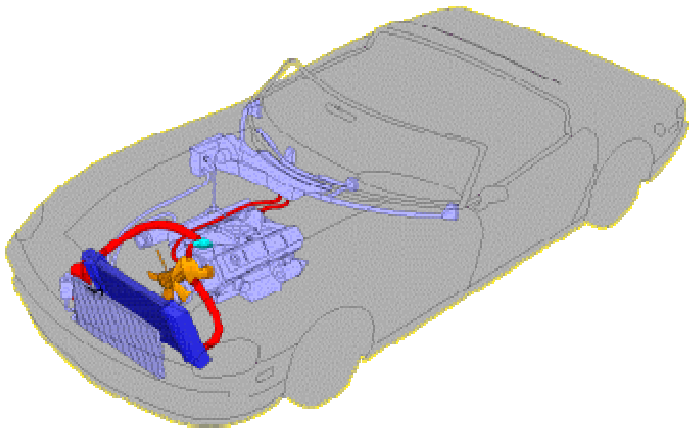
Cooling System Overview



Below is an explanation of this system's operation

The Cooling System

The purpose of the engine's cooling system is to remove excess heat from the engine, to keep the engine operating at its most efficient temperature, and to get the engine up to the correct temperature as soon as possible after starting. Ideally, the cooling system keeps the engine running at its most efficient temperature no matter what the operating conditions are.

As fuel is burned in the engine, about one-third of the energy in the fuel is converted into power. Another third goes out the exhaust pipe unused, and the remaining third becomes heat energy.

A cooling system of some kind is necessary in any internal combustion engine. If no cooling system were provided, parts would melt from the heat of the burning fuel, and the pistons would expand so much they could not move in the cylinders (called "seize").

The cooling system of a water-cooled engine consists of: the engine's water jacket, a thermostat, a water pump, a radiator and radiator cap, a cooling fan (electric or belt-driven), hoses, the heater core, and usually an expansion (overflow) tank.

Fuel burning engines produce enormous amounts of heat; temperatures can reach up to 4,000 degrees F when the air-fuel mixture burns. However, normal operating temperature is about 2,000 degrees F. The cooling system removes about one-third of the heat produced in the combustion chamber.

The exhaust system takes away much of the heat, but parts of the engine, such as the cylinder walls, pistons, and cylinder head, absorb large amounts of the heat. If a

part of the engine gets too hot, the oil film fails to protect it. This lack of lubrication can ruin the engine.

On the other hand, if an engine runs at too low a temperature, it is inefficient, the oil gets dirty (adding wear and subtracting horsepower), deposits form, and fuel mileage is poor-- not to mention exhaust emissions! For these reasons, the cooling system is designed to stay out of the action until the engine is warmed up.

There are two types of cooling systems; liquid cooling and air cooling. Most auto engines are cooled by the liquid type; air cooling is used more frequently for airplanes, motorcycles and lawnmowers.

Liquid cooled engines have passages for the liquid, or coolant, through the cylinder block and head. The coolant has to have indirect contact with such engine parts as the combustion chamber, the cylinder walls, and the valve seats and guides. Running through the passages in the engine heats the coolant (it absorbs the heat from the engine parts), and going through the radiator cools it. After getting "cool" again in the radiator, the coolant comes back through the engine. This business continues as long as the engine is running, with the coolant absorbing and removing the engine's heat, and the radiator cooling the coolant.

A cooling system pressure tester is used to check the pressure in the cooling system, which allows the mechanic to determine if the system has any slow leaks. The leak can then be found and fixed before it causes a major problem.

The Heater Core

The heater core is a smaller version of the radiator that is used to keep your toes warm when it's cold outside.

The heater core is mounted under the dash board. Some of the hot coolant is routed through this little radiator, by more hoses. A small electric fan is also mounted there especially for the purpose of directing the heat inside the car. To turn this fan on, you use a switch called "fan" or "blower," located on your control panel. The principle is exactly the same as the one used in the radiator for your engine, except that the heat is released inside the car instead of outside. Most engines use the heater core to warm the air coming from the air conditioner if the dash setting is not on "cold". More efficient designs don't do this because it makes the engine work harder than it has to. They cycle the compressor on and off to lessen the cooling output.

If your car is running hot, turning the heater on will help to reduce the heat in the engine. Unfortunately, most cars don't overheat in the winter.