

# Automotive Heating and Air Conditioning, 8e

## Chapter 11 Automatic Temperature Control Systems

### 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, 8e</b> . It correlates material to task lists specified by ASE and NATEF/ASEEducation.
<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. Discuss the purpose and function of automatic temperature control (ATC) systems.</li> <li>2. Discuss the sensors used in ATC systems.</li> <li>3. State the need for airflow control.</li> <li>4. Discuss the purpose of automatic HVAC controls.</li> <li>5. Discuss how to diagnose the electrical ATC system faults.</li> <li>6. Explain the climatic control diagnostic procedure.</li> <li>7. Explain the types of actuators in ATC systems.</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.

**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 11:**

[http://www.jameshalderman.com/links/book\\_hvac/ci/hvac\\_ci\\_ch\\_11.pptx](http://www.jameshalderman.com/links/book_hvac/ci/hvac_ci_ch_11.pptx)

These Power Point files contain more than just the images

ICONS	Ch11 Automatic Temp. Control Systems
 	<p><b>1. SLIDE 1 AUTOMATIC TEMPERATURE CONTROL SYSTEMS</b></p> <p><b>2. SLIDES 2-3 EXPLAIN OBJECTIVES</b>  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><b><u>Chapter 11 ATC VIDEOS</u></b>  <a href="http://www.jameshalderman.com/links/book_hvac/vi&lt;br/&gt; d/ch12/video_frame.html">http://www.jameshalderman.com/links/book_hvac/vi  d/ch12/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</b> Purpose and Function of Automatic Temperature Control (ATC) Systems</p> <p><b>6. SLIDE 6 EXPLAIN</b> FIGURE 11–1 The automatic climatic control display is part of the navigation screen on this vehicle</p> <p><b><u>DEMONSTRATION: SHOW STUDENTS AN EXAMPLE OF A SENSOR FROM AN AUTOMATIC A/C SYSTEM AND DESCRIBE ITS FUNCTION.</u></b></p> <p><b>7. SLIDES 7-12 EXPLAIN</b> Sensors Used in ATC Systems</p> <p><b><u>Automatic Temperature Control, ATC Sun Load</u></b>  <b><u>Automatic Temperature Control, ATC Temperature, Heat</u></b>  <b><u>Automatic Temperature Control, ATC Air Quality</u></b>  <b><u>Automatic Temperature Control, ATC Temp. Cool, Adjust</u></b>  <b><u>Automatic Temperature Control, ATC Temp. Cool</u></b>  <b><u>Automatic Temperature Control, ATC Temp. Humidity</u></b></p> <p><b><u>DISCUSSION: BREAK CLASS INTO 2 GROUPS. HAVE HALF CLASS TEST THE OTHER ON THE TYPICAL SETTINGS FOR HEATING AND AIR CONDITIONING; THEN REVERSE GROUPS TO TEST SETTINGS FOR VENTILATION &amp; DEFOGGING OR DEFROSTING THE INSIDE FRONT WINDSHIELD.</u></b></p>

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**DISCUSSION: ASK STUDENTS TO TALK ABOUT THE FUNCTIONS OF ALL THE SENSORS RELATING TO AUTOMATIC A/C SYSTEMS. ASK STUDENTS TO IDENTIFY WHERE EACH SENSOR IS LOCATED AND WHAT ITS FUNCTION IS.**

**HANDS-ON TASK: ASK STUDENTS TO GO TO A LAB VEHICLE EQUIPPED WITH AUTO A/C & IDENTIFY WHERE EACH SENSOR IS LOCATED AND LABEL IT WITH MASKING TAPE OR STICKY NOTE.**

13. SLIDE 13 **EXPLAIN** Figure 11–2 The outside air temperature sensor is mounted on the radiator core support in front of the A/C condenser on this vehicle.

14. SLIDE 14 **EXPLAIN** Airflow Control

**DEMONSTRATION: SHOW STUDENTS AN EXAMPLE OF A VACUUM CONTROL CIRCUIT. DESCRIBE HOW IT WORKS AND WHERE IT IS USED. DOWNLOAD ONE**

**DEMONSTRATION: SHOW AN EXAMPLE OF AN ELECTRIC SERVOMOTOR CIRCUIT. DESCRIBE HOW IT WORKS AND WHERE IT IS USED.**

**FAULTY BLOWER MOTOR OPERATION CAN OFTEN BE TRACED TO A BAD BLOWER MOTOR RESISTOR.**

15. SLIDE 15 **EXPLAIN** FIGURE 11–8 three major portions of the A/C and heat system are air inlet, plenum, and air distribution. The shaded portions show the paths of the four control doors

16. SLIDE 16 **EXPLAIN** Actuators

**DEMONSTRATION: SHOW AN ACTUATOR FROM AN AUTOMOTIVE A/C SYSTEM AND DESCRIBE ITS FUNCTION**

**DISCUSSION: ASK STUDENTS TO DISCUSS THE ELECTRONIC CONTROLS OF AN AUTOMATIC A/C SYSTEM. WHICH ARE INPUT AND WHICH ARE OUTPUT CONTROLS?**

17. SLIDE 17 **EXPLAIN** FIGURE 11–9 Three electric actuators can be easily seen on this demonstration unit. However, accessing these actuators in a vehicle can be difficult

18. SLIDE 18 **EXPLAIN** Automatic HVAC Controls



## ICONS

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### **HANDS-ON TASK: HAVE STUDENTS LABEL ELECTRONIC CONTROLS OF AN AUTOMATIC A/C SYSTEM & SHOW WHICH ARE INPUT AND OUTPUT CONTROLS? USE STICKY NOTES OR MASKING TAPE**

19. SLIDE 19 **EXPLAIN** FIGURE 11–13 block diagram showing the inputs to the electronic control assembly and outputs; note that some of outputs have feedback to ECM.
20. SLIDE 20 **EXPLAIN** Air Filtration
21. SLIDE 21 **EXPLAIN** FIGURE 11–14 Cabin filter can be Accessed either through the glove compartment or under the hood on most vehicles
22. SLIDE 22 **EXPLAIN** Automatic Climatic Control Diagnosis
23. SLIDE 23 **EXPLAIN** Figure 12–15 **TECH 2** scan tool factory scan tool used on GM vehicles.
24. SLIDES 24-25 **EXPLAIN** Automatic Climatic Control Diagnostic Procedure

### **NATEF MAST TASK A7D8: CHECK OPERATION OF AUTOMATIC OR SEMI-AUTOMATIC HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC) CONTROL SYSTEMS; DETERMINE NECESSARY ACTION. P2**

26. SLIDES 26-30 **EXPLAIN** Summary