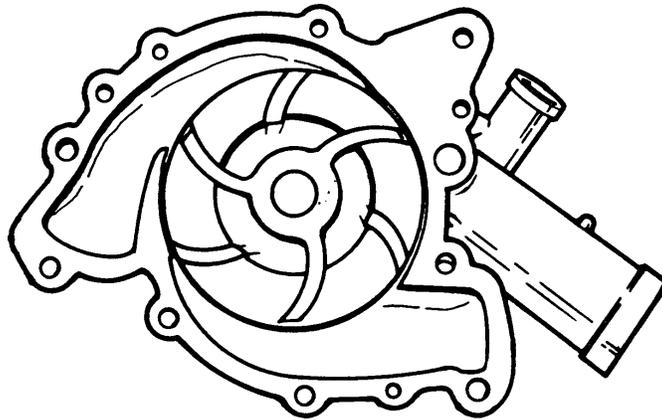




# ***HOW - TO WATER PUMPS***



## ***Tool And Material Checklist***

- |   |  |
|---|--|
| <input type="checkbox"/> Thick Rag        | <input type="checkbox"/> Tap                       |
| <input type="checkbox"/> Drain Pan        | <input type="checkbox"/> Non-hardening Sealer      |
| <input type="checkbox"/> Pliers           | <input type="checkbox"/> Clamps                    |
| <input type="checkbox"/> Wrenches         | <input type="checkbox"/> Belt Tension Gauge        |
| <input type="checkbox"/> Ratchet Wrenches | <input type="checkbox"/> Hydrometer                |
| <input type="checkbox"/> Screwdriver      | <input type="checkbox"/> Antifreeze                |
| <input type="checkbox"/> Scraper          | <input type="checkbox"/> Safety Glasses or Goggles |
| <input type="checkbox"/> Wire Brush       |  |

*\* This How-To Guide is designed as a general overview of a vehicle repair procedure. You should always refer to a service manual designed for your vehicle for detailed instructions. Parts Plus assumes no liability for an incorrect procedure.*

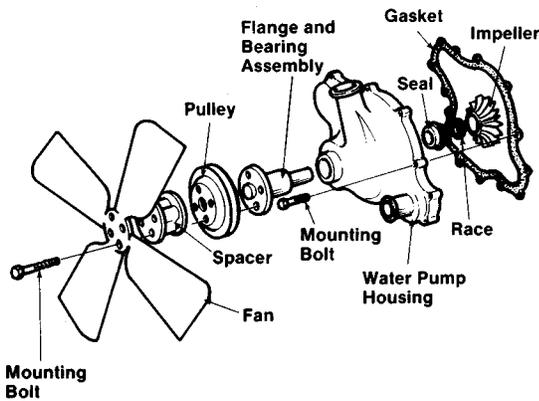
The water pump is the heart of the auto cooling system. Belt driven by the crankshaft, it circulates the coolant through the engine block and radiator. The water pump is located between the radiator and the front of the block, and consists of an impeller, shaft and bearing, fan pulley hub, and seals. The impeller, mounted on the shaft, has curved vanes or blades, when turned, they throw the coolant outward by centrifugal force. This pushes the coolant through the pump outlet and into the cylinder block.

## PUMP FAILURE

There are three problems that can lead to failure of the water pump; seal failure, worn bearings, and, in rare cases, impeller breakage or slippage.

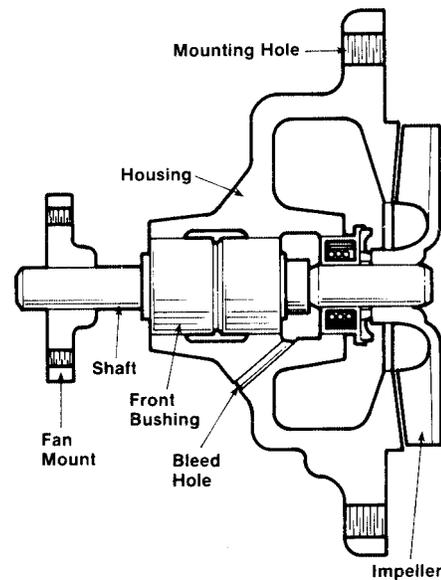
## SEAL FAILURE

This is the most common malfunction. Seal failure makes itself known when coolant trickles down from the pump's bleed hole, which is located on the underside of the pump housing. Inspecting the bleed hole might require using a small mirror or getting underneath the car.



