3

COOLING, HEATING AND AIR CONDITIONING SYSTEMS

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1 General information

All vehicles covered by this manual employ a pressurized engine cooling system with thermostatically controlled coolant circulation. Coolant is drawn from the radiator by an impeller-type water pump mounted at the front of the block. The coolant is then circulated through the engine block, the cylinder heads and, on V6 engines, the intake manifold before it's redirected back into the radiator.

A wax pellet type thermostat is located in the thermostat housing on the engine. During warm up, the closed thermostat prevents coolant from circulating through the radiator. When the engine reaches normal operating temperature, the thermostat opens and allows hot coolant to travel through the radiator, where it is cooled before returning to the engine.

The cooling system is pressurized by the surge tank cap, which contains a blow-off pressure valve and a vacuum atmospheric valve. By maintaining higher atmospheric pressure, it increases the boiling point of the coolant. If the coolant temperature goes above this increased boiling point, the extra pressure in the system forces the cap valve off its seat and allows excess pressure to escape the system.

The surge tank serves as both the point at which fresh coolant is added to the cooling system to maintain the proper fluid level and as the point where coolant is circulated to allow air to bubble out of the system.

V8 engines are equipped with a Overheat Protection Mode operating system to protect the engine from damage caused by severe overheating. When the computer senses an overheat condition, ai instrument panel warning light comes on that says "reduced pow In this mode, the computer switches the firing of the individual cc On and Off at each cylinder to allow cooling cycles between the fi cycles. The engine will have a dramatic loss of power, but will all vehicle operation in an emergency. If this light is On, find a safe p to get off the road as soon as possible, and allow the engine to cc thoroughly. Check the coolant level and inspect for a split hose o other obvious signs of coolant leakage. The engine oil will be ruir after this mode has operated, since unburned fuel will get into the After fixing the overheating problem, change the oil and filter righ away and reset the Oil Life Monitor (see Chapter 1).

The heating system works by directing air through the heater c mounted in the dash and then to the interior of the vehicle by a sy of ducts. Rear heating systems are equipped with separate heater located at the rear of the vehicle. Temperature is controlled by mix heated air with fresh air, using a system of doors in the ducts, anc blower motor.

Air conditioning is an optional accessory, consisting of an eva tor core located under the dash, a condenser in front of the radiatc accumulator in the engine compartment and a belt-driven compre: mounted at the front of the engine. Rear air conditioning systems equipped with a separate evaporator core located at the rear of the vehicle.

2 Antifreeze - general information

Refer to illustration 2.4

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 it's sweet smell and may drink it. Check with local authorities about disposing of used antifreeze. Many communities have collection centers which will see that antifreeze is disposed of safely. Never dump used anti-freeze on the ground or pour it into drains.

CAUTION:

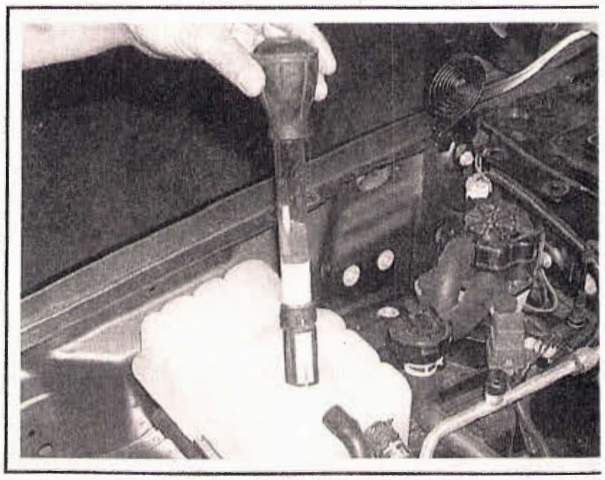
The manufacturer recommends using only DEX-COOL coolant for these systems. DEX-COOL is a long-lasting coolant designed for 100,000 miles or 5 years. Never mix green-colored ethylene glycol anti-freeze and orange-colored "DEX-COOL" silicate-free coolant because doing so will destroy the efficiency of the "DEX-COOL".

The cooling system should be filled with a water/ethylene glycol based antifreeze solution which will prevent freezing down to at least -20-degrees F (even lower in cold climates). It also provides protection against corrosion and increases the coolant boiling point.

The cooling system should be drained, flushed and refilled at least every other year (see Chapter 1). The use of antifreeze solutions for periods of longer than two years is likely to cause damage and encourage the formation of rust and scale in the system. However, these models are filled with a new, long-life "Dex-Cool" coolant, which the manufacturer claims is good for five years.

Before adding antifreeze, check all hose connections, because antifreeze tends to leak through very minute openings. Engines do normally consume coolant, so if the level goes down, find the cau: and correct it.

The exact mixture of antifreeze to water which you should use depends on the relative weather conditions. The mixture should cc at least 50-percent antifreeze, but should never contain more than percent antifreeze. Consult the mixture ratio chart on the antifreeze tainer before adding coolant. Hydrometers are available at most au parts stores to test the coolant (see illustration). Always use antifre which meets the vehicle manufacturer's specifications.



2.4 An inexpensive hydrometer can be used to test the condition of your coolant

3 Thermostat - check and replacement

WARNING:

The engine must be completely cool when this procedure is performed.

CHECK

1 Before assuming the thermostat is to blame for a cooling system problem, check the coolant level, drivebelt tension (see Chapter 1) and temperature gauge (or light) operation.

2 If the engine seems to be taking a long time to warm up (based on heater output or temperature gauge operation), the thermostat is probably stuck open. Replace the thermostat with a new one.

3 If the engine runs hot, use your hand to check the temperature of the upper radiator hose. If the hose isn't hot, but the engine is, the thermostat is probably stuck closed, preventing the coolant inside the engine from escaping to the radiator. Replace the thermostat.

➡Note: The thermostat and housing on V8 engines is located on the inlet side (before the water pump), therefore this check will not work on V8 engines.

CAUTION:

Don't drive the vehicle without a thermostat. The computer may stay in open loop and emissions and fuel economy will suffer.

4 If the upper radiator hose is hot, it means the coolant is flowing and the thermostat is open. Consult the *Troubleshooting* Section at the front of this manual for cooling system diagnosis.

REPLACEMENT

V6 engines

♦ Refer to illustrations 3.10 and 3.12

5 Disconnect the cable from the negative terminal of the battery.

CAUTION:

On models equipped with the Theftlock audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front of this manual). Partially drain the cooling system. If the coolant is relatively new or in good condition, save it and reuse it. If it is to be replaced, see Section 2 for cautions about proper handling of used antifreeze.

6 Remove the air filter housing and air intake duct (see Chapter 4).

7 Follow the upper radiator hose to the engine to locate the thermostat housing cover. The thermostat is located at the end of the lower intake manifold at the front of the engine.

8 Loosen the hose clamp, then detach the radiator hose from the thermostat housing cover. If the hose sticks, grasp it near the end with a pair of adjustable pliers and twist it to break the seal, then pull it off. If the hose is old or deteriorated, cut it off and install a new one.

9 If the outer surface of the cover fitting that mates with the hose is deteriorated (corroded, pitted, etc.) it may be damaged further by hose removal. If it is, the thermostat housing cover will have to be replaced.

10 Remove the bolts/nuts and detach the thermostat cover (see illustration). If the cover is stuck, tap it with a soft-face hammer to jar it loose. Be prepared for some coolant to spill as the gasket seal is broken.

11 Note how it's installed (which end is facing up), then remove the thermostat.

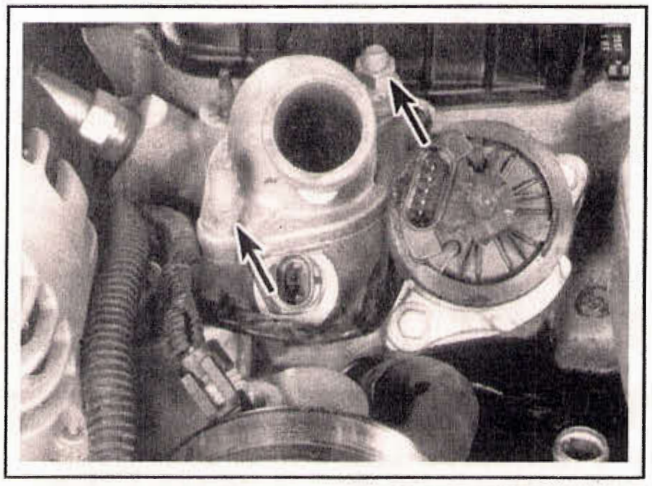
12 If a paper gasket was used, use a scraper or putty knife to remove all traces of old gasket material and sealant from the mating surfaces.

➡Note: Most of these models do not have a traditional gasket, but rather a rubber ring around the thermostat. If so, replace this ring and install the thermostat into the intake manifold without gasket sealant (see illustration).

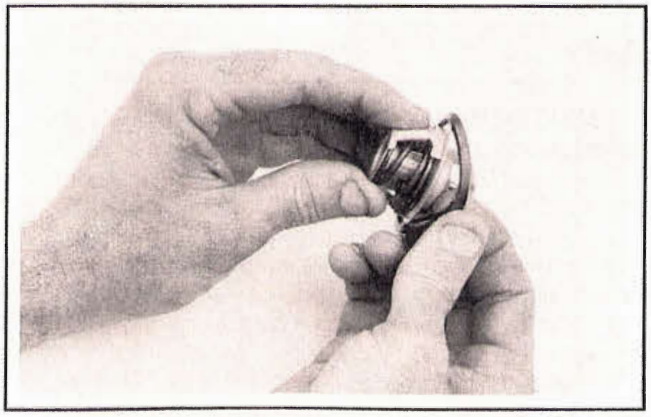
13 Install the thermostat into the intake manifold and make sure the correct end faces out - the spring is directed toward the engine.

14 If a traditional paper gasket was used, apply a thin coat of RTV sealant to both sides of the new gasket and position it on the engine, over the thermostat, and make sure the gasket holes line up with the bolt holes in the housing.

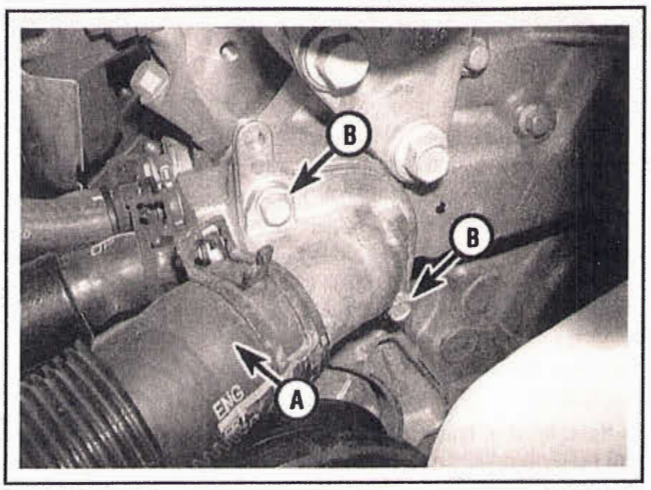
15 Reattach the thermostat housing cover to the intake manifold and tighten the bolts to the torque listed in this Chapter's Specifications.



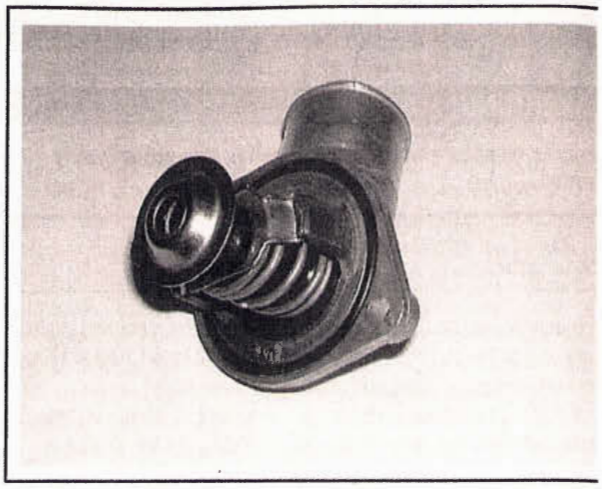
3.10 Thermostat housing cover bolts (arrows) - V6 engines



3.12 Install a new rubber seal around the thermostat



3.18a On V8 engines, remove the lower radiator hose (A) and the thermostat housing bolts (B)



3.18b Thermostat and housing assembly - V8 engines

V8 engines

Refer to illustrations 3.18a and 3.18b

16 Drain the cooling system (see Chapter 1).

17 Remove the air intake duct and resonator. Removing the air filter housing will give you a little more working room, but it isn't absolutely necessary (see Chapter 4).

