








# Automotive Heating and Air Conditioning, 7e

## Chapter 11 Heating System Operation and Diagnosis

### Opening Your Class

KEY ELEMENT	EXAMPLES
<b>Introduce Content</b>	This course or class covers operation and service of <b>Automotive Heating and Air Conditioning, 7e</b> . It correlates material to task lists specified by ASE and NATEF.
<b>Motivate Learners</b>	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.
<b>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.</b>	<p>Explain the chapter learning objectives to the students.</p> <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>
<b>Establish the Mood or Climate</b>	Provide a <i>WELCOME</i> , Avoid put downs and bad jokes.
<b>Complete Essentials</b>	Restrooms, breaks, registration, tests, etc.
<b>Clarify and Establish Knowledge Base</b>	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.

ICONS	Ch11 Heating System Operation & Diagnosis
      	<p>1. SLIDE 1 HEATING SYSTEM OPERATION AND DIAGNOSIS</p> <p>2. SLIDES 2-3 EXPLAIN OBJECTIVES</p> <p>Check for <b>ADDITIONAL VIDEOS &amp; ANIMATIONS</b> @ <a href="http://www.jameshalderman.com/">http://www.jameshalderman.com/</a>  <b>WEB SITE IS CONSTANTLY UPDATED</b></p> <p>4. SLIDES 4-5 EXPLAIN Operation of Heating Systems</p> <p><u>HEAT TRANSFER &amp; BOILING</u>  <u>HEAT TRANSFER</u>  <u>HEAT TRANSFER THROUGH LATENT HEAT</u>  <u>HEATER OPERATION</u></p> <p><b><u>DEMONSTRATION: USE LAB VEHICLE</u></b> 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.</p> <p><b><u>DEMONSTRATION:</u></b> SHOW STUDENTS THE PARTS OF AN AUTOMOTIVE COOLING SYSTEM. POINT OUT THE COMPRESSOR AND EXPLAIN HOW IT WORKS.</p> <p>6. SLIDES 6-10 EXPLAIN Diagnosis of Heating Systems</p> <p>11. SLIDE 11 EXPLAIN Figure 11-4 A special wrench being used to remove the tension from the accessory drive belt so it can be removed.</p> <p>12. SLIDES 12-14 EXPLAIN Operation of Electrically Heated Seats</p>

## ICONS



## Ch11 Heating System Operation & Diagnosis

15. **SLIDES 15-16 EXPLAIN** Operation of Heated and Cooled Seats
17. **SLIDE 17 EXPLAIN Figure 11–7** A Peltier effect device is capable of heating or cooling, depending on the polarity of the applied current.
18. **SLIDES 18-19 EXPLAIN** Operation of Heated Steering Wheel
20. **SLIDE 20 EXPLAIN Figure 11–8** 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**

21. **SLIDES 21-22 EXPLAIN Summary**