Components of a water pump

The bleed hole is important because it allows coolant to run out of the engine before it can contaminate the shaft bearings.



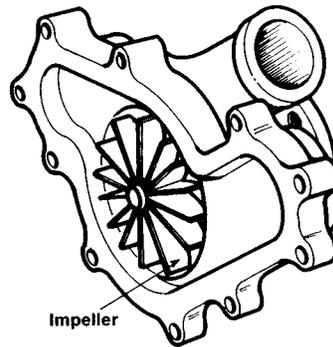
Location of a bleed hole

## WORN BEARINGS

A loud, shrill noise is one sign of worn shaft bearings. Excess play in the shaft is another indication that a problem exists. To check for excess play, remove the fan belt (as explained later in this booklet), then firmly grasp the fan and try to move it vertically and horizontally. Excessive shaft movement of 1/4" or more will eventually damage the seals. **NOTE:** It is difficult to perform this test on cars with freewheeling fans because the viscous unit has so much built-in movement.

## IMPELLER BREAKAGE / SLIPPAGE

This failure is the rarest of the three and is usually preceded by one of the other two. An impeller that is damaged or slipping on the shaft will not pump enough coolant through the system. Checking the impeller requires removing the pump and visually examining it. In some cases, a cover must also be removed.



Location of the impeller

When a water pump fails, replace it with either a new or factory-rebuilt unit. (Frequently, a rebuilt pump is only half the cost of a new one and will last just as long.) Do not try to rebuild the old pump. Although many service manuals give detailed water pump overhaul procedures, it is a job better left to the professional. During the manufacturing process, special procedures are used to install the pump shaft seal so that it will not leak; these procedures would be hard for the amateur mechanic to duplicate.

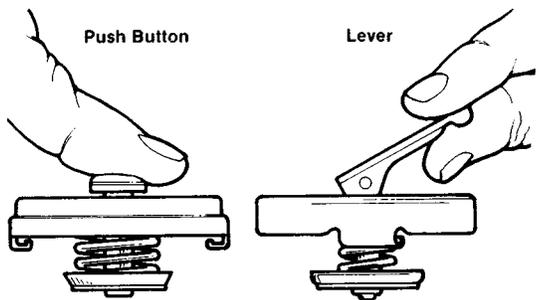
**NOTE:** Always wear safety glasses or goggles when doing any work on a running engine or around a hot radiator.

## WATER PUMP REPLACEMENT

Because this procedure is rather lengthy, it is important to do it in the order it is presented. Be careful not to skip any steps. Also, keep in mind that some aspects of this procedure do not apply to cars with transverse engines.

## DRAINING THE COOLANT

1. Wait until the engine is cool.
2. Relieve the cooling system pressure. To do this, some radiator pressure caps have a lever to flip or a button to hold in; others are simply turned.
3. Use a thick rag to cover the cap while removing it slowly. Be ready to move out of the way—the coolant might still spray out.
4. Place a clean drain pan under the



Two types of radiator pressure caps

radiator petcock. If the radiator does not have a petcock, the lower radiator hose will have to be removed to drain it; see the section “**Removing the Hoses**”.

5. Use pliers to loosen the petcock so that the coolant can drain out. Be careful: the coolant might still be hot.

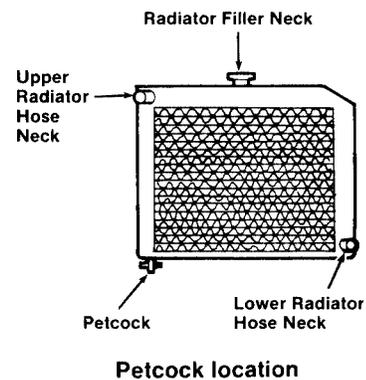
## REMOVING THE BELTS

1. Loosen the mounting and adjustment bolts that accompany the belt closest to the radiator.
2. Move the component toward the fan.
3. For reassembly purposes, make a note of which grooves the belt rides in.
4. Remove the belt.

5. Repeat steps 1 to 4 with every belt in front of the fan belt. On many cars the brackets holding such components as the alternator, A/C compressor, power steering pump, and air pump are also attached to the water pump. In such cases, removal of the component might be necessary. Always remove the positive battery cable before starting.

