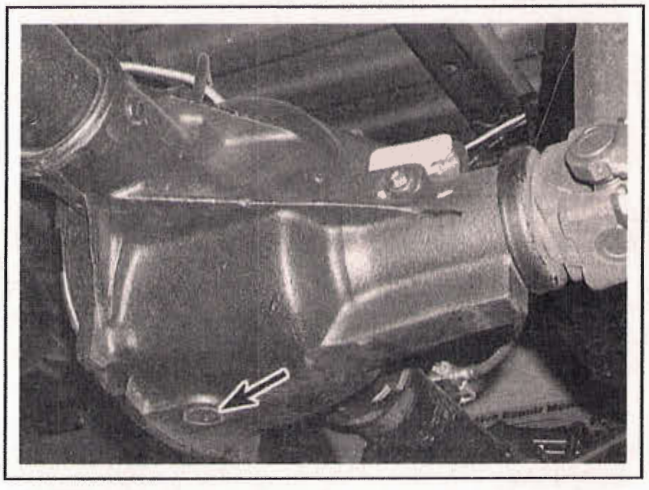
7 If any of these symptoms are present, it's suggested that the vehicle be checked at your dealership or repair facility with a scan tool, to look for trouble codes that relate to the EGR operation.



33.2 Disconnect the EGR valve electrical connector (A) and remove the two mounting bolts (B)

33.3 Use a cloth to clean the pintle and seat area (arrow) of the EGR valve

34 Differential lubricant change (every 60,000 miles or 48 months)



34.3 Remove the differential drain plug (arrow) to drain the lubricant

Refer to illustration 34.3

1 This procedure should be performed after the vehicle has been driven, so the lubricant will be warm and therefore will flow out of the differential more easily.

2 Raise the vehicle and support it securely on jackstands. You'll be draining the lubricant by removing the drain plug, so move a drain pan, rags, newspapers and wrenches under the vehicle.

3 Remove the plug and allow the lubricant to drain into the pan, then clean and reinstall the drain plug (see illustration).

Note: On differentials not equipped with a drain plug, the differential cover must be removed to drain the lubricant.

4 Use a hand pump, syringe or squeeze bottle to fill the differential housing with the specified lubricant until it's level with the bottom of the fill-plug hole. If using synthetic axle lubricant, the level should be below the fill-plug opening by 5/8-inch to 1 5/8-inch on 1500 Series models, but no more than 3/8-inch lower than the hole on 2500 Series models.

Note: On some models with limited-slip differentials, a different lubricant or additive may be required.

35 Positive Crankcase Ventilation (PCV) valve replacement (every 60,000 miles or 48 months)

Refer to illustration 35.2

1 The PCV valve is located in the valve cover on all engines.

2 With the engine idling at normal operating temperature, pull the valve (with hose attached) from the rubber grommet in the cover (see illustration).

3 Place your finger over the valve opening. If there's no vacuum at the valve, check for a plugged hose, manifold port, or the valve itself. Replace any plugged or deteriorated hoses.

4 Turn off the engine and shake the PCV valve, listening for a rattle. If the valve doesn't rattle, replace it with a new one.

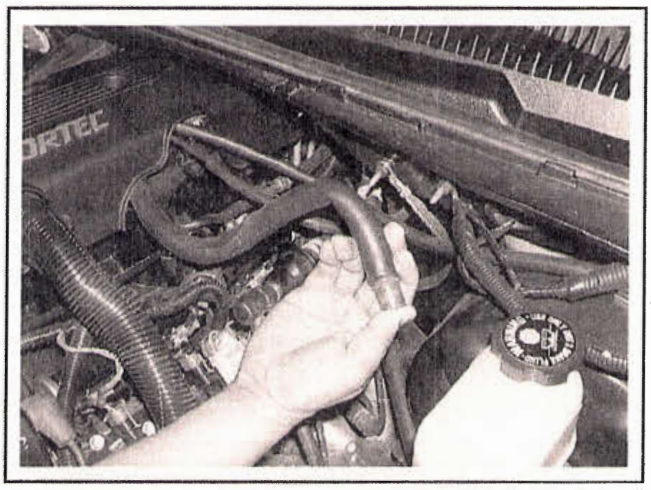
5 To replace the valve, pull it from the end of the hose, noting its installed position.

