

# Modern Automotive Technology Chapter 39

## Cooling System Fundamentals

# Chapter 39

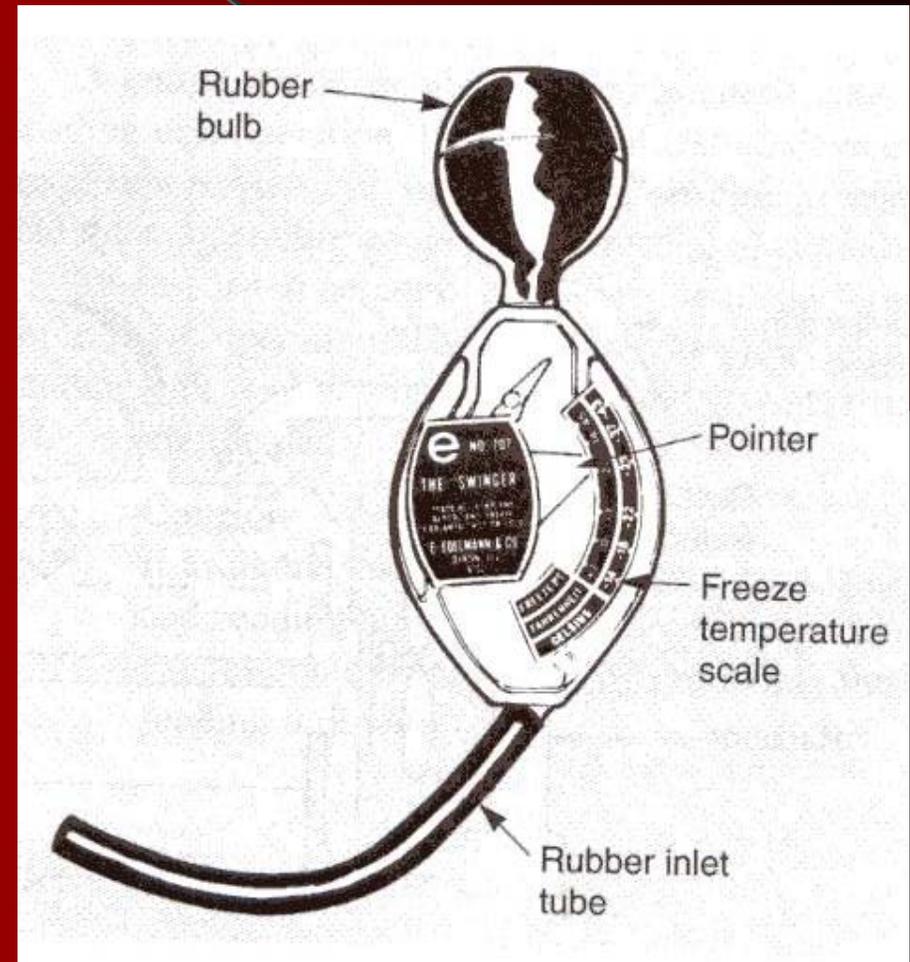
## Cooling System Fundamentals Learning Objectives

- Summarize the functions of a cooling system
- Explain the operation and construction of major cooling system parts and assemblies
- Compare cooling system designs
- Explain the importance of antifreeze
- Discuss safety procedures when working on a cooling system

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## Cooling System Fundamentals

- A 50/50 mixture of antifreeze and water protects the cooling system to  $-34\text{F}^{\circ}$
- The radiator cap usually maintains 12-16 PSI, raising the boiling point of coolant to  $250\text{-}260\text{F}^{\circ}$