18 Disconnect the lower radiator hose and remove the thermostat housing cover from the engine (see illustration).

Note: The thermostat, the thermostat housing and the O-ring seal are pre-assembled at the factory as a single unit and must be replaced as a unit as well (see illustration).

19 Clean the sealing surfaces on the water pump housing.

20 Place the thermostat housing onto the water pump housing a install the bolts. Tighten the bolts to the torque listed in this Chapt Specifications

All engines

21 The remaining steps are the reverse of the removal procedur Now would be a good time to check and replace the hoses and clar (see Chapter 1).

22 Refer to Chapter 1 and refill the cooling system, then run the engine and check carefully for leaks.

23 Repeat steps 1 through 4 to be sure the repairs corrected the previous problem(s).

4 Engine cooling fans and clutch - check and replacement

WARNING:

Keep hands, tools and clothing away from the fan. To avoid injury or damage DO NOT operate the engine with a damaged fan. Do not attempt to repair fan blades - replace a damaged fan with a new one.

CHECK

1 All V6 and V8 engines are equipped with thermostatically controlled fan clutches.

2 Begin the clutch check with a lukewarm engine (start it when cold and let it run for two minutes only).

3 Remove the key from the ignition switch for safety purposes.

4 Turn the fan blades and note the resistance. There should be moderate resistance, depending on temperature.

5 Drive the vehicle until the engine is warmed up. Shut it off and remove the key.

6 Turn the fan blades and again note the resistance. There should be a noticeable increase in resistance.

7 If the fan clutch fails this check or is locked up solid, replace ment is indicated. If excessive fluid is leaking from the hub or later play over 1/4-inch is noted, replace the fan clutch.

WARNING:

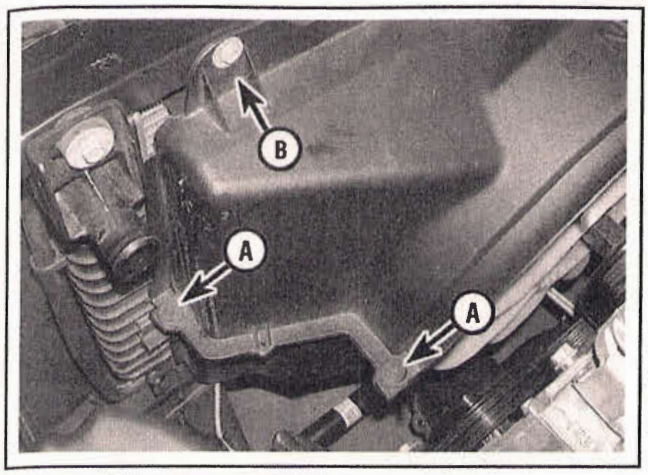
8 If the fan is damaged in any way, don't attempt to repa it. Replace the fan with a new one.

REPLACEMENT

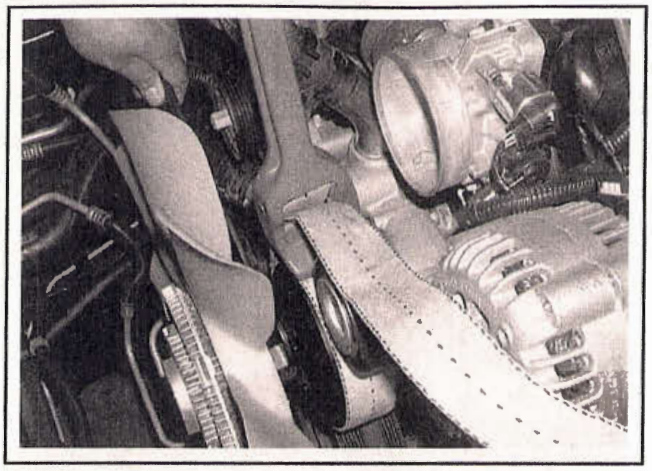
Refer to illustrations 4.10, 4.11 and 4.12

9 Remove the air filter housing assembly and intake duct (see Chapter 4).

10 Detach any hoses attached to the upper fan shroud and posit them aside. Remove the upper fan shroud (see illustration). It's onl necessary to remove the upper portion for many service operations.



4.10 With the hoses removed, detach the retaining clips (A) and the bolts (B) on each side to remove the upper fan shroud

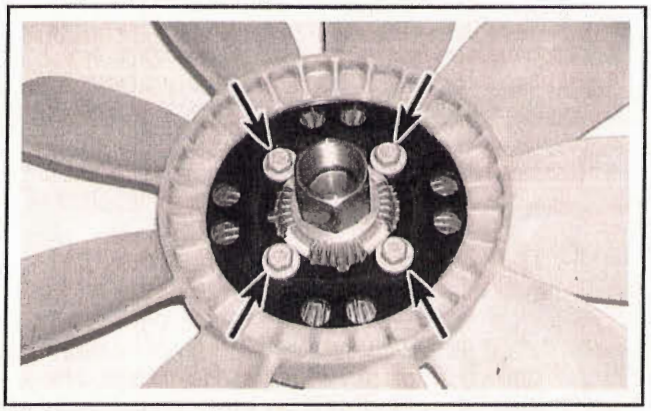


4.11 Loosening the fan clutch retaining nut while holding the pulley with a strap wrench

11 Use a large wrench to remove the fan clutch retaining nut and detach the fan clutch assembly from the engine. The drive belt should keep the pulley from turning as the fan nut is loosened. If the water pump pulley slips on the belt it will be necessary to remove the drivebelt(s) (see Chapter 1) and use a strap wrench to hold the pulley (see illustration).

12 Remove the fasteners securing the fan to the fan clutch (see illustration).

13 Installation is the reverse of removal. Be sure to tighten all fasteners to the torques listed in this Chapter's Specifications.



4.12 Fan retaining bolts (arrows)

5 Radiator and coolant surge tank - removal and installation

WARNING:

The engine must be completely cool when this procedure is performed.

RADIATOR

Refer to illustrations 5.2, 5.3, 5.4 and 5.8

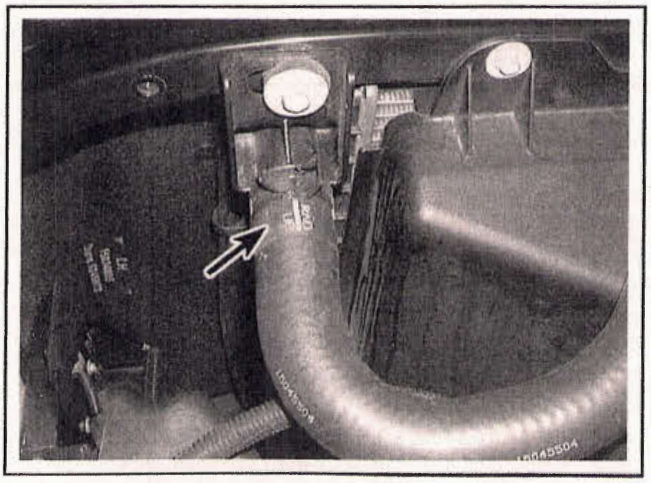
Note: The vehicles covered by this manual use spring type radiator hose clamps. If you decide to reuse them, make sure that the hose is installed on a connection that is clean and dry. Don't try to reuse these clamps on aftermarket hoses. Replace them with conventional worm drive type clamps.

1 Disconnect the cable from the negative terminal of the battery.

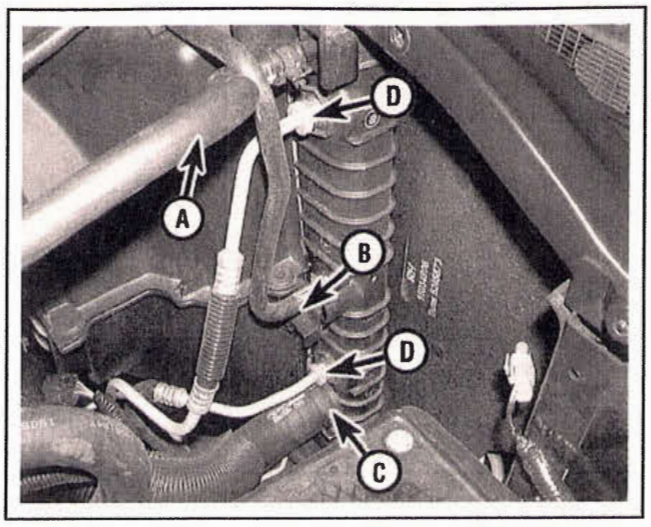
CAUTION:

On models equipped with the Theftlock audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front of this manual).

2 Drain the cooling system as described in Chapter 1, then disconnect upper radiator hose from the radiator and the upper fan shroud and position it aside (see illustration). Remove the air intake duct and resonator.



5.2 Detach the upper radiator hose (arrow) from the radiator and the upper fan shroud, then position it aside



5.3 Remove the following components from the right side of the radiator

A	*Coolant recovery hose*	*C*	*Lower radiator hose*
B	*Coolant vent pipe hose (if equipped)*	*D*	*Automatic transmission cooler lines (if equipped)*

3 Disconnect the coolant surge tank hose, the vent pipe hose (if equipped) and the lower radiator hose from the radiator (see illustration).

4 If equipped with an automatic transmission, disconnect the transmission cooler lines from the right side of the radiator (see illustration). To disconnect the lines from the radiator, simply unsnap the plastic collar from the quick-connect fitting, then pry off the quick-connect fitting retaining clip and remove the lines. Plug the ends of the lines to prevent fluid from leaking out after you disconnect them. Have a drip pan ready to catch any spills. Always be sure to inspect the O-rings on the cooler lines before reinstallation.

➡Note: Do not remove the clips by pulling straight out. Hold one side in with your fingers while using a pick (with a bent tip) to pull the other side out, then rotate the clip off. Install clips the same way, not straight on.

5 If equipped with an engine oil cooler, disconnect the lines on the opposite side of the radiator, as described in the previous step. Also disconnect the engine oil cooler lines from the lower fan shroud.

6 Unbolt and remove the upper fan shroud and the engine cooling fan (see Section 4).

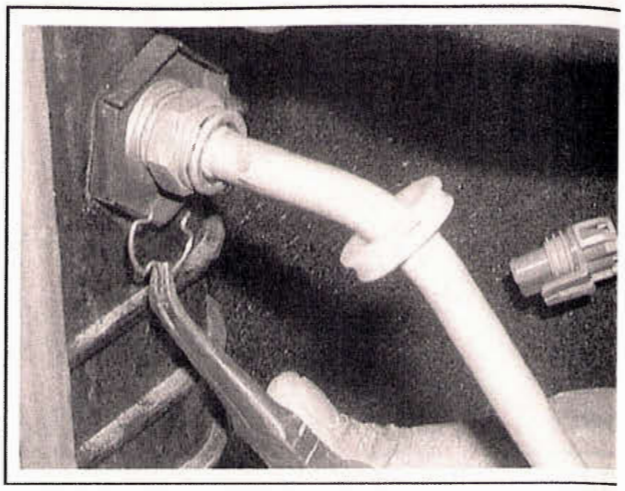
7 Detach the lower fan shroud, by pulling straight up and releasing it from the retaining tabs on the radiator.

8 Remove the radiator mounting bolts and lift the radiator from the engine compartment (see illustration).

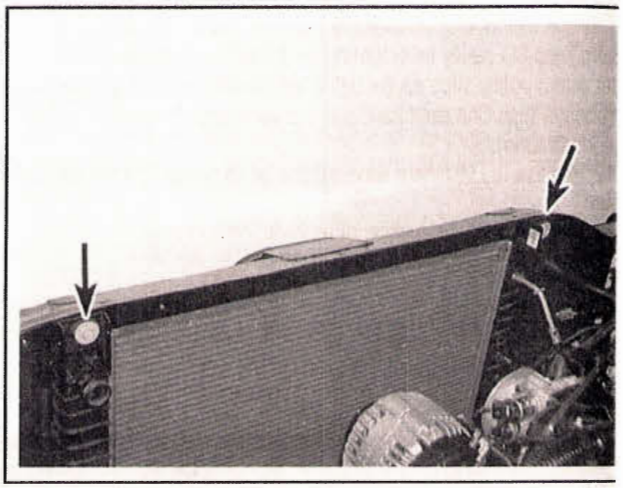
9 Prior to installation of the radiator, replace any damaged radiator hoses and hose clamps.