6 When purchasing a replacement PCV valve, make sure it's for your particular vehicle and engine size. Compare the old valve with the new one to make sure they're the same.

7 Push the valve into the end of the hose until it's seated.

8 Inspect the rubber grommet for damage and hardening. Replace it with a new one if necessary.

9 Push the PCV valve and hose securely into position.



35.2 The PCV valve (arrow, V8 engine shown) is located at the rear of the left valve cover - pull it out and check for vacuum with your finger

36 Spark plug wires, distributor cap and rotor check and replacement (every 100,000 miles or 60 months)

SPARK PLUG WIRES

Refer to illustration 36.6

1 The spark plug wires should be checked at the recommended intervals and whenever new spark plugs are installed in the engine. V6 engines have spark plug wires that go from the plugs all the way to the distributor, while V8 engines have individual coils for each cylinder (no distributor is used) and short plug wires from each coil to the corresponding spark plug.

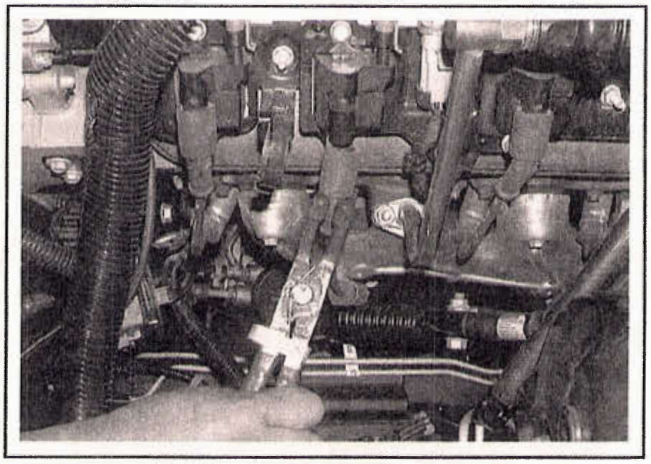
2 Begin this procedure by making a visual check of the spark plug wires while the engine is running. In a darkened garage (make sure there is adequate ventilation) start the engine and observe each plug wire. Be careful not to come into contact with any moving engine parts. If there is a break in the wire, you will see arcing or a small spark at the damaged area. If arcing is noticed, make a note to obtain new wires, then allow the engine to cool and check the distributor cap and rotor.

3 Disconnect the plug wire from one spark plug (with the engine Off). To do this, grab the rubber boot, twist slightly and pull the wire free. Do not pull on the wire itself, only on the rubber boot. A boot-pulling tool is helpful (see illustration 27.6).

4 Check inside the boot for corrosion, which will look like a white crusty powder. Push the wire and boot back onto the end of the spark plug. It should be a tight fit on the plug. If it isn't, remove the wire and use a pair of pliers to carefully crimp the metal connector inside the boot until it fits securely on the end of the spark plug.

5 Using a clean rag, wipe the entire length of the wire to remove any built-up dirt and grease. Once the wire is clean, check for holes, burned areas, cracks and other damage. Don't bend the wire excessively or the conductor inside might break.

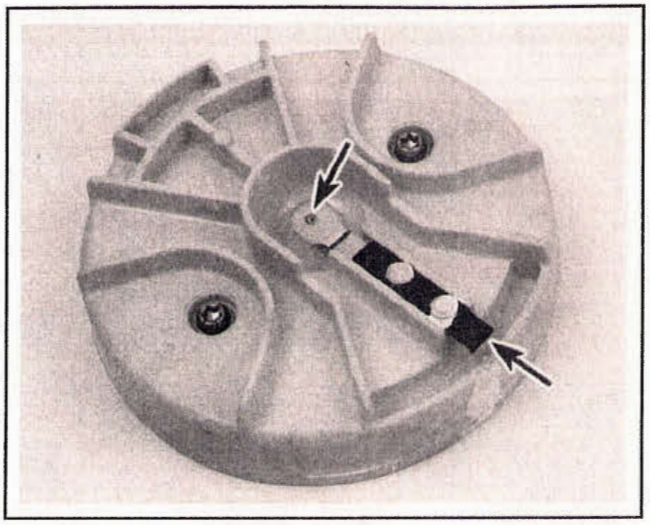
6 Disconnect the wire from the distributor cap (V6 engines) or coil (V8 engines). Pull the wire straight out of the cap. Pull only on the rubber boot during removal (see illustration). Check for corrosion and a tight fit in the same manner as the spark plug end. Reattach the wire to the distributor cap or individual coil.



