

Chapter 9 Cooling System Operation and Diagnosis

NAME _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1. What is normal coolant operating temperature?

2. Explain the flow of coolant through the engine and radiator.

3. Why is a cooling system pressurized?

4. What is the purpose of the coolant system bypass?

5. What are 10 common causes of overheating?

6. Describe how to perform a drain, flush, and refill procedure performed on a cooling system.

7. Explain the operation of a thermostatic cooling fan.

8. Describe how to diagnose a heater problem.

Answer Key

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1. Normal operating temperature is within the range of the thermostat rating. A thermostat with a rating of 195°F will start to open at 195°F and be fully open by 215°F.

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2. Most automotive engines use the coolant pump to circulate coolant through the engine block then cylinder head(s) through the thermostat to the upper portion of the radiator. After losing its heat in the radiator, the coolant is drawn through the lower radiator hose to the inlet opening of the coolant pump where the cycle of events is repeated.

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3. A cooling system is pressurized to prevent boiling until above the normal boiling point of the coolant and to help prevent cavitation (bubbles or foaming) inside the coolant pump.

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4. The bypass allows coolant to circulate (to prevent hot spots) by the coolant pump within the engine before the thermostat opens. Therefore, the bypass actually is a passage that bypasses the thermostat.

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5. Ten causes of overheating include:

- a. low coolant level
- b. clogged radiator
- c. defective cooling fan
- d. incorrect ignition timing
- e. defective coolant pump belt
- f. defective pressure cap
- g. defective coolant pump
- h. defective thermostat
- i. frozen coolant
- j. engine problem

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6. Cooling system service involves draining the system and forcing water (sometimes with chemical cleaners) through the system and refilling the system with a 50/50 solution of antifreeze and water. Care should be exercised to be assured that all air is burped from the system.

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7. A thermostatic cooling fan senses air temperature and through a silicone coupling fan drive engages the engine-driven cooling fan only when needed.

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8. To diagnose a heater problem, first feel the radiator hoses to see that the coolant is hot enough. If the thermostat and coolant level is okay, feel the temperature of the heater hoses; both should be hot.

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