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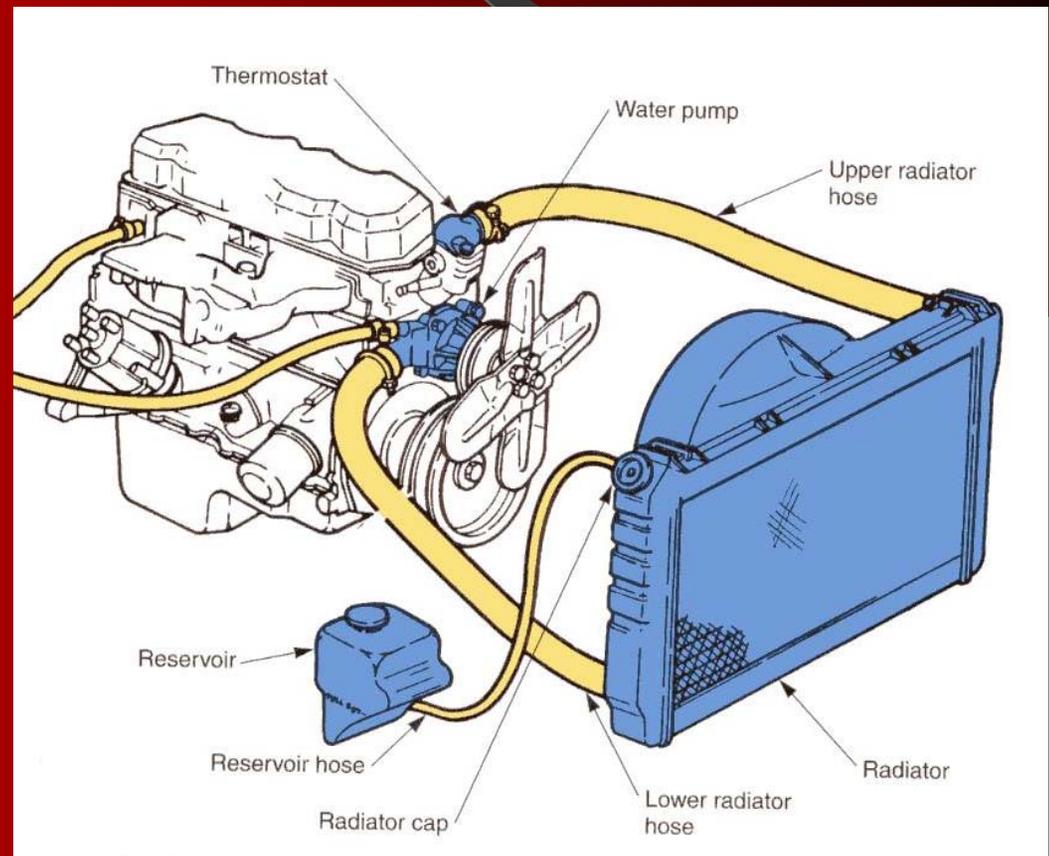
## Cooling System Fundamentals

1. Coolant is forced through the engine and other system parts by the **WATER PUMP**
2. The **RADIATOR** transfers engine coolant heat to outside air

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## Cooling System Fundamentals

- The basic parts of a cooling system are:
- Water Pump
- Radiator Hoses
- Radiator
- Cooling Fan
- Thermostat
- Radiator Cap