**NOTE:** Some belts (for example, the alternator belt) are removed by loosening an idler pulley instead of a component.

To remove the fan belt, the same procedure is



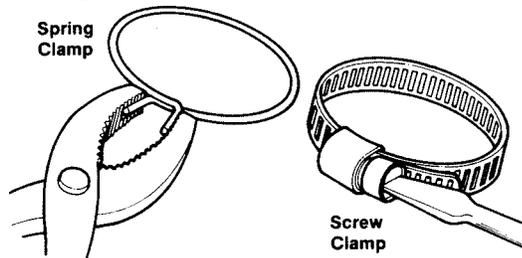
used. First, loosen the alternator’s mounting and adjustment bolts. Push the alternator toward the fan, and then remove the fan belt.

# REMOVING THE HOSES

1. Loosen the clamp securing the hose to the water pump. Screw clamps must be loosened with a screwdriver; spring clamps are squeezed with hose clamp pliers.

2. Slide the clamp back along the hose so that it is out of the way.

3. Mark the hose for identification when reassembling.



Two types of hose clamps

4. Twist the hose loose from its fitting.

5. If the hose cannot be removed in this manner, cut a slit several inches long in it, beginning at the end. Then use a screwdriver to pry off the hose. (Of course, the hose will have to be replaced.)

6. Scrape or sand off all debris on the fitting and wipe it clean.

**NOTE:** On some vehicles, the radiator fan shroud must be removed as part of the water pump removal.

## REMOVING THE WATER PUMP

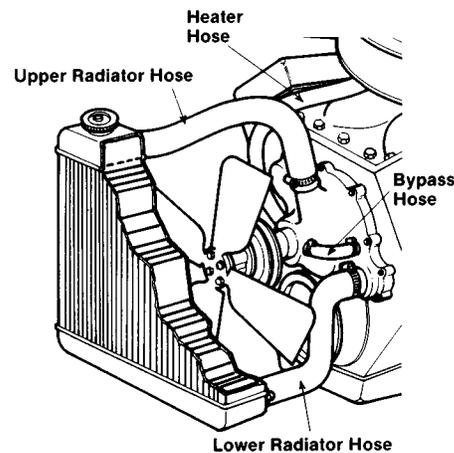
1. If the front of the fan is not identified, mark the front of one of the blades to ensure correct reinstallation.

2. Use a wrench to remove the bolts holding the fan to the water pump.

3. Remove the fan.

4. Use a ratchet wrench to loosen the bolts holding the water pump to the engine block.

5. Remove only one bolt at a time from the water pump. If the bolt is rusted (due to leaking coolant) clean it using a wire brush. Screw



Water pump hoses

a tap into the bolt hole to push the rust out of the grooves.

6. Place the bolt in the corresponding hole of the replacement pump.

**NOTE:** Because the bolts might differ in size and length, remove only one bolt at a time. This will ensure proper installation of the new pump.

7. Remove the old water pump.

8. Stuff a lint-free rag into the opening behind the pump to keep out debris.

9. Scrape the old gasket material and sealer from the water pump mounting surface and wipe it clean.

10. Remove the rag from the opening.

## INSTALLING THE NEW PUMP

1. Apply sealer to the side of the new gasket that fits against the engine block.

2. Place the gasket on the engine block's mounting surface.

3. Apply sealer to the other side of the gasket.

4. Being careful not to drop the bolts, position the new water pump over the gasket and mounting surface.

5. Start all the bolts by hand only.

**NOTE:** Use non-hardening sealer on the threads of the bolts to minimize any further corrosion.

6. Tighten the bolts evenly and securely using a ratchet wrench.

7. Replace the fan on the end of the pump.

8. Install and securely tighten the mounting bolts with a wrench.

9. If applied, reinstall the radiator fan shroud at this time.

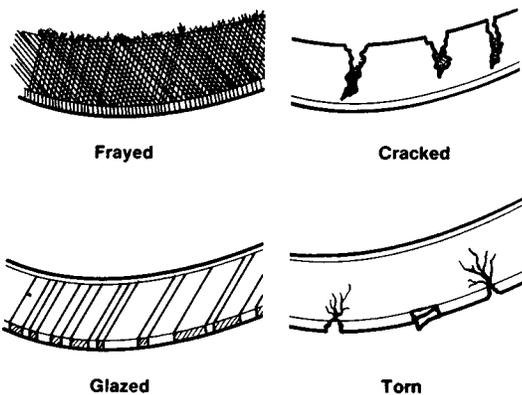
## INSTALLING THE HOSES

If any hose was cut for removal, it must be replaced. And if one hose is replaced, it is recommended that all of them be replaced. This will reduce the possibility of a future hose failure.

