

# Automotive Heating and Air Conditioning, 8e

## Chapter 9 Heating System Operation and Diagnosis

### Opening Your Class



KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of <b>Automotive Heating and Air Conditioning, 8e</b> . It correlates material to task lists specified by ASE and NATEF/ASEEducation.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time, which translates into more money.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as a result of attending this session or class.	Explain the chapter learning objectives to the students. <ol style="list-style-type: none"><li>1. Prepare for the ASE Heating and Air Conditioning (A7) certification test content area "A" (A/C System Service, Diagnosis and Repair).</li><li>2. Discuss the operation of heating systems.</li><li>3. Discuss the diagnosis of heating systems.</li><li>4. Explain the operation of electrically heated seats.</li><li>5. Explain the operation of heated and cooled seats.</li><li>6. Explain the operation of heated steering wheel.</li></ol>
Establish the Mood or Climate	Provide a <i>WELCOME</i> , Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.

**NOTE: This lesson plan is based on the 8<sup>th</sup> Edition Chapter Images found on Jim's web site @ [www.jameshalderman.com](http://www.jameshalderman.com)**

**LINK CHP 09:**

**[http://www.jameshalderman.com/links/book\\_hvac/ci/hvac\\_ci\\_ch\\_9.pptx](http://www.jameshalderman.com/links/book_hvac/ci/hvac_ci_ch_9.pptx)**

**These Power Point files contain more than just the images.**

ICONS	Ch09 Heating System Operation & Diagnosis
 	<p><b>1. SLIDE 1 HEATING SYSTEM OPERATION AND DIAGNOSIS</b></p> <p><b>2. SLIDES 2-3 EXPLAIN OBJECTIVES</b></p> <p><b>Check for ADDITIONAL VIDEOS &amp; ANIMATIONS @ <a href="http://www.jameshalderman.com/">http://www.jameshalderman.com/</a> WEB SITE IS CONSTANTLY UPDATED</b></p> <p><b><u>Chapter 9 Heating System</u></b></p> <p><b><u><a href="http://www.jameshalderman.com/links/book_hvac/vid/ch9/video_frame.html">http://www.jameshalderman.com/links/book_hvac/vid/ch9/video_frame.html</a></u></b></p> <p><b><u>Crossword Puzzle (Microsoft Word)_ (PDF)</u></b></p> <p><b><u>Word Search Puzzle (Microsoft Word)_ (PDF)</u></b></p> <p><b>4. SLIDES 4-5 EXPLAIN</b> Operation of Heating Systems</p> <p><b>6. SLIDE 6 EXPLAIN</b> FIGURE 9–1 main parts of a vehicle’s heating system are the heater core, blower, heater hoses, and, in some cases, a heater control valve</p> <p><b><u>HEAT TRANSFER &amp; BOILING</u></b></p> <p><b><u>HEAT TRANSFER</u></b></p> <p><b><u>HEAT TRANSFER THROUGH LATENT HEAT</u></b></p> <p><b><u>HEATER OPERATION</u></b></p> <p><b><u>DEMONSTRATION: USE LAB VEHICLE SHOW PARTS OF AN AUTOMOTIVE HEATING SYSTEM, INCLUDING HEATER HOSES &amp; HEATER CORE. ALSO SHOW THEM BLOWER MOTOR THAT SENDS HEATED AIR INTO PASSENGER COMPARTMENT. USE AN INFRARED THERMOMETER TO SHOW TEMPERATURE DIFFERENCES ON HIGH AND LOW SIDES OF AC SYSTEM &amp; HEATING SYSTEM.</u></b></p> <p><b><u>DEMONSTRATION: SHOW STUDENTS THE PARTS OF AN AUTOMOTIVE COOLING SYSTEM. POINT OUT THE COMPRESSOR AND EXPLAIN HOW IT WORKS.</u></b></p> <p><b>7. SLIDE 7 EXPLAIN</b> Dual Heating Systems</p> <p><b>8. SLIDES 8-12 EXPLAIN</b> Diagnosis of Heating Systems</p>

## ICONS

## Ch09 Heating System Operation & Diagnosis



13. **SLIDE 13 EXPLAIN FIGURE 9–4** A special wrench being used to remove the tension from the accessory drive belt so it can be removed.
14. **SLIDES 14-16 EXPLAIN** Operation of Electrically Heated Seats
17. **SLIDE 17 EXPLAIN FIGURE 9–6** heating element of a heated seat is a replaceable part, but service requires that the upholstery be removed. The yellow part is seat foam material and the entire white cover is the replaceable heating element. This is then covered by seat material.
18. **SLIDES 18-19 EXPLAIN** Operation of Heated and Cooled Seats
20. **SLIDE 20 EXPLAIN FIGURE 9–7** A Peltier effect device is capable of heating or cooling, depending on the polarity of the applied current.
21. **SLIDES 21-22 EXPLAIN** Operation of Heated Steering Wheel
23. **SLIDE 23 EXPLAIN FIGURE 9–8** The heated steering wheel is controlled by a switch on the steering wheel in this vehicle.

**NATEF MAST TASK A7C1: INSPECT ENGINE COOLING AND HEATER SYSTEMS HOSES; PERFORM NECESSARY ACTION. P1**

**NATEF MAST TASK A7C2: INSPECT AND TEST HEATER CONTROL VALVE(S); PERFORM NECESSARY ACTION. P2**

**NATEF MAST TASK A7C3: DIAGNOSE TEMPERATURE CONTROL PROBLEMS IN THE HEATER/VENTILATION SYSTEM; DETERMINE NECESSARY ACTION. P2**

24. **SLIDE 24 EXPLAIN** Summary

25. **SLIDES 25-42 EXPLAIN SLIDE SHOW**

