

Automotive Technology 6th Edition

Chapter 21 – Cooling System Operation and Diagnosis

Lesson Plan



CHAPTER SUMMARY:

1. Cooling system purpose, function, and operation
 2. Thermostats, radiators and pressure caps
 3. Coolant system recovery and water pumps
 4. Coolant flow in the engine, cooling fans, and heater cores
 5. Cooling system testing, temperature warning light, and cooling system inspection and service
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OBJECTIVES:

1. Explain the purpose and function of the cooling system, and cooling system operation.
 2. Explain the purpose of thermostats, radiators, pressure caps, and water pumps.
 3. Explain coolant flow in the engine and coolant recovery systems.
 4. Explain the purpose of cooling fans and heater cores.
 5. Describe cooling system testing and explain the purpose of coolant temperature warning light.
 6. Explain cooling system inspection and cooling system service.
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RESOURCES: (All resources may be found at <http://www.jameshalderman.com>)

1. Task Sheet ASE (A1-D-1) P-1: Cooling System Tests
 2. Task Sheet ASE (A1-A-3) P-1: Engine Cooling System Identification
 3. Task Sheet ASE (A1-D-1) P-1: Engine Cooling System Inspection
 4. Task Sheet ASE (A1-D-2) P-1, A8-A-10) P-1: Radiator Testing with an Infrared Pyrometer
 5. Task Sheet ASE (A1-D-3) P-1: Accessory Drive Belt Inspection
 6. Task Sheet ASE (A1-D-7) P-1: Thermostat Replacement
 7. Task Sheet ASE (A1-D-6) P-2: Radiator Replacement
 8. Task Sheet ASE (A1-D-8) P-1: Engine Fan Inspection and Testing
 9. Task Sheet ASE (A1-D-2) P-1, (A1-A-3) P-1: Identify the Cause of Engine Overheating
 10. Chapter PowerPoint
 11. Chapter Crossword Puzzle and Word Search
 12. Animations: See list at the end of the lesson plan
 13. Videos: See list at the end of the lesson plan
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ACTIVITIES:

1. Task Sheet ASE (A1-D-1) P-1: Have students complete Cooling System Tests Task Sheet.
 2. Task Sheet ASE (A1-A-3) P-1: Have students complete Engine Cooling System Identification Task Sheet.
 3. Task Sheet ASE (A1-D-1) P-1: Have students complete Engine Cooling System Inspection Task Sheet.
 4. Task Sheet ASE (A1-D-2) P-1, A8-A-10) P-1: Have students complete Radiator Testing with an Infrared Pyrometer Task Sheet.
 5. Task Sheet ASE (A1-D-3) P-1: Have students complete Accessory Drive Belt Inspection Task Sheet.
 6. Task Sheet ASE (A1-D-7) P-1: Have students complete Thermostat Replacement Task Sheet.
 7. Task Sheet ASE (A1-D-6) P-2: Have students complete Radiator Replacement Task Sheet.
 8. Task Sheet ASE (A1-D-8) P-1: Have students complete Engine Fan Inspection and Testing Task Sheet.
 9. Task Sheet ASE (A1-D-2) P-1, (A1-A-3) P-1: Have students complete the Identify the Cause of Engine Overheating Task Sheet.
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ASSIGNMENTS:

1. Chapter crossword and word search puzzles.
 2. Complete end of chapter 10 question quiz.
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CLASS DISCUSSION:

1. Review and group discussion chapter Frequently Asked Questions and Tech Tips sections.
 2. Review and group discussion of the five (5) chapter Review Questions.
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NOTES AND EVALUATION:

Videos: (at <http://www.jameshalderman.com>)

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| Heater box removal (time 6:44) | Thermostat (time 1:07) |
| Flushing a heater core (time 9:49) | Thermostat (time 1:40) |
| Plugged heater core (time 9:33) | Radiator (time 3:52) |
| F-150 heater core part 1 (time 7:15) | Coolant tube (time 14:54) |
| F 150 heater core part 2 (time 15:28) | Radiator (time 4:05) |
| Heater core removal (time 9:16) | Water pump replacement (time 2:19) |
| Dodge heater core (time 6:41) | Radiator replacement (time 3:02) |
| Audi heater core (time 6:09) | Belt tensioner (time 3:59) |
| S 10 heater core (time 3:52) | Belt and pulley basics (time 10:58) |
| Thunderbird heater core (time 5:35) | Idler pulley (time 2:50) |
| Chevy 1500 heater core (time 11:59) | Cooling fan diagnosis (time 2:21) |
| Lincoln heater core (time 21:46) | Thermostat (time 0:05) |
| Kia Sportage heater core (time 7:14) | Coolant by pass pipe (time 9:14) |
| Cooling system pressure test (time 9:02) | Thermostat (time 8:27) |
| Cooling system animation (time 0:22) | Coolant temp sensor (time 5:18) |
| Water pump replacement (time 8:36) | Draining the radiator (time 2:33) |
| Thermostat (time 6:20) | Cooling fan (time 5:15) |
| Radiator replacement (time 11:32) | OIL SYSTEM (time 0:54) |
| Water pump and timing belt (time 12:22) | Priming an oil pump (time 4:39) |
| Coolant testing (time 2:11) | Oil cooler inspection (time 2:54) |
| Cooling system (time 4:02) | Oil pump inspection (time 1:49) |
| Replace freeze plugs (time 3:43) | Pressure Testing Cooling Systems (time 11:06) |
| Engine overheat (time 26:09) | How To Replace A Radiator In Your Car (time 3:01) |
| Water pump failure (time 6:00) | How To Replace A Thermostat In Your Car (time 6:57) |
| Does stop leak work (time 8:29) | How To Replace A Water Pump And Timing Belt Yourself (time 3:58) |
| Cooling system check (time 4:12) | How to Replace the Upper Radiator Hose (time 1:52) |
| Water pump (time 2:31) | Heater Hose Replacement (time 9:47) |

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Animations: (at <http://www.jameshalderman.com>)

Thermostat Operation
Coolant Flow-World Engine
Coolant Replacement
Cooling System Heat Store
Fan Clutch Checks
Fan Motor Checks
Overheating Causes
Pressure Cap Operation
Radiator Remove and Replace
Thermostat Electric Assist
Water Pump Operation