10 Radiator installation is the reverse of removal. When installing the radiator, make sure that the radiator seats properly in the lower saddles and that the upper brackets are secure. Install the cooler line retaining clips onto the quick connect fitting before installing the lines, then snap the cooler lines into place on the quick connect fittings. Be sure to reinstall the plastic collars on the quick connect fittings as they lock the retaining clip in place.

11 After installation, refill the cooling system (see Chapter 1), then check the engine oil and automatic transmission fluid levels.



5.4 Unsnap the plastic collar, then pry off the retaining clip from the quick-connect fitting to disconnect the transmission and engine oil cooler lines



5.8 Radiator mounting bolts (arrows)

COOLANT SURGE TANK

➧ Refer to illustration 5.15

12 Disconnect the cable from the negative terminal of the battery.

⚠ CAUTION:

On models equipped with the Theftlock audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front o this manual).

13 Drain the cooling system as described in Chapter 1 until the surge tank is empty. Refer to the coolant **Warning** in Section 2.

14 Remove the air filter housing (see Chapter 4).

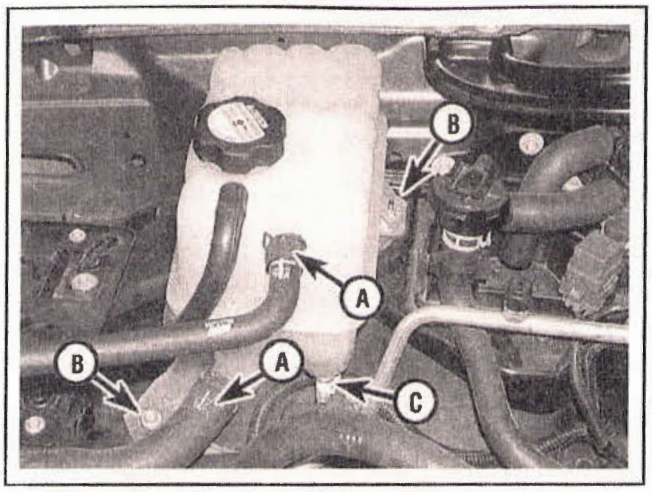
15 Detach the coolant hoses from the surge tank. Unscrew the mounting bolt and nut, then lift the surge tank from the notch on the

inner fenderwell and disconnect the coolant level sensor connector (see illustration).

16 Remove the surge tank from the engine compartment.

17 Prior to installation make sure the reservoir is clean and free of debris which could be drawn into the radiator (wash it with soapy water and a brush if necessary, then rinse thoroughly).

18 Installation is the reverse of removal. Refill the cooling system (see Chapter 1) and check for leaks.



5.15 Remove the coolant hoses (A) and the mounting bolts (B), then lift the surge tank from the notch on the inner fenderwell and disconnect the coolant level sensor connector (C)

6 Water pump - check and replacement

WARNING:

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

CHECK

Refer to illustration 6.2

1 Water pump failure can cause overheating and serious damage to the engine. There are three ways to check the operation of the water pump while it is installed on the engine. If any one of the following quick-checks indicates water pump problems, it should be replaced immediately.

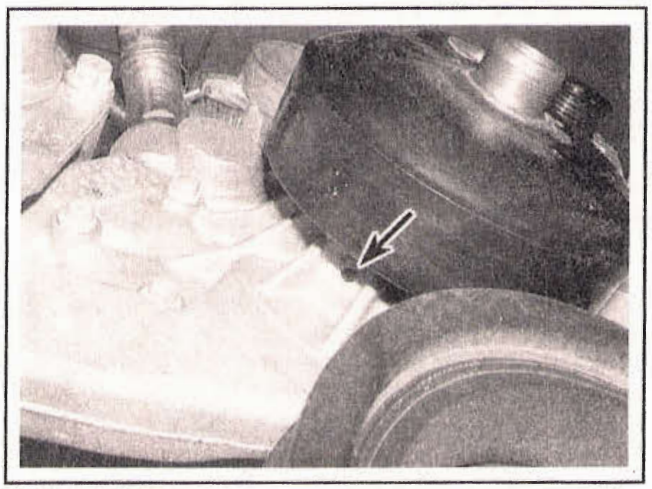
2 A seal protects the water pump impeller shaft bearing from contamination by engine coolant. If this seal fails, a weep hole in the water pump snout will leak coolant (see illustration) (an inspection mirror can be used to look at the underside of the pump if the hole isn't on top). If the weep hole is leaking, shaft bearing failure will follow. Replace the water pump immediately.

3 The water pump impeller shaft bearing can also prematurely wear out. When the bearing wears out, it emits a high-pitched squealing sound. If such a noise is coming from the water pump during engine operation, the shaft bearing has failed - replace the water pump immediately.

Note: Do not confuse belt noise with bearing noise.

4 To identify excessive bearing wear, remove the drivebelt (see Chapter 1), grasp the water pump pulley and try to force it up-and-down or from side-to-side. If the pulley can be moved either horizontally or vertically, the bearing is nearing the end of its service life. Replace the water pump.

5 It is possible for a water pump to be bad, even if it doesn't howl or leak water. Sometimes the fins on the back of the impeller can corrode away until the pump is no longer effective. The only way to check for this is to remove the pump for examination.



6.2 The weep hole (arrow) is located on the bottom of the water pump (V8 engine shown, V6 engine similar)

REPLACEMENT

Refer to illustrations 6.11, 6.12a and 6.12b

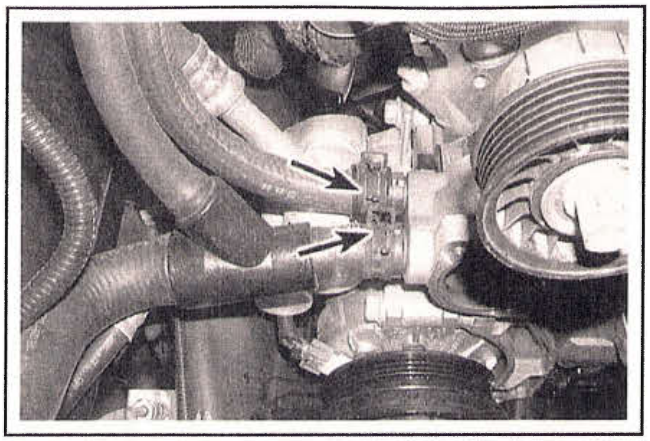
6 Disconnect the cable from the negative terminal of the battery.

CAUTION:

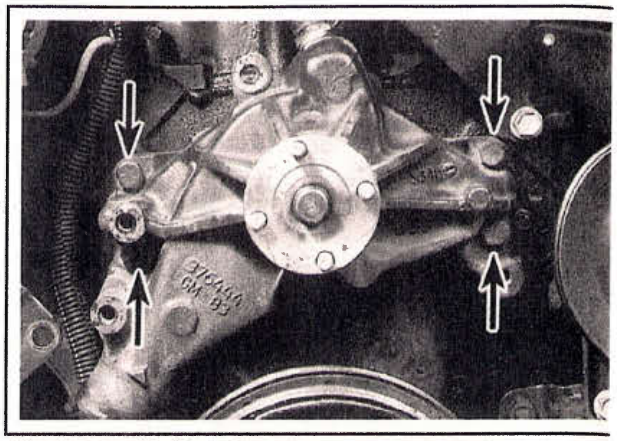
On models equipped with the Theftlock audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front of this manual).

7 Drain the coolant (see Chapter 1). Remove the air intake duct and resonator.

8 Remove the upper radiator shroud and fan/clutch assembly (see Section 4). On V6 engines, loosen the water pump pulley bolts a few



6.11 Heater hose-to-water pump housing connections - V8 engines



6.12a Water pump mounting bolts (arrows) - V6 engine

turns while the drivebelt is still installed on the engine.

9 Remove the serpentine belt (see Chapter 1).

10 On V6 engines, remove the water pump pulley, detach the lower radiator hose, the heater hose and the coolant by-pass hose from the water pump.

➡Note: To detach the pulley on V6 engines, you will need a strap wrench or two-pin spanner to hold the pulley while the bolts are removed.

11 On V8 engines, remove the lower radiator hose and the thermostat housing (see Section 3). Also remove the upper radiator hose and the heater hoses from the water pump housing (see illustration).

12 Unbolt the water pump (see illustrations). It may be necessary to tap the pump with a soft-face hammer to break the gasket seal. Inspect the pump's impeller blades on the backside for corrosion. If any fins are missing or badly corroded, replace the pump with a new one.

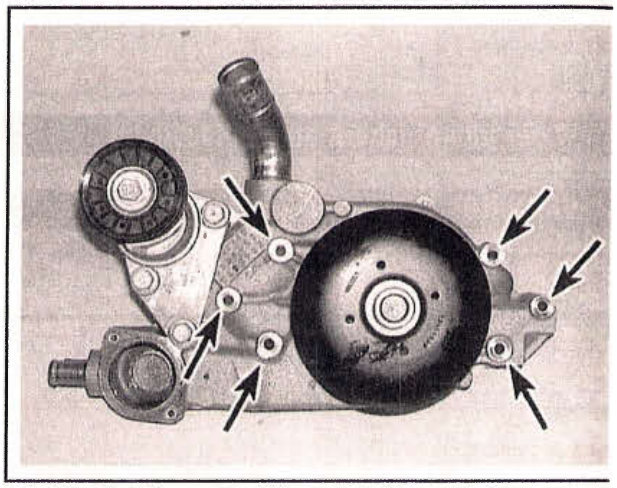
13 Clean the sealing surfaces of all gasket material on both the water pump and block. Wipe the mating surfaces with a rag saturated with lacquer thinner or acetone.

14 Apply a thin layer of RTV sealant to both sides of the new gasket and install the gasket on the water pump.

15 Place the water pump in position and install the bolts finger tight. Use caution to ensure that the gasket doesn't slip out of position. Tighten the bolts to the torque listed in this Chapter's Specifications.

➡Note: On V6 engines, use RTV sealant on the water pump bolt threads.

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



6.12b Water pump mounting bolt locations (arrows) - V8 engines

➡Note: If a new water pump in installed on a V8 engine, a n thermostat/housing assembly must be installed also.

17 Add coolant to the specified level (see Chapter-1), start the engine and check for the proper coolant level. Be sure to bleed the cooling system of air as described in Chapter-1. Also check for coo leaks around the water pump and hoses.

7 Coolant temperature gauge sending unit - check and replacement

CHECK

1 The coolant temperature indicator system is composed of a temperature gauge or warning light mounted in the dash and a coolant temperature sensor mounted on the engine. This coolant temperature sensor doubles as an information sensor for the fuel and emissions systems (see Chapter 6) and as a sending unit for the temperature gauge.

2 If an overheating indication occurs, check the coolant level in the system and then make sure the wiring between the gauge and the sending unit is secure and all fuses are intact.

3 Check the operation of the coolant temperature sensor (see Chapter 6). If the sensor is defective, replace it with a new part of th same specification.

4 If the coolant temperature sensor is good, have the temperatu gauge checked by a dealer service department. This test will require scan tool to access the information as it is processed by the On Boa computer.

REPLACEMENT

5 Refer to Chapter 6 for the engine coolant temperature sensor replacement procedure.

8 Blower motor and circuit - check

Refer to illustrations 8.3 and 8.5

WARNING:

These models have airbags. Always disable the airbag system before working in the vicinity of any airbag system component to avoid the possibility of accidental deployment of the airbag, which could cause personal injury (see Chapter 12).

Note: This procedure applies to the front blower motor and circuit on all models covered by this manual. Some models are equipped with rear auxiliary heating and air conditioning systems which can't be tested using conventional equipment. Due to the use of an integrated electronic control module that can only be tested with specialized equipment it will be necessary to take these vehicles to dealer service department or other qualified repair shop.

1 Check the fuse (marked HVAC) and all connections in the circuit for looseness and corrosion. Make sure the battery is fully charged.

Note 1: The heater/blower relay is located on the blower motor housing in the passenger compartment on 1999 through 2002 models and in the fuse/relay center in the engine compartment on 2003 and later models. The HVAC fuse is located in the fuse/relay panel under the left side of the dash (see Chapter 12).

Note 2: The auxiliary cooling fan fuses are located in the fuse/relay block next to the large fuse/relay center in the engine compartment.