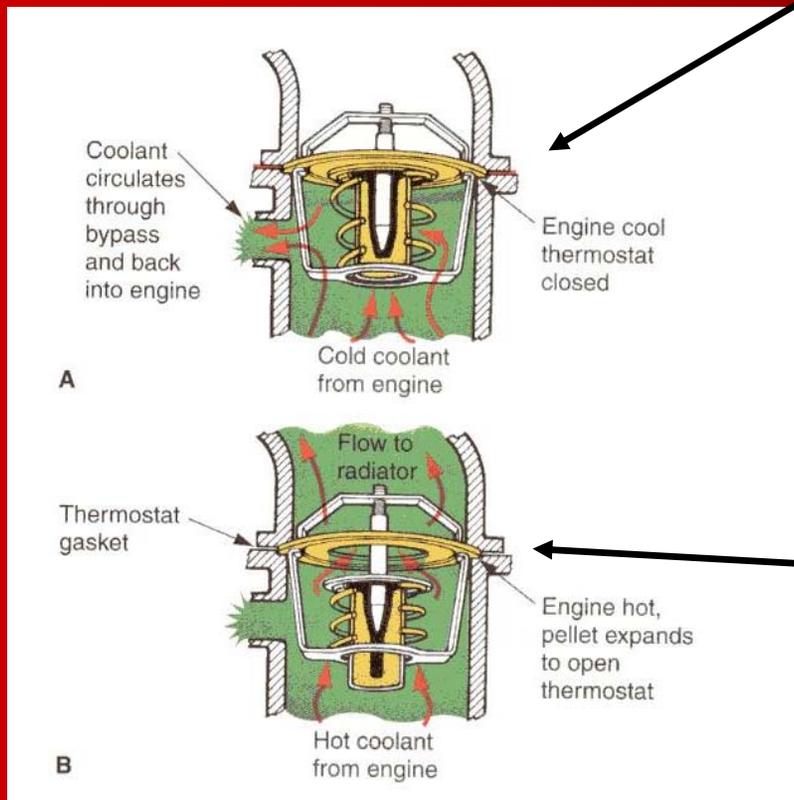
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## Cooling System Fundamentals

3. Coolant flow and engine operating temperature are controlled by the THERMOSTAT
4. ANTIFREEZE is mixed with water to produce engine coolant

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## Cooling System Fundamentals



A: When the coolant is cold, the thermostat stays closed due to spring tension — the water pump circulates coolant in the engine, but not through the radiator

B: When the coolant is hot the thermostat opens, allowing coolant to pass through the radiator

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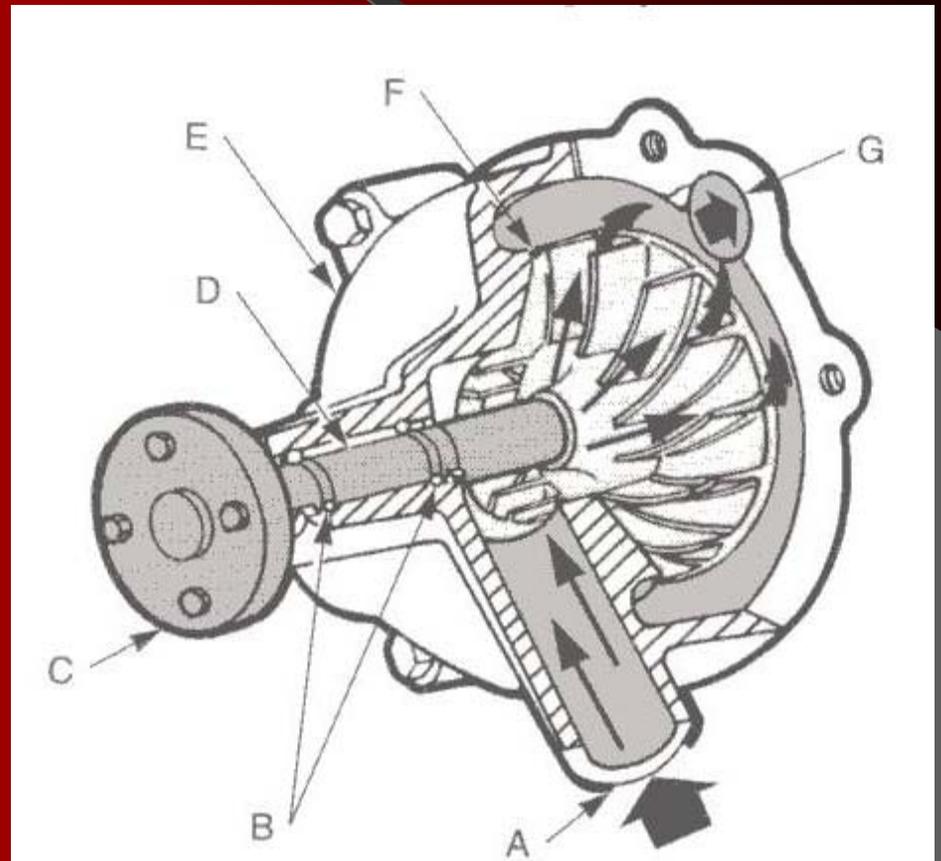
## Cooling System Fundamentals

