

# Automotive Electrical & Engine Performance 8/E


## Chapter 10 Capacitance & Capacitors

### Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This Automotive Electrical & Engine Performance 8th edition provides complete coverage of automotive areas pertaining vehicle electrical systems and engine performance. It correlates material to task lists specified by ASE and ASE Education (NATEF) and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, Case Studies, Videos, and Animations that are listed in this Lesson Plan. This Lesson Plan also references ASE Education (NATEF) Task Sheets available from Jim's web site.
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. Explain capacitance and the construction and operation of capacitors.</li><li>2. Explain the uses of capacitors and discuss capacitors in series and parallel circuits.</li></ol> <p><b>This chapter will help you prepare for the ASE Electrical/Electronic Systems (A6) certification test content area "A" (General Electrical/Electronic System Diagnosis)</b></p>
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 **Automotive Electrical & Engine Performance 8<sup>th</sup> Edition** Chapter Images found on Jim's web site @ [www.jameshalderman.com](http://www.jameshalderman.com)

**DOWNLOAD Chapter 10 Chapter Images: From**  
[http://www.jameshalderman.com/books\\_a8.html#anchor2](http://www.jameshalderman.com/books_a8.html#anchor2)

ICONS	Ch10 Capacitance & Capacitors
	<p><b>1. SLIDE 1 CH10 CAPACITANCE/ CAPACITORS</b></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><b>No VIDEOS FOR THIS CHAPTER. CHECK</b>  <a href="http://www.youtube.com">WWW.YOUTUBE.COM</a></p> <p><b>At the beginning of this class, you can download the crossword puzzle &amp; Word Search from Jim's web site to familiarize your class with terms in this chapter &amp; then discuss them, see below:</b>  <a href="http://www.jameshalderman.com/books_a8.html#anchor2">HTTP://WWW.JAMESHALDERMAN.COM/BOOKS_A8.HTML#ANCHOR2</a>  <b>DOWNLOAD</b>  <b>CROSSWORD PUZZLE (MICROSOFT WORD) (PDF)</b>  <b>WORD SEARCH PUZZLE (MICROSOFT WORD) (PDF)</b></p> <p><b>2. SLIDE 2 EXPLAIN Figure 10-1</b> Leyden jar can be used to store an electrical charge</p> <p><b><u>DISCUSS CHART 10-1</u> higher dielectric constant is, the better are insulating properties between plates of the capacitor.</b></p> <p><b>3. SLIDE 3 EXPLAIN Figure 10-2</b> This simple capacitor, made of two plates separated by an insulating material, is called a dielectric.</p> <p><b>4. SLIDE 4 EXPLAIN Figure 10-3</b> capacitor is charging, the battery forces electrons through the circuit</p> <p><b>5. SLIDE 5 EXPLAIN Figure 10-4</b> When capacitor is charged, there is equal voltage across capacitor and battery. An electrostatic field exists between capacitor plates. No current flows in circuit.</p> <p><b>6. SLIDE 6 EXPLAIN Figure 10-5</b> capacitor is charged through one circuit (top) and discharged through another (bottom)</p> <p><b>7. SLIDE 7 EXPLAIN Figure 10-6</b> Capacitor symbols are shown in electrical diagrams. Negative plate is often shown curved</p>

**ICONS** Ch10 Capacitance & Capacitors



**DISCUSS FREQUENTLY ASKED QUESTION: *WHAT ARE “POINTS AND CONDENSER”?***









**Points and condenser are used in point-type ignition systems. Points. A set of points uses one stationary contact and a movable contact that is opened by a cam lobe inside ignition distributor. When the points are closed, current flows through primary windings of ignition coil and creates strong magnetic field. As engine rotates, distributor can open contact points, which opens circuit to coil. The stored magnetic field in coil collapses and generates a high-voltage arc from secondary winding of coil. It is this spark that is sent to spark plugs that ignites air-fuel mixture inside engine. Condenser. The condenser (capacitor) is attached to points and case of condenser is grounded. When points start to open, charge built up in primary winding of coil likely starts to arc across opening points. To prevent the points from arcing and to increase how rapidly current is turned off, condenser stores current temporarily. Points and condenser were used in vehicles and small gasoline engines until the mid-1970s. • SEE FIGURE 10-7.**

- 8. SLIDE 8 **EXPLAIN FIGURE 10-7** A point-type distributor shown with the condenser from an old vehicle being tested on a distributor machine.



**DEMONSTRATION: BUILD CIRCUIT ON PROJECT BOARD USING CAPACITOR & DEMO HOW TO TEST IT**

**HAVE STUDENTS DUPLICATE THE DEMO ON PROJECT BOARD**

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	<p><b>ANIMATION: <u>Capacitor</u></b></p>
	<p>9. SLIDE 9 <b>EXPLAIN</b> Figure 10-8 A capacitor blocks direct current (DC) but passes alternating current (AC). A capacitor makes a very good noise suppressor because most of interference is AC and the capacitor will conduct this AC to ground before it can reach radio or amplifier</p>
	<p>10. SLIDE 10 <b>EXPLAIN</b> Figure 10-9 1 farad capacitor used to boost the power to large speakers.</p>
	<p><b>DEMONSTRATION: SHOW STUDENTS SEVERAL DIFFERENT TYPES OF CAPACITORS THAT ARE USED IN AUTOMOTIVE APPLICATIONS.</b></p>
	<p>11. SLIDE 11 <b>EXPLAIN</b> Figure 10-10 Capacitors in parallel effectively increase the capacitance</p> <p>12. SLIDE 12 <b>EXPLAIN</b> Figure 10-11 Capacitors in series decrease the capacitance.</p>
	<p><b>BE SURE THAT CAPACITORS ARE FULLY DISCHARGED BEFORE WORKING NEAR THEM. INFORM STUDENTS THAT, BECAUSE A CAPACITOR STORES ELECTRICITY, IT CAN DELIVER A SHOCK TO A PERSON.</b></p>
	<p><b>ASE EDUCATION TASK G3 DIAGNOSE OPERATION OF ENTERTAINMENT AND RELATED CIRCUITS (SUCH AS: RADIO, DVD, REMOTE CD CHANGER, NAVIGATION, AMPLIFIERS, SPEAKERS, ANTENNAS, AND VOICE-ACTIVATED ACCESSORIES);</b></p>
	<p><b>DETERMINE NEEDED REPAIRS.</b></p>
	<p><b><u>HOMEWORK: SEARCH INTERNET</u></b>  <b>HAVE THE STUDENTS USE INTERNET TO RESEARCH THE LEYDEN JAR. DISCOVER CONSTRUCTION OF ORIGINAL JAR &amp; SCIENTISTS WHO CONSTRUCTED IT, AS WELL AS LATER MODIFICATIONS.</b></p>