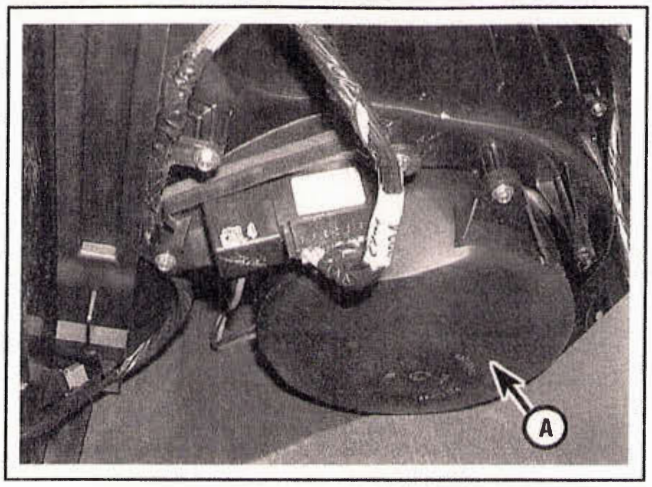
2 With the transmission in Park (or Neutral on manual transmission equipped vehicles), set the parking brake securely and turn the ignition switch to the Run position. It isn't necessary to start the vehicle.

3 Remove the heater/air conditioning assembly cover (below the glove box) for access to the blower motor, then remove the blower motor cover (see illustration) (see Section 9).

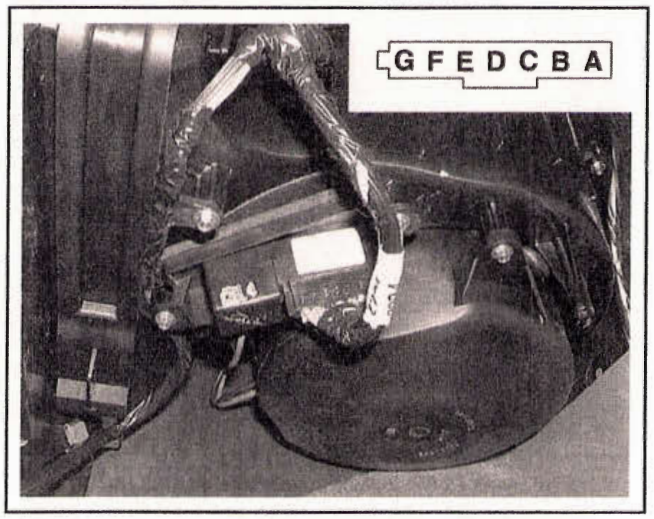
4 Disconnect the blower motor connector, then hook one side of the blower motor terminals to a chassis ground and the other to a fused source of battery voltage. If the blower doesn't operate, it is faulty.

5 To check the blower resistor, use an ohmmeter to test for continuity between the blower feed terminal (purple wire) on the blower motor pigtail connector and terminals A, B, C and D on the blower resistor (see illustration). There should be continuity at all four terminals with varied resistance between them.

6 If the blower motor works in every position except HIGH, the blower high relay is probably defective and must be replaced. Since the blower resistor/relay is assembled as a single unit it will be necessary to replace the entire unit.



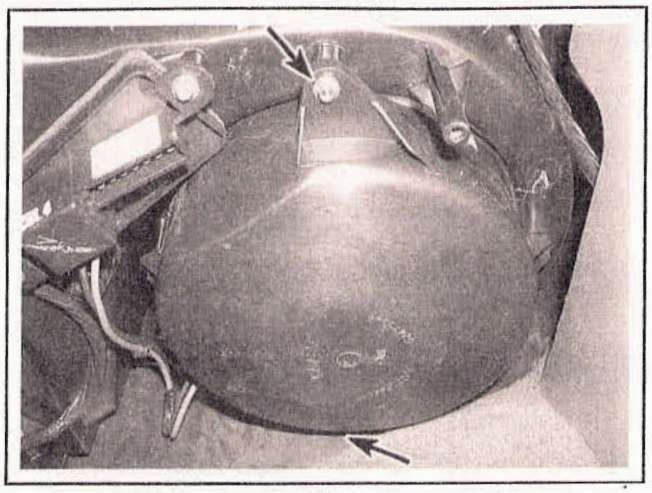
8.3 Remove the blower motor cover (A)



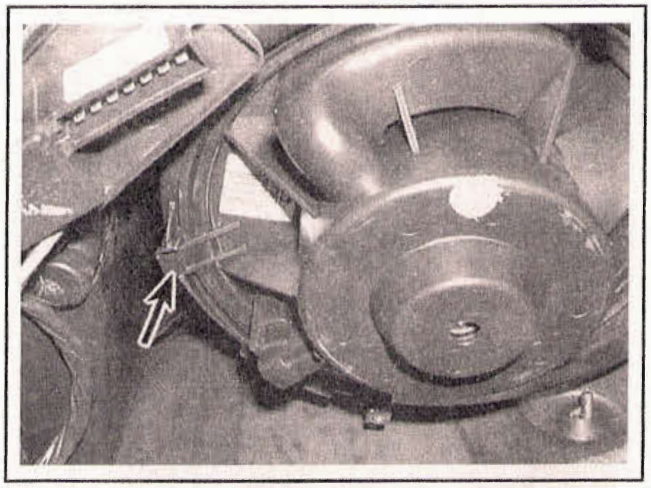
8.5 Blower motor resistor terminal guide

A Medium 1 speed output terminal
B Low speed output terminal
C Medium 3 speed output terminal
D Medium 2 speed output terminal
E Ground terminal
F High speed output terminal
G Fused battery feed terminal

9 Blower motor - removal and installation



9.3 Remove the screws (arrows) retaining the blower motor cover



9.5 Pull down on the blower motor retaining tab (arrow) and rotate the fan assembly counterclockwise to remove it from the vehicle

WARNING:

These models have airbags. Always disable the airbag sys before working in the vicinity of any airbag system compoı to avoid the possibility of accidental deployment of the air which could cause personal injury (see Chapter 12).

FRONT BLOWER MOTOR (ALL MODELS)

Refer to illustrations 9.3 and 9.5

1 Remove the heater/air conditioning assembly cover.

2 Disconnect the electrical connector from the blower resisto Section 8).

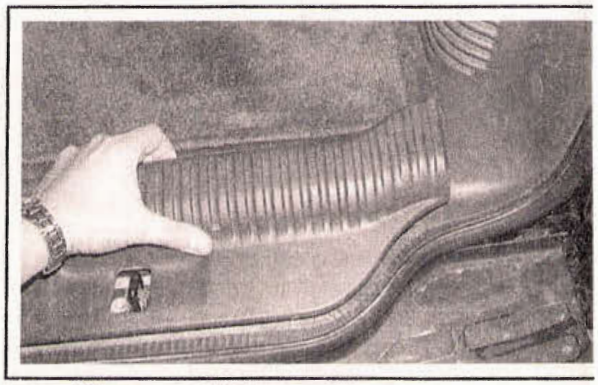
3 Remove the blower motor cover (see illustration).

4 Disconnect the electrical connector from the blower motor.

5 Pull down the retaining tab and rotate the blower motor cou clockwise (see illustration) to remove it.

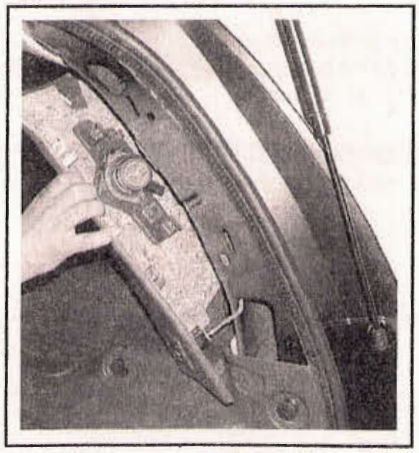
6 If you're replacing the blower motor with a new one, remov fan from the blower motor. The fan is pressed onto the blower mo shaft and can be pried off with two screwdrivers.

7 Install the fan onto the new motor and install the blower mc into the heater housing.



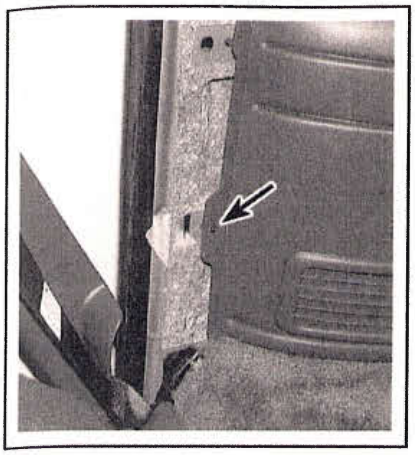
9.8a Remove the rear door sill plate

9.8b Remove the headliner trim panel

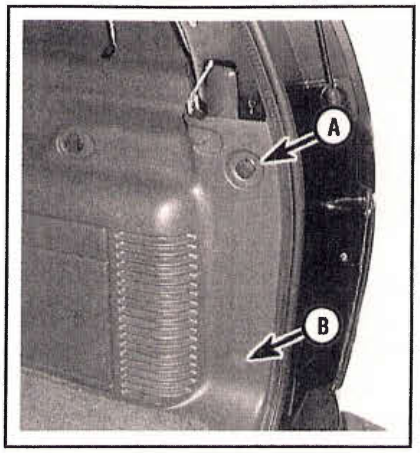


9.8c Pry off the rear door pillar trim panel and disconnect the electrical connectors (if equipped) from the rear of the panel

9.8d Pry off the right rear door pillar trim panel and position it asi without removing the rear safety be



9.8e Remove the screw (arrow) at the front of the panel



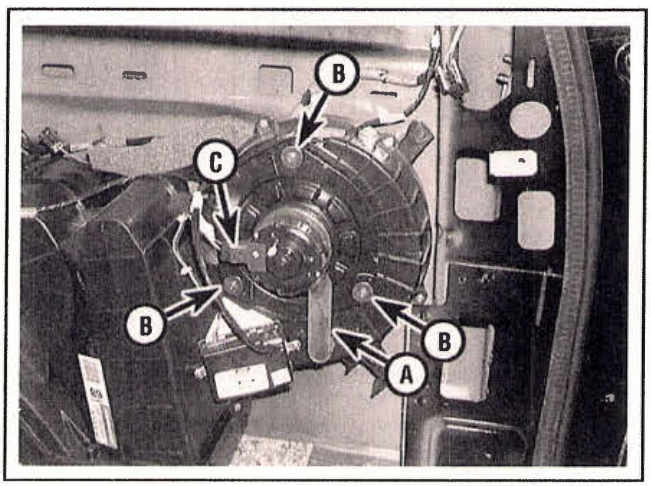
9.8f The rear of the trim panel is secured by the cargo net hook (A), which must be unscrewed, and a retaining clip (B)

9.8g Lift the right rear quarter trim panel up and away, then disconnect the electrical connectors from the rear of the panel and remove it from the vehicle

REAR AUXILIARY BLOWER MOTOR

Refer to illustrations 9.8a, 9.8b, 9.8c, 9.8d, 9.8e, 9.8f, 9.8g and 9.10

8 Remove the right rear quarter trim panel (see illustrations).
9 Disconnect the electrical connector from the blower motor.
10 Detach the cooling hose and remove the blower motor retaining screws (see illustration).
11 Pull the blower motor straight out to remove it.
12 If you're replacing the blower motor with a new one, remove the fan from the blower motor. The fan is pressed onto the blower motor shaft and can be pried off with two screwdrivers.
13 Install the fan onto the new motor and install the blower motor into the heater housing.



9.10 Rear auxiliary blower motor mounting details

A Blower motor cooling hose
B Mounting screws
C Electrical connector

10 Heater and air conditioning control assembly - removal and installation

WARNING:

These models have airbags. Always disable the airbag system before working in the vicinity of any airbag system component to avoid the possibility of accidental deployment of the airbag, which could cause personal injury (see Chapter 12).

1 Disconnect the cable from the negative terminal of the battery

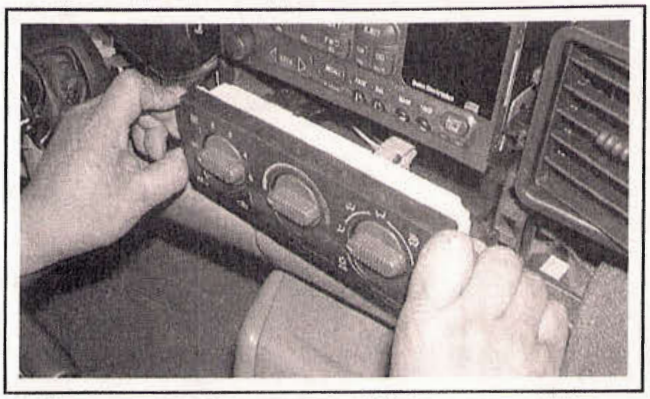
CAUTION:

On models equipped with the Theftlock audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front of this manual).