5. The **BYPASS VALVE** permits coolant circulation through the engine when the thermostat is closed
6. The fan or **THERMO SWITCH** is a temperature sensitive switch that controls fan motor operation.

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## Cooling System Fundamentals

- A. Inlet from Radiator
- B. Sealed Bearings
- C. Fan Hub
- D. Pump Shaft
- E. Housing
- F. Impeller
- G. Outlet to Water Jackets



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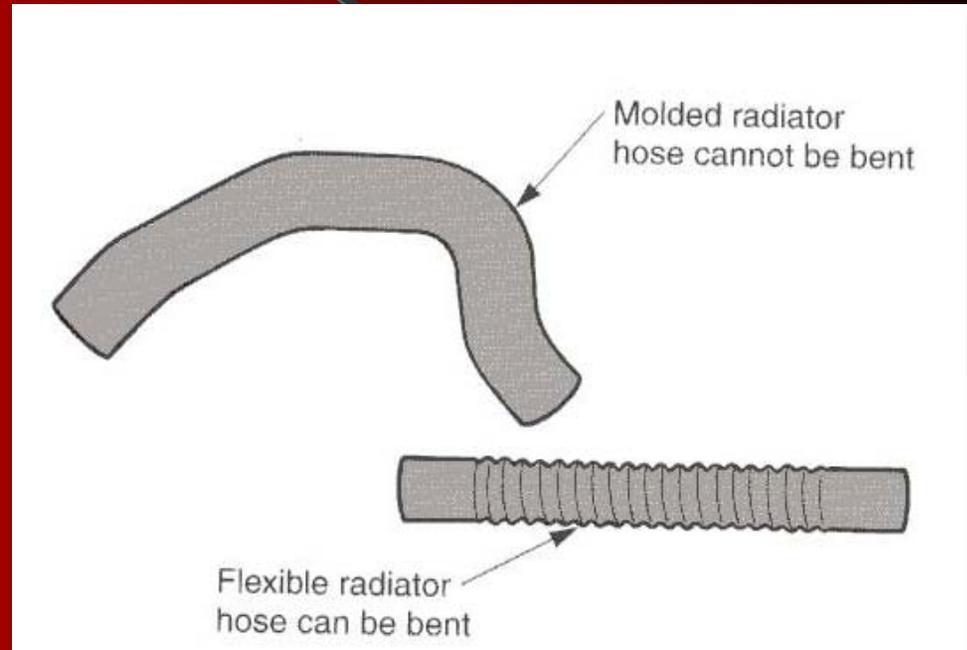
## Cooling System Fundamentals

7. The engine is connected to the radiator by the **RADIATOR HOSES**
8. The **FAN** draws air through the radiator

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## Cooling System Fundamentals

- A molded hose is manufactured in a special shape, with bends to clear other engine or cooling system parts
- A flexible hose has an accordion shape and can be bent into different angles