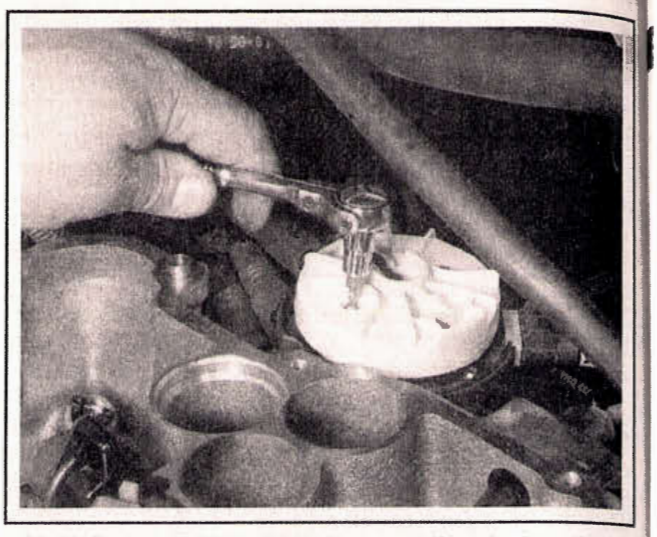
36.6 Use a spark plug boot pulling tool to remove each end of a spark plug wire (V8 shown) - never pull on the wire itself

7 Check the remaining spark plug wires one at a time, making sure they are securely fastened at both ends when the check is complete.

8 If new spark plug wires are required, purchase a new set for your specific engine model. Wire sets are available pre-cut, with the rubber boots already installed. Remove and replace the wires one at a time to avoid mix-ups in the firing order. The wire routing is extremely important, so be sure to note exactly how each wire is situated before removing it. On V6 engines, release the ignition wire loom clamps to exchange the wires, then snap the clamps back in place on the new wires. On V8 engines, there are two designs of plug wires, and the lengths are different. Compare your old ones to the new ones to insure obtaining the correct replacements.



36.10 The ignition rotor should be checked for wear and corrosion (if in doubt about its condition, buy a new one)

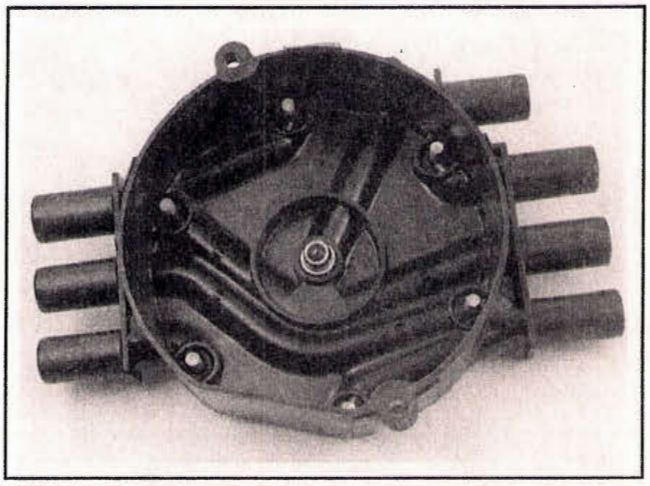


36.11 Remove the two screws to remove the rotor from the distributor - a Torx bit on a 1/4-inch drive ratchet is used here

DISTRIBUTOR CAP AND ROTOR (V6 ENGINES ONLY)

Refer to illustrations 36.10, 36.11 and 36.13

9 Remove the distributor cap screws. Pull up on the cap, with the wires attached, to separate it from the distributor, then position it to one side.



36.13 Inspect the inside of the cap for corrosion, carbon tracks and wear (check the outside of the cap for carbon tracks, too)

10 The rotor is now visible on the end of the distributor shaft. Check it carefully for cracks and carbon tracks. Make sure the center terminal spring tension is adequate and look for corrosion and wear on the rotor tip (see illustration). If in doubt about its condition, replace it with a new one.

11 If replacement is required, remove the two screws, then detach the rotor from the shaft and install a new one (see illustration).