FRONT HEATER CONTROLS (ALL MODELS)

Refer to illustrations 10.4a and 10.4b

2 Remove the main instrument panel bezel to allow access to the heater/air conditioning control mounting screws (see Chapter 11).
3 Remove the radio (see Chapter 12). On models so equipped, remove the passenger airbag On/Off switch from the instrument panel.
4 Release the control assembly retaining tabs and pull the unit from the dash (see illustrations on next page). It can be pulled out just far enough to allow disconnecting the electrical connections and control cables (if equipped) from the control head. Use a small screwdriver to release the clips.
5 To install the control assembly, reverse the removal procedure.



10.4a Pinch the retaining tabs and pull the control assembly outward . . .

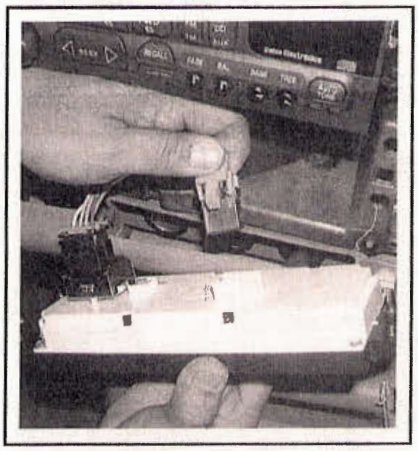
REAR AUXILIARY HEATER CONTROLS

Refer to illustrations 10.6 and 10.7

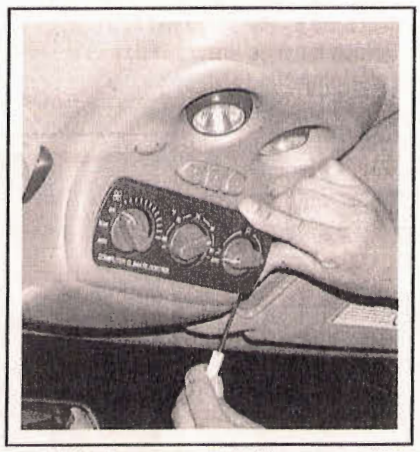
6 Using a small screwdriver pry out the rear control panel(s) (illustration).

7 Pull the control head downward from the overhead console, connect the electrical connections and remove it from the vehicle (illustration). Use a small screwdriver to release the clips.

8 To install the control assembly, reverse the removal procedu Be sure the control head snaps securely into place on the overhea console.



10.4b . . . disconnect the electrical connectors (and the control cables, if equipped)



10.6 Pry the rear control assembly outward from the overhead console

10.7 Disconnect the electrical connectors and remove it from the vehicle

11 Heater core - removal and installation

WARNING 1:

These models have airbags. Always disable the airbag system before working in the vicinity of any airbag system component to avoid the possibility of accidental deployment of the airbag, which could cause personal injury (see Chapter 12).

WARNING 2:

The air conditioning system is under high pressure. DO NOT loosen any fittings or remove any components until after the system has been discharged. Air conditioning refrigerant must be properly discharged into an EPA-approved container at a dealership service department or an automotive air conditioning facility. Always wear eye protection when disconnecting air conditioning system fittings.

WARNING 3:

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

1 Have the air conditioning system discharged by a dealership vice department or an automotive air conditioning facility (see **Wa ing** above).

2 Disconnect the cable at the negative terminal of the battery.

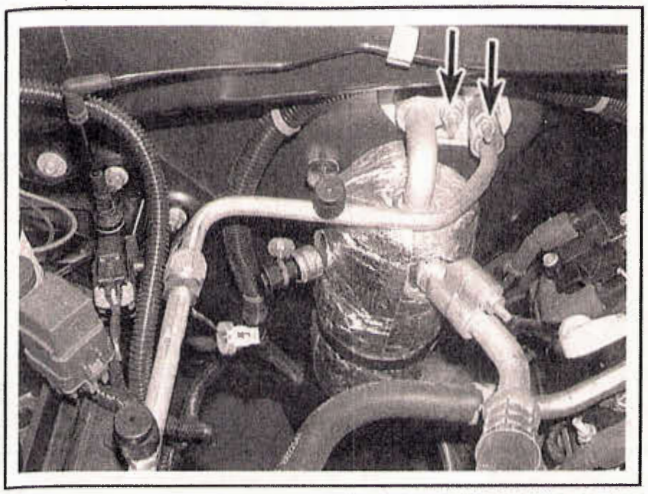
CAUTION:

On models equipped with the Theftlock audio system, be su the lockout feature is turned off before performing any proce dure which requires disconnecting the battery (see the front this manual).

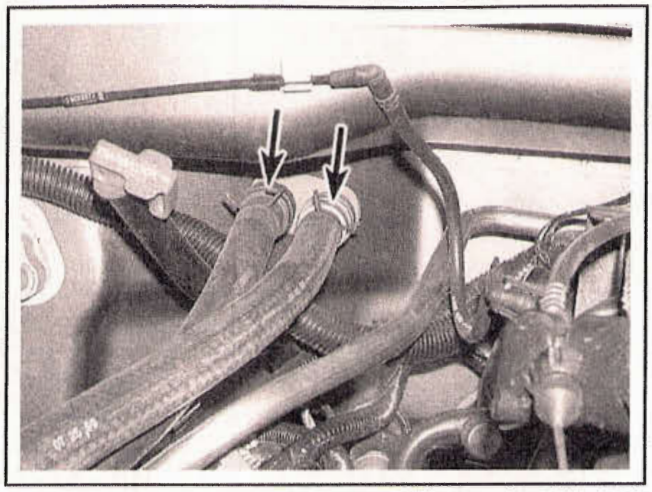
FRONT HEATER CORE (ALL MODELS)

Refer to illustrations 11.3, 11.4, 11.7, 11.9, 11.10a and 11.10b

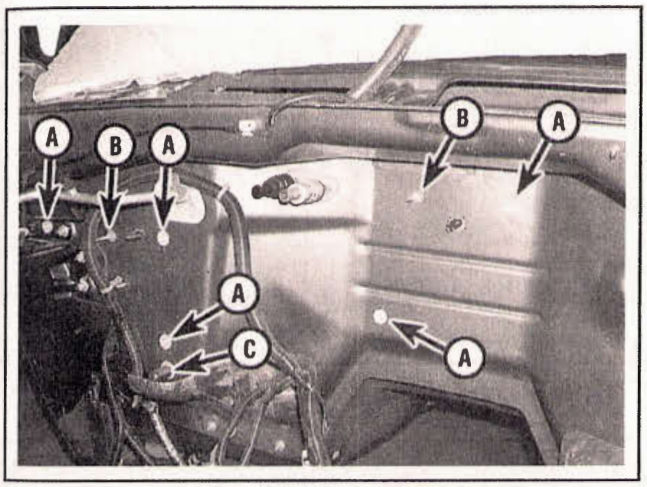
3 Drain the cooling system (see Chapter 1). Remove the air co tioning lines from the evaporator core fittings at the firewall (see ill tration). Be sure to plug each refrigerant line to avoid contaminatio



11.3 Have the air conditioning system discharged by a dealership service department or an automotive air conditioning facility, then remove the air conditioning lines (arrows) from the evaporator core fittings at the firewall



11.4 Disconnect the heater core hoses (arrows) at the engine compartment firewall



11.7 Heater/air conditioning unit mounting details

A Mounting bolts
B Mounting nuts
C Drain tube

the air conditioning system.

4 Disconnect the heater hoses at the heater core inlet and outlet on the engine side of the firewall (passenger side) (see illustration) and plug the open fittings. If the hoses are stuck to the pipes, cut them off and replace them with new ones upon installation.

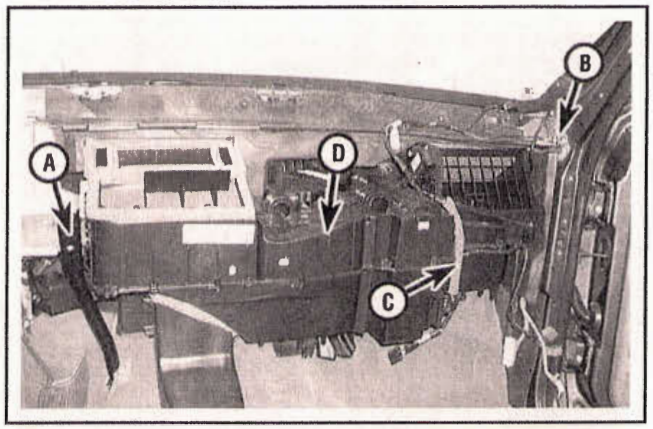
5 From the inside of the vehicle, remove the heater/air conditioning assembly cover from below the glove box.

6 Remove the instrument panel from the passenger compartment. Refer to Chapter 11 and read through the entire instrument panel removal procedure before attempting to remove it. The instrument panel removal procedure is quite lengthy and can be particularly difficult for a beginner. Once the instrument panel is removed from the vehicle, the heating /air conditioning unit can be removed from the vehicle and set on a workbench.

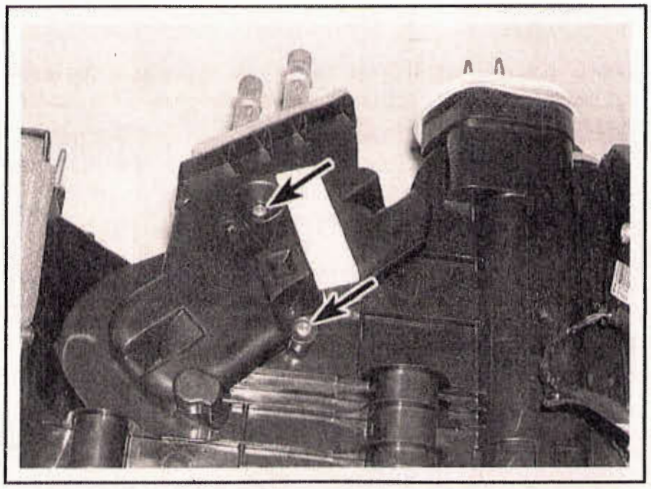
7 Working in the engine compartment, remove the fasteners securing the heating/air conditioning unit to the firewall (see illustration).

8 Disconnect the drain tube from the heater/air conditioning unit.

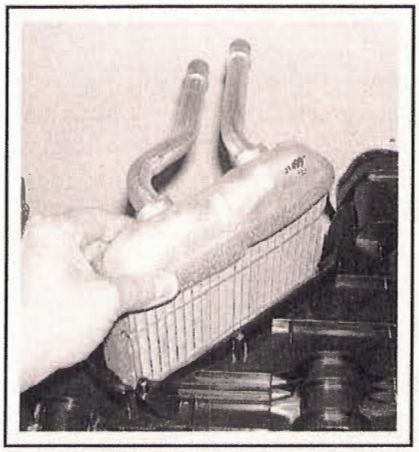
9 Working back inside the passenger compartment, remove the center support brace, the electrical connections and any ground straps, then remove the heating/air conditioning unit from the vehicle (see illustration). Follow the remaining steps to remove the heater core from the heating/air conditioning unit.