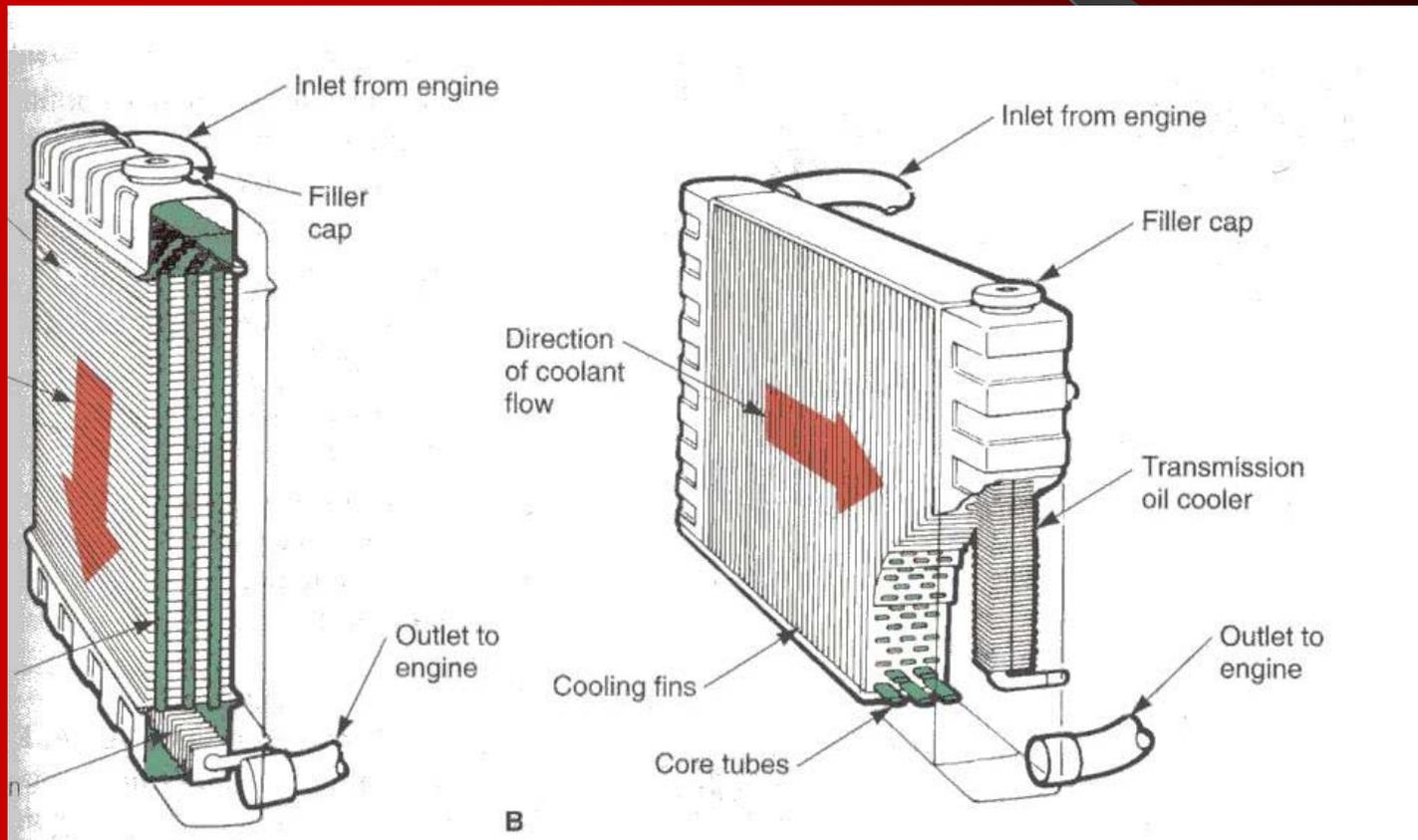
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## Cooling System Fundamentals

9. A disc with fan-like blades inside the water pump that spins and produces pressure and flow is known as the **WATER PUMP IMPELLER**
10. The center section of the radiator made up of tubes and cooling fins is called the **CORE**

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## Cooling System Fundamentals



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## Cooling System Fundamentals

- The cooling system quickly increase the temperature of a cold engine, removes excess heat from the engine and maintains constant engine temperature
- Never remove the radiator cap until the engine cools down
- Used coolant must be removed by a certified recycling company, and never poured down the drain

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