

Automotive Technology 5th Edition

Chapter 46 CAPACITANCE & CAPACITORS

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This Automotive Technology 6th text provides complete coverage of automotive components, operation, design, and troubleshooting. It correlates material to task lists specified by ASE and ASEEducation (NATEF) and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, Case Studies, Videos, Animations, and ASEEducation (NATEF) Task Sheets.
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 learning objectives to students as listed: 1. Explain capacitance and the construction and operation of capacitors. 2. Explain the uses of capacitors and discuss capacitors in series and parallel circuits.
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: Lesson plan is based on 6th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

DOWNLOAD Chapter 46 Chapter Images: From http://www.jameshalderman.com/automotive_principles.html

NOTE: You can use Chapter Images or possibly Power Point files:

ICONS



Chapter 46 Capacitors

1. TITLE SLIDE 1: CAPACITANCE & CAPACITORS

2. SLIDE 2 EXPLAIN Figure 46-1 Leyden jar can be used to store an electrical charge

Check for **ADDITIONAL VIDEOS & ANIMATIONS**
@ <http://www.jameshalderman.com/>
WEB SITE IS CONSTANTLY UPDATED

http://www.jameshalderman.com/automotive_principles.html

DOWNLOAD

Crossword Puzzle (Microsoft Word) (PDF)

Word Search Puzzle (Microsoft Word) (PDF)

Videos

DISCUSS CHART 46-1 higher dielectric constant is, better are insulating properties between plates of capacitor

3. SLIDE 3 EXPLAIN Figure 46-2 This simple capacitor, made of two plates separated by an insulating material, is called a dielectric.
4. SLIDE 4 EXPLAIN Figure 46-3 As the capacitor is charging, the battery forces electrons through the circuit.
5. SLIDE 5 EXPLAIN Figure 46-4 When the capacitor is charged, there is equal voltage across the capacitor and the battery. An electrostatic field exists between the capacitor plates. No current flows in the circuit.
6. SLIDE 6 EXPLAIN Figure 46-5 The capacitor is charged through one circuit (top) and discharged through another (bottom).
7. SLIDE 7 EXPLAIN Figure 46-6 Capacitor symbols are shown in electrical diagrams. The negative plate is often shown curved.

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 46-7.



8. SLIDE 8 EXPLAIN FIGURE 46.7 A point-type distributor shown with the condenser from an old vehicle being tested on distributor machine.

DEMONSTRATION: Build a circuit on Project Board using a capacitor and DEMO how to test it

Have students duplicate the DEMO on Project Board

Capacitor (View) (Download)

9. SLIDE 9 EXPLAIN Figure 46-8 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.

10. SLIDE 10 EXPLAIN Figure 46-9 A 1 farad capacitor

used to boost the power to large speakers.

DEMONSTRATION: Show students several different types of capacitors that are used in automotive applications.

11. SLIDE 11 **EXPLAIN** Figure 46-10 Capacitors in parallel effectively increase the capacitance.
12. SLIDE 12 **EXPLAIN** Figure 46-11 Capacitors in series decrease the capacitance.

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.

ASE EDUCATION Task Sheet Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action



HOMEWORK: SEARCH INTERNET

Have the students use Internet to research the Leyden jar. Discover the construction of the original jar and the scientists who constructed it, as well as later modifications. Ask students to share their findings with the class.