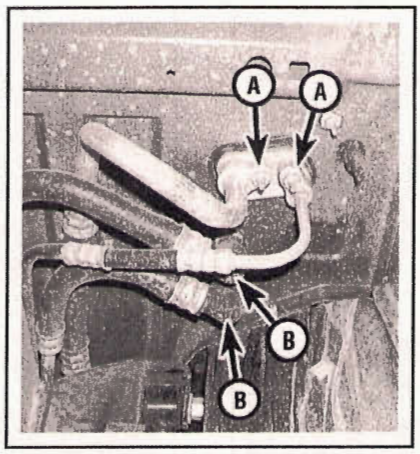
11.9 Remove the center support brace (A), ground strap (B), the electrical connectors (C) and the heating/air conditioning unit (D)



11.10a Remove the heater core cover screws (arrows)

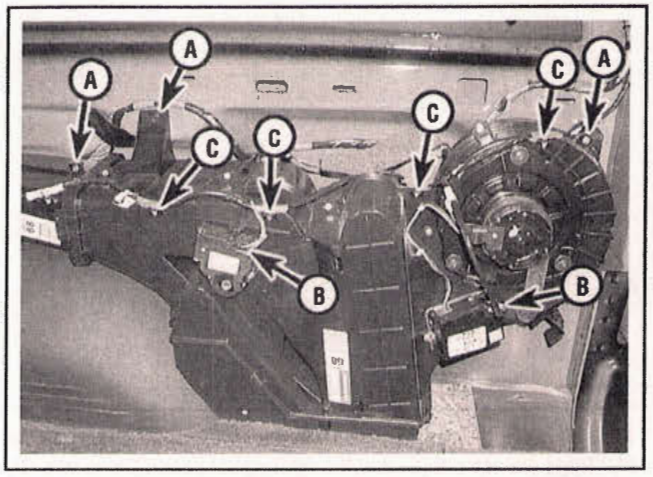


11.10b Carefully slide the heater core out of the heater/air conditioning unit



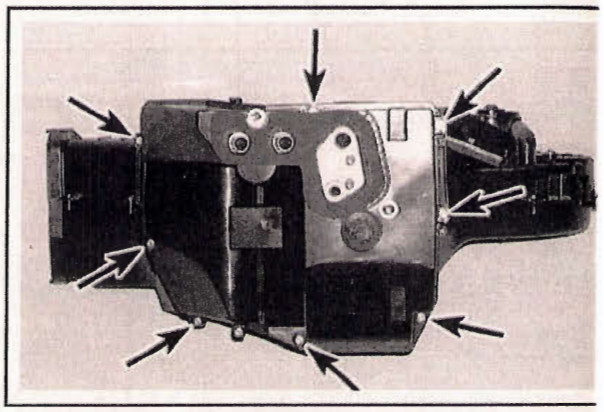
11.15 Raise the vehicle and support it securely on jackstands to access the rear air conditioning lines (A) and the rear heater hoses (B)

11.16 Rear heating/air conditionin unit lower mounting nuts (arrows)

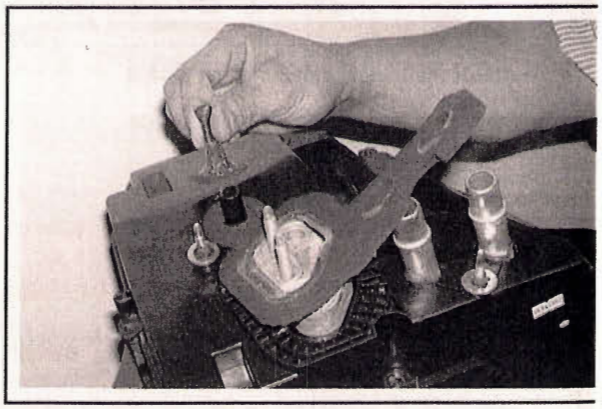


11.18 Rear heating/air conditioning unit mounting details

A Mounting screws
B Electrical connectors
C Wiring harness retainers



11.19a Remove the rear heater core cover screws (arrows



11.19b Detach the cover-to-floor pan gasket and the drain t

10 Remove the heater core cover and slide the heater core out carefully (see illustrations).

11 Installation is the reverse of removal.

➡Note: When reinstalling the heater core, make sure any original insulating/sealing materials are in place around the heater core pipes and around the core.

12 Refill the cooling system (see Chapter 1). Have the air conditioning system charged by the shop that discharged it.

13 Start the engine and check for proper operation.

REAR AUXILIARY HEATER CORE

◗ Refer to illustrations 11.15, 11.16, 11.18, 11.19a, 11.19b, 11.19c, 11.19d and 11.20

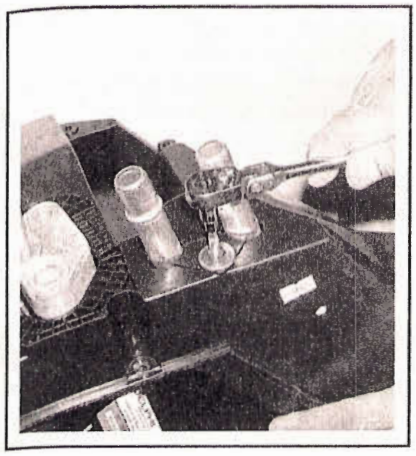
14 Remove the air conditioning lines from the rear evaporator core fittings on the floorboard. Be sure to plug each refrigerant line to avoid contamination of the air conditioning system.

15 Clamp off the heater hoses leading to the rear heater core, then disconnect the hoses from the inlet and outlet fittings (see illustration) and plug the open fittings. Pinch the tabs to release the quick-conr fittings.

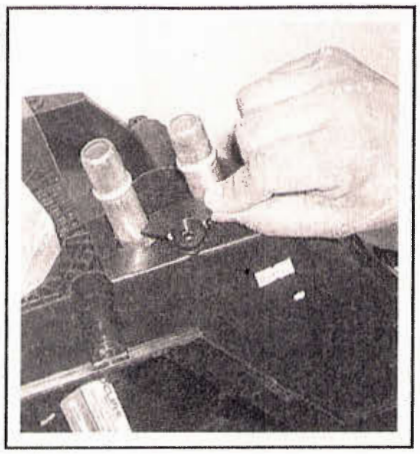
16 Remove the rear heating/air conditioning unit lower mountin nuts (see illustration).

17 From the inside of the vehicle, remove the right rear quarter panel as described in Section 9, Step 8.

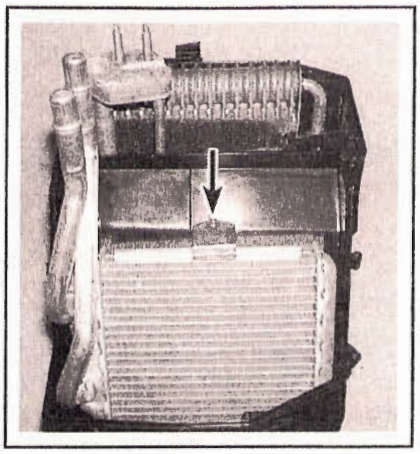
18 Remove the electrical connections and wiring harness retain straps straps, then detach the rear heating/air conditioning unit mc



11.19c Detach the cover retaining stud . . .



11.19d . . . and the cover retaining tab, then remove the rear heater core cover



11.20 Detach the heater core clamp (arrow) and remove the heater core from the housing

ing screws and remove it from the vehicle (see illustration).

➡Note: It is not necessary to remove the air duct from the vehicle.

Follow the remaining steps to remove the heater core from the rear heating/air conditioning unit.

19 Remove the heater core cover (see illustrations).

20 Remove the heater core retaining clamp and slide the heater core out of the rear heating and air conditioning unit (see illustration).

21 Installation is the reverse of removal.

➡Note: When reinstalling the heater core, make sure any original insulating/sealing materials are in place around the heater core pipes and around the core.

22 Check the coolant level, adding coolant as necessary (see Chapter 1). Have the air conditioning system charged by the shop that discharged it.

23 Start the engine and check for proper operation. Recheck the coolant level.

12 Air conditioning and heating system - check and maintenance

AIR CONDITIONING SYSTEM

♦ Refer to illustration 12.1

WARNING:

The air conditioning system is under high pressure. Do not loosen any hose fittings or remove any components until after the system has been discharged. Air conditioning refrigerant must be properly discharged into an EPA-approved recov-ery/recycling unit at a dealer service department or an automotive air conditioning repair facility. Always wear eye protection when disconnecting air conditioning system fittings.

CAUTION 1:

All models covered by this manual use environmentally friendly R-134a. This refrigerant (and its appropriate refrigerant oils) are not compatible R-12 refrigerant system components and must never be mixed or the components will be damaged.

CAUTION 2:

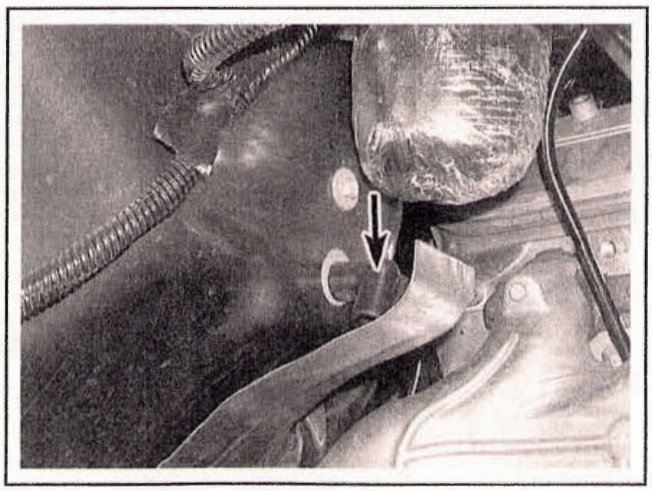
When replacing entire components, additional refrigerant oil should be added equal to the amount that is removed with the component being replaced. Be sure to read the can before adding any oil to the system, to make sure it is compatible with the R-134a system.

1 The following maintenance checks should be performed on a regular basis to ensure that the air conditioning continues to operate at peak efficiency.

a) Inspect the condition of the compressor drivebelt. If it is worn or deteriorated, replace it (see Chapter 1).

b) Check the drivebelt tension and, if necessary, adjust it (see Chapter 1).

c) Inspect the system hoses. Look for cracks, bubbles, hardening



12.1 Check that the evaporator housing drain tube (arrow) at the firewall is clear of any blockage - the view here is from the right fenderwell

and deterioration. Inspect the hoses and all fittings for oil bubbles or seepage. If there is any evidence of wear, damage or leakage, replace the hose(s).

d) Inspect the condenser fins for leaves, bugs and any other foreign material that may have embedded itself in the fins. Use a "fin comb" or compressed air to remove debris from the condenser.

e) Make sure the system has the correct refrigerant charge.

f) If you hear water sloshing around in the dash area or have water dripping on the carpet, check the evaporator housing drain tube (see illustration) and insert a piece of wire into the opening to check for blockage.

2 It's a good idea to operate the system for about ten minutes at least once a month. This is particularly important during the winter months because long term non-use can cause hardening, and subsequent failure, of the seals. Note that using the Defrost function operates the compressor.

3 If the air conditioning system is not working properly, proceed to Step 6 and perform the general checks outlined below.

4 Because of the complexity of the air conditioning system and the special equipment necessary to service it, in-depth troubleshooting and repairs beyond checking the refrigerant charge and the compressor clutch operation are not included in this manual. However, simple checks and component replacement procedures are provided in this Chapter.

5 The most common cause of poor cooling is simply a low system refrigerant charge. If a noticeable drop in system cooling ability occurs, one of the following quick checks will help you determine whether the refrigerant level is low. Should the system lose its cooling ability, the following procedure will help you pinpoint the cause.

Check

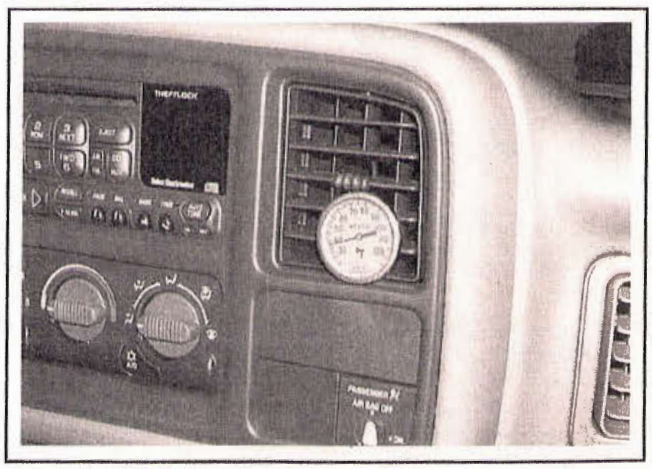
Refer to illustration 12.9

6 Warm the engine up to normal operating temperature.

7 Place the air conditioning temperature selector at the coldest setting and put the blower at the highest setting. Open the doors (to make sure the air conditioning system doesn't cycle off as soon as it cools the passenger compartment).