12 The rotor is indexed to the shaft so it can only be installed one way. It has an internal key that must line up with a slot in the end of the shaft (or vice versa).

13 Check the distributor cap for carbon tracks, cracks and other damage. Closely examine the terminals on the inside of the cap for excessive corrosion and damage (see illustration). Slight deposits are normal. Again, if in doubt about the condition of the cap, replace it with a new one. Be sure to apply a small dab of silicone dielectric grease to each terminal before installing the cap. Also, make sure the carbon brush (center terminal) is correctly installed in the cap - a wide gap between the brush and rotor will result in rotor burn-through and/or damage to the distributor cap.

14 To replace the cap, simply separate it from the distributor and transfer the spark plug wires, one at a time, to the new cap. Be very careful not to mix up the wires!

15 Reattach the cap to the distributor, then install the screws to hold it in place.

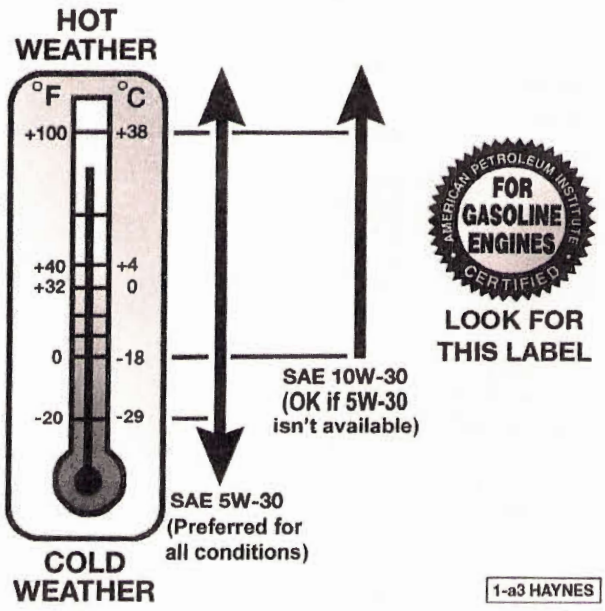
➡Note: The original screws are coated to prevent loosening under vibration. The factory recommends using new screws for the cap and rotor. If you reuse the original screws, use a mild thread-locking coating on them.

Specifications

Recommended lubricants and fluids

➡Note: Listed here are manufacturer recommendations at the time this manual was written. Manufacturers occasionally upgrade their fluid and lubricant specifications, so check with your local auto parts store for current recommendations.

Engine oil	API "certified for gasoline engines"
Viscosity	See accompanying chart
Fuel	Unleaded gasoline, 87 octane minimum
Automatic transmission fluid	DEXRON III automatic transmission fluid (2006 and later models require DEXRON VI)
Manual transmission lubricant	
NV 3500	Synchromesh transmission fluid or equivalent
NV 4500	Syn-torq synthetic transmission fluid or equivalent
ZF S6-650	Trans-Synd synthetic transmission fluid or equivalent
Manual transfer case	
New Venture 261 NP2	DEXRON III automatic transmission fluid (2006 and later models require DEXRON VI)
Automatic transfer case	
New Venture 236 NP8, New Venture 246-NP8,	GM Auto Trak II transfer case fluid
All others	DEXRON-III automatic transmission fluid (2006 and later models require DEXRON VI)
Differential	
Front	
Selectable 4WD	SAE 80W90 GL-5 gear oil
Full-time 4WD	SAE 75W90 synthetic gear oil
Rear	SAE 75W90 synthetic gear oil
Quadrasteer rear axle	GM synthetic axle lubricant
Power steering fluid	GM power steering fluid
Brake hydraulic fluid	DOT 3 brake fluid



Engine oil viscosity chart - for best fuel economy and cold starting, select the lowest SAE viscosity grade for the expected temperature range

Recommended lubricants and fluids (continued)

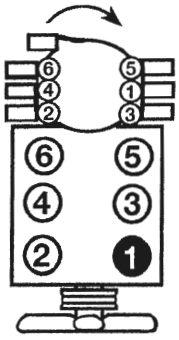
Clutch hydraulic fluid	
5-speed transmission	DOT 3 brake fluid
6-speed transmission	GM clutch hydraulic fluid
Engine coolant	50/50 mixture of DEX-COOL coolant and demineralized water
Parking brake mechanism grease	White lithium-based grease NLGI no. 2
Chassis lubrication grease	NLGI Grade 2 LB or GC-LB chassis grease
Hood, door and trunk hinge lubricant	Lubriplate, lubricant aerosol spray
Door hinge and check spring grease	NLGI no. 2 multi-purpose grease or equivalent
Key lock cylinder lubricant	Graphite spray
Hood latch assembly lubricant	NLGI no. 2 multi-purpose grease or equivalent
Door latch lubricant	NLGI no. 2 multi-purpose grease or equivalent