If possible, purchase preformed hoses designed for your make and model car. If these are not available, use flexible hoses. They can be used in place of preformed hoses provided they are the proper size and length. The lower radiator hose must be a wire-reinforced type designed to withstand the suction created by the water pump.

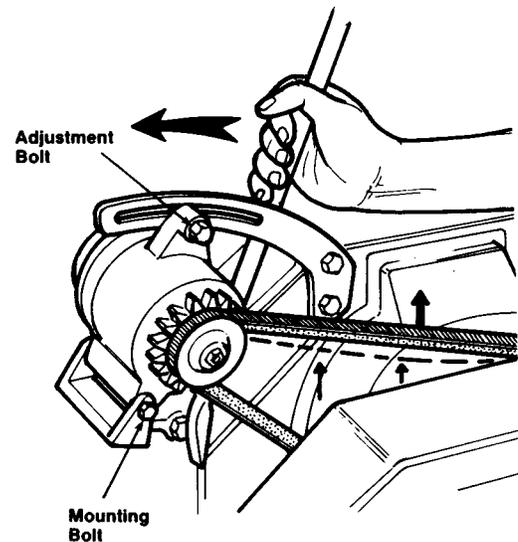
Since hose clamps have a limited life span, purchase new ones unless the old clamps are in excellent shape. Make sure they are the right size. Following are the installation instructions for hoses:

1. Coat the fitting of the water pump with gasket sealer to ensure a good connection.
2. Slip the new hose clamp onto the hose.
3. Mount the hose on the fitting.
4. Slide the clamp into position approximately 1" from the end of the hose. Tighten the screw (if applicable).



Signs of defective belts

## INSTALLING THE BELTS



Tightening a belt

Before reinstalling belts, check for frayed edges, tears, cuts, cracks, polished sides, brittleness, and oil spots. Replace any defective belts and make sure any new belts are the right size.

1. Using the notes made earlier, route each belt on the appropriate pulleys beginning with the belt closest to the engine and working out toward the radiator.

**WARNING:** Using a screwdriver to stretch a new belt over the pulleys weakens the belt; do not try it. Instead, move the pulleys closer together by pushing the appropriate component toward the engine block. Loosen the mounting and adjustment bolts, if necessary.

2. With the belts in place, tighten them by prying back the appropriate components with a pry bar. Be careful not to damage any component, especially the power steering pump, which is housed in relatively soft sheet metal.

3. As each belt is held taut, tighten the mounting and adjustment bolts. Check the owner's manual for the correct belt tensions, and use a belt tension gauge to accurately adjust each belt. If the belt is too tight or too loose, it will wear quickly. A belt that is too tight will also strain the bearings.

4. Check again to see that all belts are installed on the correct pulleys.

# ***REPLACING THE COOLANT***

1. Close the radiator drain petcock.
2. Use a hydrometer to check the protection level of the coolant that was removed from the radiator earlier.

3. Replace all or part of the coolant as needed.

**NOTE:** Use only an ethylene glycol-based antifreeze containing rust and corrosion inhibitors. Read the label to make sure that a 50/50 mixture of the antifreeze provides protection against freezing to -34°F.

4. Reinstall the radiator pressure cap.

## ***FINAL CHECKS***

1. Start the engine. Turn on the heater so that the coolant fills up the heater core.

2. Visually check the hoses for leaks. Check the coolant level after the engine has been running for 10 minutes.

3. Once the engine reaches its normal operating temperature, shut it off and allow it to cool.

4. Remove the radiator cap in the manner described earlier.

5. Recheck the coolant level; it should be 1" below the radiator filler neck. Make sure that the expansion tank is filled to the proper level.

6. Replace the cap.

7. Check the alignment and tension of all the belts again.

8. After about a month, check the tensions once more because new belts tend to stretch a little.