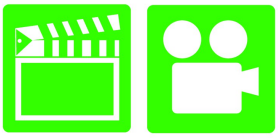
A6 Electricity & Electronics 4th Edition

Chapter 6 PARALLEL CIRCUITS

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of **Automotive Electricity and Electronics Systems.** 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. 1. State Kirchhoff's current law. 2. Explain parallel circuit laws. 3. Calculate voltage drops in a parallel circuit. **This chapter will help you prepare for the ASE Electrical/Electronic Systems (A6) certification test content area "A" (General Electrical/Electronic System Diagnosis).**
Establish the Mood or Climate	Provide a *WELCOME,* 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	Ch06 PARALLEL CIRCUITS
	**1. SLIDE 1 CH6 PARALLEL CIRCUITS** **2. SLIDE 2 EXPLAIN OBJECTIVES**
	**Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/** **WEB SITE IS CONSTANTLY UPDATED**
	**3. SLIDE 3 EXPLAIN** PARALLEL CIRCUIT **4. SLIDE 4 EXPLAIN Figure 6-1** amount of current flowing into junction point A equals the total amount of current flowing out of the junction. **5. SLIDE 5 EXPLAIN KIRCHHOFF'S CURRENT LAW**
	**KIRCHHOFF'S CURRENT LAW: 1ST LAW: CURRENT FLOWING INTO ANY JUNCTION OF CIRCUIT EQUAL TO CURRENT FLOWING OUT OF JUNCTION**
 	**DEMONSTRATION: BUILD PARALLEL CIRCUIT IN FIGURE 6-1. SHOW STUDENTS WHAT HAPPENS WHEN 1 BULB IS REMOVED. ASK THEM TO COMPARE THIS CIRCUIT WITH SERIES CIRCUIT. CONSTRUCT SERIES & PARALLEL CIRCUIT, EACH WITH 3 IDENTICAL BULBS. MEASURE TOTAL RESISTANCE IN EACH CIRCUIT. ASK: HOW DO PARALLEL CIRCUITS COMPARE TO SERIES CIRCUITS?**
	**6. SLIDE 6 EXPLAIN Figure 6-2** current in a parallel circuit splits (divides) according to the resistance in each branch. **7. SLIDES 7-8 EXPLAIN Parallel Circuit Laws** **9. SLIDE 9 EXPLAIN Figure 6-3** In a typical parallel circuit, each resistance has power and ground and each leg operates independently of other legs of circuit
	**DEMO BUILD FIGURE 6-3: SHOW STUDENTS HOW TO SOLVE FOR TOTAL CIRCUIT CURRENT. CHANGE VALUES AND HAVE STUDENTS SOLVE FOR CURRENT FLOW**
	**10. SLIDE 10 EXPLAIN Determining Total Resistance in a Parallel Circuit**

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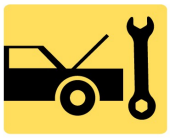
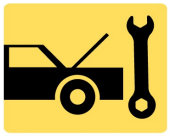
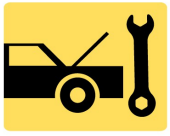
	11. **SLIDE 11** EXPLAIN **Figure 6-4** In a typical parallel circuit, each resistance has power and ground and each leg operates independently of the other legs of the circuit
	**Parallel Circuit**
	**DEMONSTRATE BUILDING PARALLEL CIRCUITS, USING FIGURES: 6-3, 6-4, & 6-5**
	**BUILD FIGURE 6-4: CALCULATE RESISTANCE OF 6-4. CHANGE VALUES & HAVE STUDENTS SOLVE FOR RESISTANCE.**
	12. **SLIDE 12** EXPLAIN **Figure 6-5** schematic showing two resistors in parallel connected to a 12 volt battery 13. **SLIDE 13** EXPLAIN **Figure 6-6** parallel circuit with three resistors connected to a 12 volt battery
	**BUILD FIGURE 6-5: CALCULATE RESISTANCE OF 6-5. CHANGE VALUES & HAVE STUDENTS SOLVE FOR RESISTANCE.**
	14. **SLIDE 14** EXPLAIN **Figure 6-7** Using an electronic calculator to determine total resistance of parallel circuit.
	**DEMONSTRATION: SHOW STUDENTS HOW TO SOLVE PROBLEM IN FIGURE 6–6 USING CALCULATOR. HAVE STUDENTS WORK WITH YOU AS YOU SOLVE PROBLEM**
	**HANDS-ON TASK: STUDENTS WORK IN TEAMS & USE CALCULATOR TO SOLVE PARALLEL CIRCUIT PROBLEMS USING FIGURE 6-6**
	15. **SLIDE 15** EXPLAIN **Figure 6-8** example of how to use an electronic calculator to determine total resistance of parallel circuit. Answer is 13.45 ohms. Effective resistance of this circuit is < resistance of lowest branch (20 ohms) 16. **SLIDE 16** EXPLAIN **Figure 6-8** parallel circuit containing four 12-ohm resistors. When circuit has more

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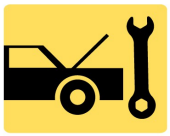
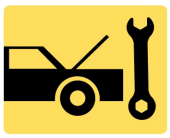
	than 1 resistor of equal value, 1 total resistance can be determined by simply dividing 1 value of 1 resistance (12 ohms in example) by 1 number of equal-value resistors (4 in this example) to get 3 ohms.
	17. SLIDES 17-18 EXPLAIN Parallel Circuit Calculation Examples
	**DISCUSSION: ASK STUDENTS TO TALK ABOUT METHODS FOR SOLVING PARALLEL CIRCUIT PROBLEMS. WHICH METHOD IS EASIEST TO USE?**
	**19. SLIDE 19 EXPLAIN Figure 6-9** Example 1 **20. SLIDE 20 EXPLAIN Figure 6-10** Example 2 **21. SLIDE 21 EXPLAIN Figure 6-11** Example 3 **22. SLIDE 22 EXPLAIN Figure 6-12** Example 4
	**TASK: BUILD THE PARALLEL CIRCUITS IN FIGURES 6-9, 6-10, 6-11, & 6-12. DETERMINE WHAT THEY ARE TO SOLVE FOR.**
	**DISCUSSION: ASK STUDENTS TO TALK ABOUT VOLTAGE IN PARALLEL CIRCUITS. IS VOLTAGE ALWAYS 12 VOLTS? EXPLAIN THAT THE VOLTAGE IN AUTOMOTIVE APPLICATIONS OF PARALLEL CIRCUITS USUALLY IS 12 VOLTS, BUT THAT THE SAME RULES WOULD APPLY IF VOLTAGE WERE 20, 30, OR 50 VOLTS OR MORE.**
	**COMPLETE PARALLEL CIRCUIT WORKSHEETS 1, 2, & 3 TASK SHEET ON ELECTRICAL CIRCUITS**
	**Parallel Circuit, Open** **Parallel Circuits, Volts**
	**23. SLIDE 23 EXPLAIN SUMMARY**