
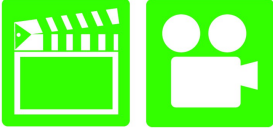













Automotive Maintenance and Light Repair, 1ST Edition

Chapter 24 Electrical Circuits

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers Automotive Maintenance and Light Repair . It correlates material to task lists specified by ASE and NATEF.
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. <ul style="list-style-type: none">— Prepare for ASE Electrical/Electronic Systems (A6) certification test content area “A” (General Electrical/Electronic Systems Diagnosis).— Explain Ohm’s law.— Identify the parts of a complete circuit.— Describe the characteristics of an open, a short-to-ground, and a short-to-voltage.
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.

ICONS	Ch24 Electrical Circuits
      	<p>1. SLIDE 1 CH24 Electrical Circuits</p> <p>2. SLIDE 2 EXPLAIN OBJECTIVES</p> <p>Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE REGULARLY UPDATED</p> <p>3. SLIDES 3-4 EXPLAIN CIRCUITS TEXT</p> <p>5. SLIDE 5 EXPLAIN Figure 24-1 All complete circuits must have a power source, a power path, protection (fuse), an electrical load (light bulb in this case), and a return path back to the power source.</p> <p><u>DEMONSTRATION: DEMONSTRATE BASIC ELECTRICAL CIRCUIT ON TRAINER. SHOW (FIGURE 4-1)WHAT HAPPENS WHEN CIRCUIT IS SHORTED TO GROUND</u></p> <p><u>TRAINER TASK: ALLOW STUDENTS TO BLOW FUSE BY CREATING A SHORT CIRCUIT, OBSERVING WHAT IT TAKES TO CREATE SHORT CIRCUIT AND WHAT RESULTS ARE FOUND</u></p> <p>6. SLIDE 6 EXPLAIN Figure 24-2 return path back to the battery can be any electrical conductor, such as a copper wire or the metal frame or body of the vehicle</p> <p>7. SLIDE 7 EXPLAIN Figure 24-3 electrical switch opens circuit and no current flows. The switch could also be on the return (ground) path wire</p> <p>8. SLIDE 8 EXPLAIN CIRCUIT FAULTS</p> <p>9. SLIDE 9 EXPLAIN Figure 24-4 Examples of common causes of open circuits. Some of these causes are often difficult to find.</p> <p>10. SLIDE 10 EXPLAIN CIRCUIT FAULTS</p> <p>11. SLIDE 11 EXPLAIN Figure 24-5 short circuit permits electrical current to bypass some or all of the resistance in the circuit.</p> <p>DISCUSSION: DISCUSS GROUND PATH. WHY DOESN'T A SEPARATE GROUND WIRE HAVE TO BE RUN FROM BATTERY TO EACH ELECTRICAL LOAD? DISCUSS HOW AND WHY A SHORT-TO-VOLTAGE OCCURS. WHAT IS THE REASON THAT SHORT-TO-VOLTAGE MAY OR MAY NOT BLOW A FUSE?</p>

ICONS	Ch24 Electrical Circuits
	<p>12. SLIDE 12 EXPLAIN Figure 4-6 fuse or circuit breaker opens the circuit to prevent possible overheating damage in the event of a short circuit.</p>
	<p>13. SLIDE 13 EXPLAIN CIRCUIT FAULTS</p>
	<p>14. SLIDE 14 EXPLAIN Figure 24-7 <u>short-to-ground</u> affects power side of circuit. Current flows directly to ground return, bypassing some or all of electrical loads in the circuit. There is no current in circuit past the short. A short-to ground will also cause fuse to blow.</p>
	<p>15. SLIDE 15 EXPLAIN CIRCUIT FAULTS</p>
	<p>DISCUSSION: DISCUSS EFFECTS OF HIGHER THAN-NORMAL RESISTANCE ON VARIOUS COMPONENTS IN AN AUTOMOTIVE ELECTRICAL SYSTEM. WHAT CAN CAUSE HIGH RESISTANCE?</p> <p>HOMEWORK: RESEARCH ON INTERNET OPPORTUNITIES FOR TECHNICIANS WHO SPECIALIZE IN ELECTRICAL SYSTEMS IN YOUR AREA. ASK THEM TO FOCUS ON FOLLOWING QUESTIONS: WHAT TYPES OF WORK ARE AVAILABLE? WHAT ARE THE TRAINING AND JOB QUALIFICATION REQUIREMENTS? WHAT IS SALARY RANGE FOR TECHNICIAN WHO IS TRAINED IN AUTOMOTIVE ELECTRICAL SYSTEMS? HAVE STUDENTS WRITE A SUMMARY OF THEIR FINDINGS AND SHARE IT WITH CLASS.</p>
	<p>DEMONSTRATION: USE AN INDUCTIVE AMMETER OR CHARGING SYSTEM TESTER TO SHOW THAT AMOUNT OF CURRENT LEAVING BATTERY ON POSITIVE IS RETURNED ON NEGATIVE SIDE.</p>
	<p>16. SLIDE 16 EXPLAIN OHM'S LAW</p>
	<p>17. SLIDE 17 EXPLAIN FIGURE 24-8 Electrical flow through a circuit is similar to water flowing over a waterwheel. The more the water (amperes in electricity), the greater amount of work (waterwheel). The amount of water remains constant, yet the pressure (voltage in electricity) drops as the current flows through the circuit.</p>
	<p><u>Ohm's Law, Current</u></p> <p><u>Ohm's Law, Resistance</u></p> <p><u>Ohm's Law, Volt</u></p>

ICONS



QUESTION



Ch24 Electrical Circuits

18. **SLIDE 18 EXPLAIN CHART 24.1** Ohm's law relationship with the three units of electricity.
19. **SLIDE 19 EXPLAIN Ohms Law**
20. **SLIDE 20 EXPLAIN FIGURE 24-9** Electrical flow through a circuit is similar to water flowing over **waterwheel**. The more water (amperes in electricity), the greater the amount of work (waterwheel). The amount of water remains constant, yet pressure (voltage in electricity) drops as current flows through circuit.

DISCUSSION: ASK STUDENTS TO TALK ABOUT OHM'S LAW. WHAT IS APPLICATION OF OHM'S LAW IN AUTOMOTIVE WIRING CIRCUITS?

COMPLETE TASK SHEET ON ELECTRICAL CIRCUITS

NATEF MLR TASK A6A1 RESEARCH APPLICABLE VEHICLE AND SERVICE INFORMATION, VEHICLE SERVICE HISTORY, SERVICE PRECAUTIONS, AND TECHNICAL SERVICE BULLETINS

NATEF MLR TASK A6A2 DEMONSTRATE KNOWLEDGE OF ELECTRICAL/ELECTRONIC SERIES, PARALLEL, AND SERIES-PARALLEL CIRCUITS USING PRINCIPLES OF ELECTRICITY (OHM'S LAW)