8 After the system reaches operating temperature, feel the two pipes connected to the evaporator at the firewall.

9 The pipe (thinner tubing) leading from the expansion (orifice) tube (see illustration 16.2) to the evaporator should be cold, and evaporator outlet line (the thicker tubing that leads back to the co pressor) should be slightly warmer (about 3 to 10 degrees F warr If the evaporator outlet is considerably warmer than the inlet, or ii the evaporator inlet isn't cold, the system needs a charge. Insert a thermometer in the center air distribution duct (see illustration) w operating the air conditioning system at its maximum setting - th temperature of the output air should be 35 to 40 degrees F below ambient air temperature (down to approximately 40 degrees F). If ambient (outside) air temperature is very high, say 110 degrees F, duct air temperature may be as high as 60 degrees F, but generall air conditioning is 35 to 40 degrees F cooler than the ambient air.



12.9 Insert a thermometer in the center duct while operating the air conditioning system - the output air should be 35-40 degrees F less than the ambient temperature, depending on humidity (but not lower than 40-degrees F)

10 If the air isn't as cold as it used to be, the system probably a charge.

11 If the air warm and the system doesn't seem to be operating properly check the operation of the compressor clutch.

12 Have an assistant switch the air conditioning On while you observe the front of the compressor. The clutch will make an audil click and the center of the clutch should rotate. If it doesn't, shut t engine off and disconnect the air conditioning system pressure sw (see illustration 12.22). Bridge the terminals of the connector with jumper wire and turn the air conditioning On again. If it works nov system pressure is too high or too low. Have your system tested b dealer service department or air conditioning shop.

13 If the clutch still didn't operate, check the appropriate fuses. Inspect the fuses in the interior fuse panel.

14 Remove the compressor clutch (A/C) relay from the engine partment relay panel and test it (see Chapter 12). With the relay ou the ignition On, check for battery power at two of the relay termina (refer to the wiring diagrams for wire color designations to determi which terminals to check). There should be battery power with the On, at the terminals for the relay control and power circuits.

15 Using a jumper wire, connect the terminals in the relay box from the relay power circuit to the terminal that leads to the compr sor clutch (refer to the wiring diagrams for wire color designations determine which terminals to connect). Listen for the clutch to clicl you make the connection. If the clutch doesn't respond, disconnect clutch connector at the compressor and check for battery voltage al compressor clutch connector. Check for continuity to ground on th black wire terminal of the compressor clutch connector. If power an ground are available and the clutch doesn't operate when connecte the compressor clutch is defective.

16 If the compressor clutch, relay and related circuits are good a the system is fully charged with refrigerant and the compressor doe not operate under normal conditions, have the PCM and related cir checked by a dealer service department or other properly equipped repair facility.

17 Further inspection or testing of the system is beyond the sco the home mechanic and should be left to a professional.

Adding refrigerant

Refer to illustrations 12.18, 12.21 and 12.22

CAUTION:

Make sure any refrigerant, refrigerant oil or replacement con ponent your purchase is designated as compatible with envir mentally friendly R-134a systems.

18 Purchase an R-134a automotive charging kit at an auto parts store (see illustration). A charging kit includes a 12-ounce can of

refrigerant, a tap valve and a short section of hose that can be attached between the tap valve and the system low side service valve.

WARNING:

Never add more than one can of refrigerant to the system (you could overfill the system).

19 Hook up the charging kit by following the manufacturer's instructions.

WARNING:

DO NOT hook the charging kit hose to the system high side! The fittings on the charging kit are designed to fit only on the low side of the system.

20 Back off the valve handle on the charging kit and screw the kit onto the refrigerant can, making sure first that the O-ring or rubber seal inside the threaded portion of the kit is in place.

WARNING:

Wear protective eyewear when dealing with pressurized refrigerant cans.

21 Remove the dust cap from the low-side charging port and attach the quick-connect fitting on the kit hose (see illustration).

22 Warm up the engine and turn on the air conditioning. Keep the charging kit hose away from the fan and other moving parts.

➡Note 1: The charging process requires the compressor to be running. If the clutch cycles off, you can put the air conditioning switch on High and leave the car doors open to keep the clutch on and compressor working.

➡Note 2: The compressor can be kept on during the charging by removing the connector from the low-pressure switch (combination high-limit and low-limit switch on some models) and bridging it with a paper clip or jumper wire during the procedure (see illustration).

23 Turn the valve handle on the kit until the stem pierces the can, then back the handle out to release the refrigerant. You should be able to hear the rush of gas. Add refrigerant to the low side of the system, keeping the can upright at all times, but shaking it occasionally. Allow stabilization time between each addition.

➡Note: The charging process will go faster if you wrap the can with a hot-water-soaked shop rag to keep the can from freezing up.

24 If you have an accurate thermometer, you can place it in the center air conditioning duct inside the vehicle and keep track of the output air temperature (see illustration 12.9). A charged system that is working properly should cool down to approximately 40-degrees F. If the ambient (outside) air temperature is very high, say 110 degrees F, the duct air temperature may be as high as 60 degrees F, but generally the air conditioning is 30-40 degrees F cooler than the ambient air.

25 When the can is empty, turn the valve handle to the closed position and release the connection from the low-side port. Replace the dust cap.

26 Remove the charging kit from the can and store the kit for future use with the piercing valve in the UP position, to prevent inadvertently piercing the can on the next use.

HEATING SYSTEMS

27 If the carpet under the heater core is damp, or if antifreeze vapor or steam is coming through the vents, the heater core is leaking. Remove it (see Section 12) and install a new unit (most radiator shops will not repair a leaking heater core).

28 If the air coming out of the heater vents isn't hot, the problem could stem from any of the following causes:

a) The thermostat is stuck open, preventing the engine coolant from warming up enough to carry heat to the heater core. Replace the thermostat (see Section 3).

b) There is a blockage in the system, preventing the flow of coolant through the heater core. Feel both heater hoses at the firewall. They should be hot. If one of them is cold, there is an obstruction in one of the hoses or in the heater core, or the heater control valve is shut. Detach the hoses and back flush the heater core with a water hose. If the heater core is clear but circulation is

12.18 A basic charging kit for 134a systems is available at most auto parts stores - it must say 134a (not R-12) and so must the can of refrigerant

12.21 Attach the refrigerant kit to the low-side charging port (arrow) - it's near the accumulator - the cap should be marked with an "L"

12.22 The air conditioning pressure switch (arrow) is located on the accumulator - if the compressor will not stay engaged, disconnect the connector and bridge the terminals (on the harness side) with a jumper wire during the charging procedure

impeded, remove the two hoses and flush them out with a water hose.

c) If flushing fails to remove the blockage from the heater core, the core must be replaced (see Section 11).

ELIMINATING AIR CONDITIONING ODORS

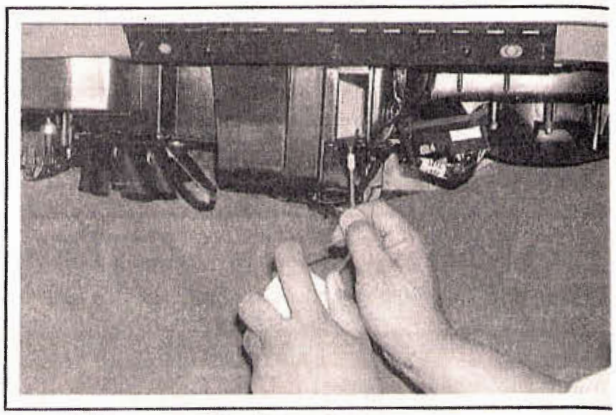
Refer to illustration 12.32

29 Unpleasant odors that often develop in air conditioning systems are caused by the growth of a fungus, usually on the surface of the evaporator core. The warm, humid environment there is a perfect breeding ground for mildew to develop.

30 The evaporator core on most vehicles is difficult to access, and factory dealerships have a lengthy, expensive process for eliminating the fungus by opening up the evaporator case and using a powerful disinfectant and rinse on the core until the fungus is gone. You can service your own system at home, but it takes something much stronger than basic household germ-killers or deodorizers.

31 Aerosol disinfectants for automotive air conditioning systems are available in most auto parts stores, but remember when shopping for them that the most effective treatments are also the most expensive. The basic procedure for using these sprays is to start by running the system in the RECIRC mode for ten minutes with the blower on its highest speed. Use the highest heat mode to dry out the system and keep the compressor from engaging by disconnecting the wiring connector at the compressor (see Section 14).

32 The disinfectant can usually comes with a long spray hose. Remove the passenger compartment air filter, point the nozzle inside the hole and to the left towards the evaporator core, and spray according to the manufacturer's recommendations (see illustration). Try to cover the whole surface of the evaporator core, by aiming the spray up, down and sideways. Follow the manufacturer's recommendations for the length of spray and waiting time between applications. The manufacturer recommends running the engine for 20 minutes while repeating the procedure in Step 30 to dry the evaporator core again.



12.32 With the passenger compartment air filter removed, spray the disinfectant at the evaporator core

33 Once the evaporator has been cleaned, the best way to prevent the mildew from coming back again is to make sure your evaporator housing drain tube is clear (see illustration 12.1).

AUTOMATIC HEATING AND AIR CONDITIONING SYSTEMS

34 Some models are equipped with an optional automatic climate control system. This system has its own computer that receives input from various sensors in the heating and air conditioning system. This computer, like the PCM, has self diagnostic capabilities to help pinpoint problems or faults within the system. Vehicles equipped with automatic heating and air conditioning systems are very complex and considered beyond the scope of the home mechanic. Vehicles equipped with automatic heating and air conditioning systems should be taken dealer service department or other qualified facility for repair.

13 Air conditioning accumulator/drier - removal and installation

REMOVAL

Refer to illustration 13.2

WARNING:

The air conditioning system is under high pressure. DO NOT loosen any fittings or remove any components until after the system has been discharged. Air conditioning refrigerant must be properly discharged into an EPA-approved container at a dealership service department or an automotive air conditioning repair facility. Always wear eye protection when disconnecting air conditioning system fittings.

1 Have the air conditioning system discharged (see Warning above). Disconnect the cable from the negative terminal of the battery.

CAUTION:

On models equipped with the Theftlock audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front of this manual).

2 Disconnect the refrigerant inlet and outlet lines (see illustration). Loosen each nut and remove the fittings from the retaining stud(s). Cap or plug the open lines immediately to prevent the entry of dirt or moisture.

3 Disconnect the electrical connector from the pressure cycling switch.

4 Loosen the clamp bolt on the mounting bracket and slide the accumulator/drier assembly up and out of the engine compartment.

INSTALLATION

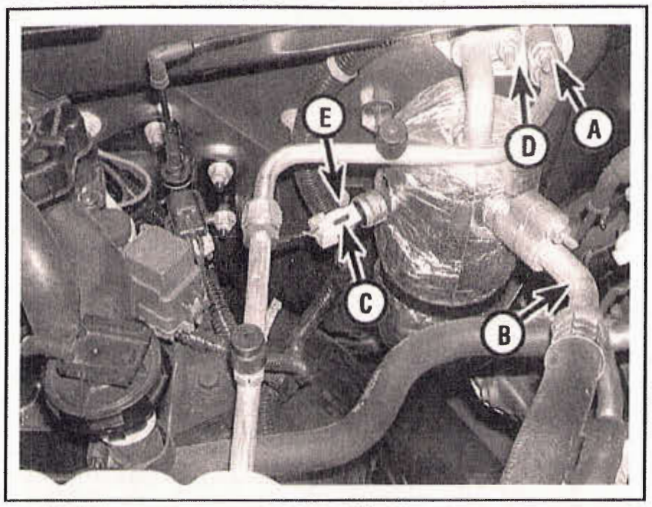
5 If you are replacing the accumulator/drier with a new one, add one ounce of fresh refrigerant oil to the new unit (oil must be R-134a compatible).

6 Place the new accumulator/drier into position in the bracket.

7 Install the inlet and outlet lines, using clean refrigerant oil on the new O-rings. Tighten the mounting bolt securely.

8 Connect the cable to the negative terminal of the battery.

9 Have the system evacuated, recharged and leak tested by a dealership service department or an automotive air conditioning repair facility.



13.2 Accumulator mounting details

A Evaporator line fitting nut
B Compressor hose
C Pressure cycling switch
D Accumulator line fitting nut
E Mounting bracket bolt

14 Air conditioning compressor - removal and installation

REMOVAL

Refer to illustrations 14.6a and 14.6b

WARNING:

The air conditioning system is under high pressure. DO NOT loosen any fittings or remove any components until after the system has been discharged. Air conditioning refrigerant must be properly discharged into an EPA-approved container at a dealership service department or an automotive air conditioning repair facility. Always wear eye protection when disconnecting air conditioning system fittings.

