

# Automotive Heating and Air Conditioning, 8e

## Chapter 6 Air Management System

### 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/ASEE Education.
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 different components of an air management system.</li><li>3. Explain airflow control and air temperature control in an A/C system.</li><li>4. Discuss plenum and control doors.</li><li>5. Explain nonelectrical and electronic HVAC controls.</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 06:**

<http://www.jameshalderman.com/links/book hvac/ci/hvac ci ch 6.pptx>

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








ICONS	Ch06 Air Management System
      	<p><b>1. SLIDE 1 AIR MANAGEMENT SYSTEM</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 6 Air MGMT Videos</u></b>  <a href="http://www.jameshalderman.com/links/book_hvac/vi d/ch6/video_frame.html">http://www.jameshalderman.com/links/book_hvac/vi d/ch6/video_frame.html</a></p> <p><b><u>Crossword Puzzle (Microsoft Word) (PDF)</u></b>  <b><u>Word Search Puzzle (Microsoft Word) (PDF)</u></b></p> <p><b>4. SLIDES 4-5 EXPLAIN Introduction</b></p> <p><b>6. SLIDE 6 EXPLAIN FIGURE 6–1 HVAC airflow is directed toward the windshield, dash or floor vents, or combinations depending on the system settings.</b></p> <p><b>7. SLIDE 7 EXPLAIN Airflow Control</b></p> <p><b>8. SLIDE 8 EXPLAIN FIGURE 6–6 Many air control doors swing on their upper and lower pivots, in red.</b></p> <p><b>9. SLIDE 9 EXPLAIN Air Temperature Control</b></p> <p><b>10. SLIDE 10 EXPLAIN FIGURE 6–8 blower motor forces air to flow through the A/C evaporator to remove moisture from air before it is sent through heater core where air is heated before being directed to defrost and floor vents</b></p> <p><b><u>HVAC FUNCTIONS</u></b>  <b><u>HVAC MODES, AIR INLET &amp; DISCHARGE</u></b>  <b><u>HVAC SYSTEM</u></b></p> <p><b>11. SLIDE 11 EXPLAIN Air Filtration</b></p> <p><b>12. SLIDE 12 EXPLAIN FIGURE 6–9 cabin filter being removed from behind the glove compartment. The dark color is part of the filter and is activated charcoal used to help remove odors.</b></p>

**ICONS****Ch06 Air Management System**

13. **SLIDE 13 EXPLAIN** Cases & Ducts
14. **SLIDE 14 EXPLAIN FIGURE 6–10** typical HVAC housing that often has to be removed from the vehicle as an assembly to get access to the heater core and evaporator.
15. **SLIDE 15-20 EXPLAIN** Plenum and Control Doors
21. **SLIDE 21 EXPLAIN FIGURE 6–12 (a)** temperature and mode doors swing to direct all of cool air past the heater core, (b) through the core to become hot, (c) or to blend hot and cool air..
22. **SLIDE 22 EXPLAIN FIGURE 6–13 (a)** In a blend-air system, all of the air is cooled. Then some of it is reheated and blended with the cool air to get the right temperature. (b) In a reheat system, all of the air is cooled and then reheated to the correct temperature.
23. **SLIDE 23 EXPLAIN FIGURE 6–14** Ducts are placed in the center console or on floor under the front seats to provide heated and cooled air to the rear seat passengers

**HVAC MODES, TEMPERATURE CHANGE COOL**  
**HVAC MODES, TEMPERATURE CHANGE HEAT**

24. **SLIDE 24 EXPLAIN** Nonelectrical and Electronic HVAC Controls
25. **SLIDE 25 EXPLAIN FIGURE 6–16** Many older vehicles used vacuum actuators to move HVAC doors. When vacuum actuators operate, they alter air–fuel mixture in engine. Because vacuum controls affect engine operation and therefore emissions, recent vehicles use electric control systems.
26. **SLIDES 26-30 EXPLAIN** Nonelectrical and Electronic HVAC Controls
27. **SLIDE 27 EXPLAIN FIGURE 6–18** two-wire HVAC electronic actuator where the direction of rotation is controlled by the HVAC control head or module, which changes direction of rotation by changing polarity of power and ground connection at motor.
28. **SLIDE 28 EXPLAIN FIGURE 6–19** Three-wire actuators include logic chip inside motor assembly. HVAC control module then sends a 0-5 volt signal to the

ICONS	Ch06 Air Management System
      	<p>motor assembly to control the direction of rotation.</p> <p>29. SLIDE 29 <b>EXPLAIN FIGURE 6–20</b> typical five-wire HVAC actuator showing the two wires used to power the motor and the three wires used for the motor position potentiometer.</p> <p>30. SLIDE 30 <b>EXPLAIN Blower Motor Control</b></p> <p><b><u>BLOWER CONTROL, MANUAL</u></b></p> <p><b><u>BLOWER CONTROL, PWM</u></b></p> <p><b><u>BLOWER</u></b></p> <p>31. SLIDE 31 <b>EXPLAIN FIGURE 6–21</b> (a) typical blower motor assembly with a squirrel-cage fan attached. The hose to the HVAC case is used to bring clean cabin air, instead of dirty outside air, to cool motor. (b) Blower motor speed is controlled through an electronic circuit (shown) or through a resistor pack</p> <p><b><u>NATEF MAST TASK A7D1:INSPECT AND TEST A/C-HEATER BLOWER MOTORS, RESISTORS, SWITCHES, RELAYS, WIRING, AND PROTECTION DEVICES; PERFORM NECESSARY ACTION. P1</u></b></p> <p><b><u>NATEF MAST TASK A7D3: DIAGNOSE MALFUNCTIONS IN THE VACUUM, MECHANICAL, AND ELECTRICAL COMPONENTS AND CONTROLS OF THE HEATING, VENTILATION, AND A/C (HVAC) SYSTEM; DETERMINE NECESSARY ACTION. P2</u></b></p> <p><b><u>NATEF MAST TASK A7D4: INSPECT AND TEST A/C-HEATER CONTROL PANEL ASSEMBLY; DETERMINE NECESSARY ACTION. P3</u></b></p> <p><b><u>NATEF MAST TASK A7D5:INSPECT AND TEST A/C-HEATER CONTROL CABLES, MOTORS, AND LINKAGES; PERFORM NECESSARY ACTION. P3</u></b></p> <p><b><u>NATEF MAST TASK A7D6: INSPECT A/C-HEATER DUCTS, DOORS, HOSES, CABIN FILTERS, AND OUTLETS; PERFORM NECESSARY ACTION. P1</u></b></p> <p><b><u>NATEF MAST TASK A7D7: IDENTIFY THE SOURCE OF A/C SYSTEM ODORS. P2</u></b></p>

<b>ICONS</b>	<b>Ch06 Air Management System</b>
	32. SLIDE 32 <b>EXPLAIN</b> Summary