Capacities*

Engine oil (including filter)	
V6 engine	4.5 quarts
V8 engine	6.0 quarts
Manual transmission	
New Venture 3500	2.2 quarts
New Venture 4500	4.0 quarts
ZF S6-650	6.3 quarts
Automatic transmission	
Fluid and filter change	
4L60-E/4L65-E	5.0 quarts
4L80-E/4L85-E	7.7 quarts
From dry, including torque converter	
4L60-E/4L65-E	11.2 quarts
4L80-E/4L85-E	13.5 quarts
Transfer case	
New Venture 246-NP8	
1999 through 2001	2.4 quarts
2002 and later	2.0 quarts
New Venture 236-NP8	2.0 quarts
New Venture 149-NP	2.4 quarts
New Venture 263-NP1	2.0 quarts
New Venture 149-NP3	2.2 quarts
New Venture 261-NP2	
1999 through 2001	2.3 quarts
2002 and later	2.0 quarts
Borg Warner 4481-NR3	1.5 quarts
Borg Warner 4482-NR4	1.5 quarts
Cooling system**	
V6 engine	13.0 qts
V8 engine	
4.8L and 5.3L	16.7 qts
6.0L	
Yukon Denali, Yukon XL Denali	19.0 qts
All others	16.8 qts

**All capacities approximate. Add as necessary to bring to appropriate level.*

***Cooling system capacities vary depending on engine/transmission package, radiator and A/C system type. Add coolant as necessary to bring to appropriate level.*



V6 engine cylinder numbering and distributor rotation diagram

V8 engine cylinder numbering diagram

Brakes

Disc brake pad wear limit	3/32 inch
Drum brake shoe wear limit	1/16 inch
Parking brake shoe wear limit	1/16 inch

Ignition system

Spark plug type	
1999	
V6 engine	AC Delco 41-932 or equivalent
V8 engine	AC Delco 41-952 or equivalent
2000	
V6 engine	AC Delco 41-932 or equivalent
V8 engine	AC Delco 41-952 or equivalent
2001	
V6 engine	AC Delco 41-932 or equivalent
V8 engine	NGK PZTR-5A15 or equivalent
2002	
V6 engine	AC Delco 41-932 or equivalent
V8 engine	NGK PZTR-5A15 or equivalent
2003	
V6 engine	AC Delco 41-932 or equivalent
V8 engine	AC Delco 41-974 or equivalent
2004 through 2005	
V6 engine	AC Delco 41-932 or equivalent
V8 engine	AC Delco 41-985 or equivalent
2006 and later	
V6 engine	AC Delco 41-932 or equivalent
V8 engine	AC Delco 25171803 or equivalent
Spark plug gap	
V6 engine	0.060 inch
V8 engine	
1999 through 2003	0.060 inch
2004 and later	0.040 inch
Firing order	
V6 engine	1-6-5-4-3-2
V8 engine	1-8-7-2-6-5-4-3

Torque specifications	Ft-lbs (unless otherwise indicated)
Spark plugs	132 in-lbs
Wheel lug nuts	140
Automatic transmission	
4L60-E/4L65-E	
Pan bolts	97 in-lbs
Drain plug	156 in-lbs
4L80-E/4L85-E	
Pan bolts	
2004 and 2005 models	18
All others	97 in-lbs
Drain plug	156 in-lbs
Engine oil drain plug	18
Manual transmission fill and drain plugs	
New Venture 3500	22
New Venture 4500	27
ZF S6-650	26
Transfer case drain/fill plug	15
Differential drain and fill plugs	
Front differential	24
Rear differential	
1999	45
2000 and 2001	24
2002 and later	
Drain plug	
9.75 inch ring gear	20
All except 9.75 inch ring gear	24
Fill plug	
9.75 inch ring gear	15
All except 9.75 inch ring gear	24