Note 1: The accumulator/drier (see Section 13) should be replaced whenever the compressor is replaced.

Note 2: Whenever the compressor is replaced because of internal damage, the expansion (orifice) tube should also be replaced (see Section 16).

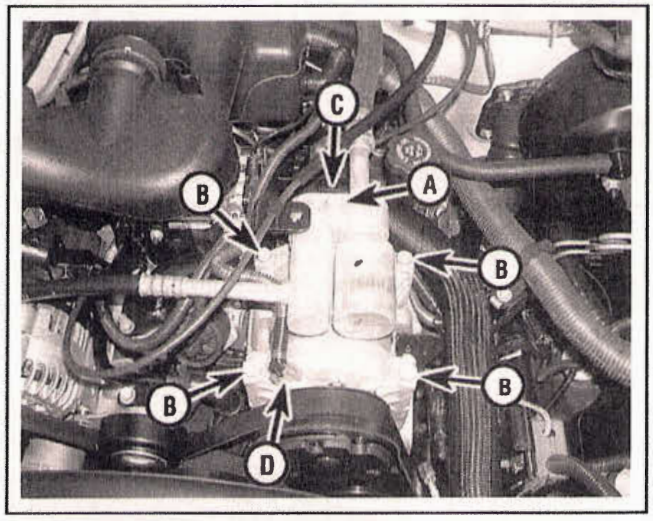
1 Have the air conditioning system discharged (see Warning above). Disconnect the cable from the negative terminal of the battery.

CAUTION:

On models equipped with the Theftlock audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front of this manual).

2 Clean the compressor thoroughly around the refrigerant line fittings.

3 Remove the serpentine drivebelt (see Chapter 1).



14.6a Air conditioning compressor mounting details - V6 engine

A Refrigerant line mounting bolt
B Compressor mounting bolts
C High pressure cycling switch electrical connector
D Compressor clutch electrical connector

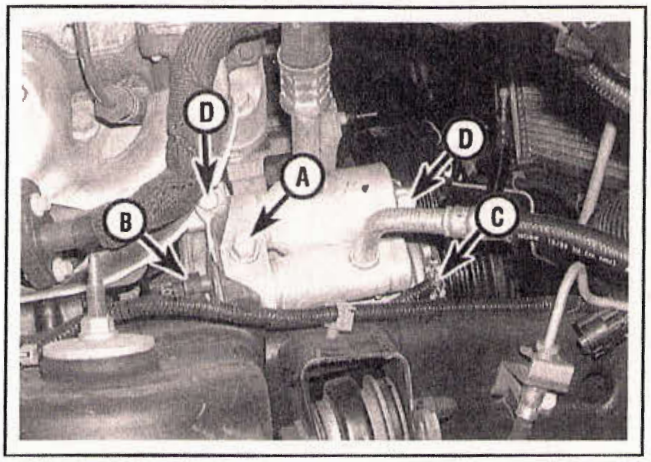
4 On V8 engines, loosen the right front wheel lug nuts. Raise the vehicle and support it securely on jackstands. Remove the plastic inner fenderwell. On V6 engines detach the accelerator cable bracket.

5 Disconnect the electrical connector(s) from the air conditioning compressor.

6 Disconnect the suction and discharge lines from the compressor. Both lines are mounted to the compressor with a manifold secured by one bolt. Plug the open fittings to prevent the entry of dirt and

moisture, and discard the seals between the plate and compressor (see illustrations).

7 Remove the compressor mounting bolts. Detach the compressor from the mounting bracket and remove the compressor from the e compartment.



14.6b Air conditioning compressor mounting details - V8 engines

A Refrigerant line mounting bolt
B High pressure cycling switch electrical connector
C Compressor clutch electrical connector
D Compressor mounting bolts (lower two bolts not visible)

INSTALLATION

8 If a new compressor is being installed, pour the oil from the compressor into a graduated container and add that exact amount new refrigerant oil to the new compressor. Also follow any directio included with the new compressor.

➡Note: Some replacement compressors come with refriger oil in them. Follow the directions with the compressor regai the draining of excess oil prior to installation.

CAUTION:

The oil used must be labeled as compatible with R-134a ref erant systems.

9 Installation is the reverse of the disassembly. When installing line fitting bolt to the compressor, use new seals lubricated with cle refrigerant oil, and tighten the bolt securely.

10 Reconnect the cable to the negative terminal of the battery.

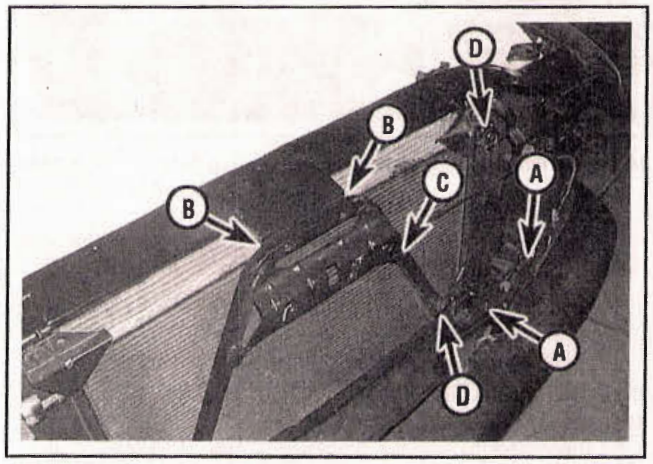
11 Have the system evacuated, recharged and leak tested by a dealership service department or an automotive air conditioning rep facility.

15 Air conditioning condenser - removal and installation

Refer to illustrations 15.4 and 15.5

WARNING:

The air conditioning system is under high pressure. DO NOT loosen any fittings or remove any components until after the system has been discharged. Air conditioning refrigerant must be properly discharged into an EPA-approved container at a dealership service department or an automotive air conditioning repair facility. Always wear eye protection when disconnecting air conditioning system fittings.



15.4 Hood latch support brace mounting details

A Lower mounting bolts
B Upper mounting bolts
C Hood latch support brace
D Power steering cooler mounting bolts

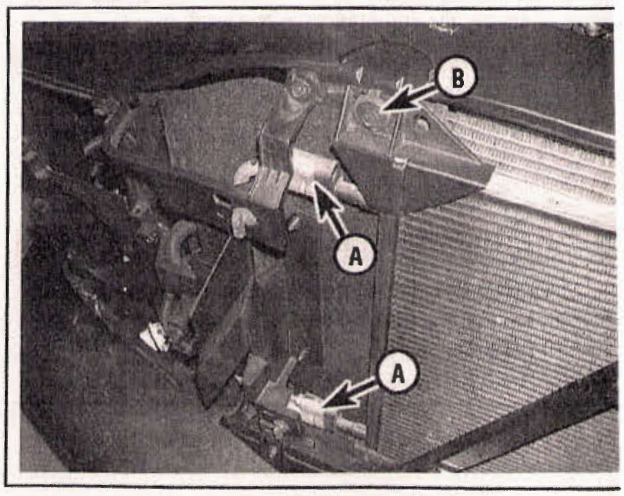
➡Note: The accumulator/drier should be replaced if the condenser was damaged, causing the system to be open for son time (see Section 13).

1 Have the air conditioning system discharged (if equipped) at dealer service department or service station.

2 Disconnect the cable from the negative terminal of the battery

CAUTION:

On models equipped with the Theftlock audio system, be sur the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front this manual).



15.5 Disconnect the refrigerant lines (A) and the condenser mounting bolt (B) on the passenger side

3 On 1999 and 2000 models, refer to Chapter 11 and remove the radiator grille, then refer to Chapter 12 and remove the headlight housings. On 2001 and later models, remove the radiator (see Section 5).

4 On 1999 and 2000 models, remove the hood latch release cable from the hood latch (see Chapter 11). Remove the power steering cooler (if equipped) and the hood latch support brace from the vehicle (see illustration).

5 Disconnect the refrigerant lines from the condenser and the remaining condenser mounting bolt (see illustration). Plug the open ends of the condenser and the disconnected refrigerant lines to prevent entry of dirt or moisture. Remove the condenser from the vehicle.

6 Inspect the rubber insulator pads (on the lower crossmember) on which the radiator sits. Replace them if they're dried or cracked.

7 If the original condenser will be reinstalled, store it with the line fittings on top to prevent oil from draining out. If a new condenser is being installed, pour one ounce of R-134a-compatible refrigerant oil into it prior to installation.

8 Reinstall the components in the reverse order of removal. Be sure the rubber pads are in place under the condenser.

9 Have the system evacuated, recharged and leak tested by the shop that discharged it.

16 Air conditioning expansion (orifice) tube - removal and installation

Refer to illustrations 16.2 and 16.5

WARNING:

The air conditioning system is under high pressure. DO NOT loosen any fittings or remove any components until after the system has been discharged. Air conditioning refrigerant must be properly discharged into an EPA-approved container at a dealership service department or an automotive air conditioning repair facility. Always wear eye protection when disconnecting air conditioning system fittings.

1 Have the air conditioning system discharged and the refrigerant recovered (see **Warning** above). Disconnect the cable from the negative terminal of the battery.

CAUTION:

On models equipped with the Theftlock audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery (see the front of this manual).

2 Open the the hood and locate the expansion orifice tube fitting (see illustration).

16.2 The expansion tube fitting (arrow) is located on the small line leading to the evaporator core

3 Hold the stationary fitting (on the line coming from the condenser) with one wrench, then loosen the other fitting with another wrench.

4 The expansion tube is a tube with a fixed-diameter orifice and a mesh filter at each end. When you separate the pipe at the fitting you will see one end of the orifice tube inside the pipe leading to the evaporator. Use needle-nose pliers to remove the orifice tube.

5 The orifice tube acts to meter the refrigerant, changing it from a high-pressure liquid to a low-pressure gas. It is possible to reuse the orifice tube if (see illustration):

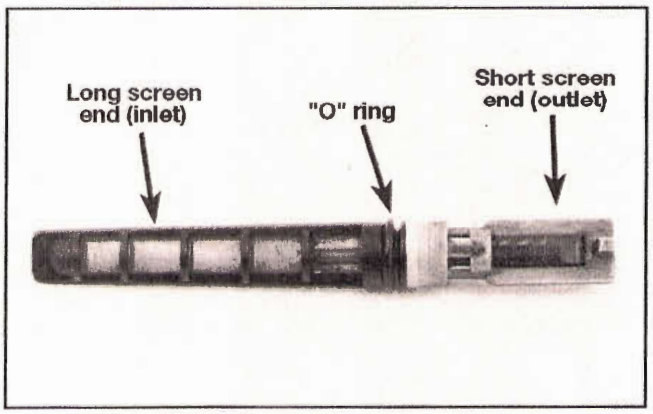
a) The screens aren't plugged with grit or foreign material
b) Neither screen is torn
c) The plastic housing over the screens is intact
d) The brass orifice inside the plastic housing is unrestricted

6 Installation is the reverse of removal. Be sure to insert the expansion tube with the shorter end in first, toward the evaporator

CAUTION:

Always use a new O-ring when installing the expansion (orifice) tube.

7 Reconnect the refrigerant line and tighten the fitting securely, then have the system evacuated, recharged and leak-tested by the shop that discharged it.



16.5 The expansion tube is equipped with a tapered mesh screen that must be cleaned and must not have any holes or damage

Specifications

General

Coolant capacity	See Chapter 1
Coolant reservoir pressure cap rating	15 psi
Refrigerant type	R-134a
Refrigerant capacity	
1999 and 2000	
Standard (front A/C only)	2.0 pounds
With rear air conditioning	2.5 pounds
2001 and 2002	
Standard (front A/C only)	1.8 pounds
With rear air conditioning	
Tahoe/Yukon	2.7 pounds
All others	3.0 pounds
2003 and later	
Standard (front A/C only)	1.6 pounds
With rear air conditioning	
Tahoe/Yukon	2.7 pounds
All others	3.0 pounds

Torque specifications	Ft-lbs (unless otherwise indicated)
Engine cooling fan-to-fan clutch bolts	17
Engine cooling fan clutch nut	41
Thermostat housing nuts/bolts	
V6 engine	168 in-lbs
V8 engines	132 in-lbs
Water pump attaching bolts	
V6 engine	33
V8 engines	
Step one	132 in-lbs
Step two	22
Water pump pulley bolts	
V6 engine	18
V8 engines (if applicable)	
Step one	89 in-lbs
Step two	18