


















Automatic Transmissions and Transaxles, 6e










Chapter 10 Hybrid Electric Vehicle Transmission/Transaxles

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of Automatic Transmissions and Transaxles, 6e . 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. <ol style="list-style-type: none">1. Prepare for ASE Automatic Transmissions (A2) certification test content area "A" (General Transmission and Transaxle Diagnosis).2. Identify the types of hybrid vehicles.3. Identify the levels of hybrids.4. Explain how an automatic transmission can be converted for use in hybrid electric vehicles.5. Identify the components of a two-mode hybrid transmission system and explain its operation.6. Discuss the operation of different hybrid vehicle transmissions.
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	Ch10 Hybrid Electric Vehicle Trans.
	<p>1. SLIDE 1 HYBRID ELECTRIC VEHICLE TRANSMISSION/TRANSAXLES</p> <p>2. SLIDES 2-3 EXPLAIN OBJECTIVES</p>
	<p>Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE IS CONSTANTLY UPDATED</p>
	<p>4. SLIDE 4 EXPLAIN Types of Hybrid Vehicles</p>
	<p>5. SLIDE 5 EXPLAIN FIGURE 10–1 power flow in a typical series-hybrid vehicle.</p>
	<p>6. SLIDE 6 EXPLAIN Types of Hybrid Vehicles</p> <p>7. SLIDE 7 EXPLAIN FIGURE 10–2 The power flow in a typical parallel-hybrid vehicle.</p>
	<p>ANIMATION: SERIES HEV OPERATION (CH89) WWW.MYAUTOMOTIVELAB.COM HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=COMPREHENSIVE%20COMPONENTS&CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/CLIP1.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/XML/CLIP1.XML</p>
	<p>ANIMATION: PARALLEL HEV OPERATION WWW.MYAUTOMOTIVELAB.COM HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/AX_ANIMATIONS/CHAPTER64_FIG_64_5/INDEX.HTM</p>
	<p>ANIMATION: SERIES-PARALLEL HEV OPERATION (CH89) WWW.MYAUTOMOTIVELAB.COM HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/AX_ANIMATIONS/CHAPTER64_FIG_64_7/INDEX.HTM</p>
	<p>8. SLIDE 8 EXPLAIN Types of Hybrid Vehicles</p> <p>9. SLIDES 9-11 EXPLAIN Levels of Hybrids</p>
	<p>DISCUSSION: HAVE STUDENTS TALK ABOUT BELT ALTERNATOR STARTER SYSTEMS. WHAT ARE THE ADVANTAGES OF <u>BAS SYSTEMS</u>?</p>
	<p>DISCUSSION: HAVE STUDENTS COMPARE & CONTRAST COMPONENTS OF SERIES AND PARALLEL HYBRID VEHICLES. ASK STUDENTS TO IDENTIFY THE PROS AND CONS OF COMPONENTS.</p>

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	<p><u>DISCUSSION:</u> HAVE STUDENTS IDENTIFY OTHER FUELS THAT CAN REPLACE DIESEL FUEL. HOW WILL THESE ALTERNATE FUELS HELP REDUCE FUEL COSTS?</p>
	<p>12. SLIDES 12-14 EXPLAIN Automatic Transmission Conversion</p>
	<p><u>DEMONSTRATION:</u> WHILE A HYBRID ENGINE IS IN IDLE STOP MODE, CONNECT A FIVE-GAS ANALYZER. HAVE STUDENTS TAKE NOTE OF THE CO2 READING TO CONFIRM ZERO OR LOW CO2 LEVELS IN IDLE STOP MODE. NEXT, CONNECT A FIVE-GAS ANALYZER TO AN ICE AND COMPARE CO2 READINGS AT IDLE. DISCUSS RESULTS.</p>
	<p>15. SLIDE 15 EXPLAIN FIGURE 10-5 Honda Accord Hybrid auxiliary transmission fluid pump. Pump operates only when ICE enters idle stop (stop-start) mode.</p>
	<p>16. SLIDES 16-17 EXPLAIN Two-Mode Hybrid Transmission System</p>
	<p>18. SLIDE 18 EXPLAIN FIGURE 10-8 The two-mode transmission has orange high-voltage cable entering the unit to carry electric energy from the high-voltage battery pack to propel the vehicle and also to charge the battery during deceleration.</p>
	<p>19. SLIDE 19 EXPLAIN Two-Mode Hybrid Transmission System</p>
	<p><u>Hybrid Auto Transmission</u> <u>Power Flow, Two-Mode Hybrid Transmission</u></p>
	<p>20. SLIDES 20-21 EXPLAIN Hybrid Vehicle Transmissions</p> <p>22. SLIDE 22 EXPLAIN FIGURE 10-15 The Toyota Hybrid System uses two electric motor/generators (MG1 and MG2) and an ICE, all connected together by a power-split device, which is a simple planetary gear set.</p> <p>23. SLIDES 23-25 EXPLAIN Hybrid Vehicle Transmissions</p>

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	<p><u>DISCUSSION:</u> REVIEW IDLE STOP MODE WITH THE STUDENTS AND HIGHLIGHT THE DIFFERENCE BETWEEN A <u>CONVENTIONAL STARTER & VOLTAGE MOTOR GENERATOR.</u></p>
	<p>26. SLIDE 26 EXPLAIN FIGURE 10–33 The Honda Accord V-6 hybrid electric vehicle use a Honda non-planetary gear type automatic transaxle equipped with a small electric pump motor to maintain hydraulic fluid pressure during idle stop operation.</p>
	<p><u>DISCUSSION:</u> DISCUSS EFFICIENCIES OF ELECTRIC MOTORS & INTERNAL COMBUSTION ENGINES (ICE). WHICH IS MORE EFFICIENT OVERALL—ELECTRIC MOTOR OR ICE?</p>
	<p><u>DEMONSTRATION:</u> DEMO DE-POWERING PROCEDURE ON A HYBRID ELECTRIC VEHICLE</p>
	<p><u>ON-VEHICLE NATEF TASK</u> IDENTIFY LOCATION OF <u>HYBRID</u> VEHICLE HIGH-VOLTAGE CIRCUIT DISCONNECT (SERVICE PLUG) LOCATION AND SAFETY PRECAUTIONS.</p>
	<p><u>DISCUSSION:</u> HAVE STUDENTS TALK ABOUT WHEN HIGH VOLTAGE SYSTEM NEEDS TO BE DE-POWERED & WHEN IT DOESN'T. WHEN SERVICING A SYSTEM THAT MAY CONTAIN HIGH VOLTAGE, HOW CAN YOU BE SURE OF WHETHER OR NOT IT NEEDS TO BE DE-POWERED?</p>
	<p><u>HANDS-ON TASK:</u> SUPERVISE STUDENTS AS THEY <u>DE-POWER VEHICLE.</u></p>
	<p><u>DISCUSSION:</u> WHAT ARE COMMON VOLTAGE RATINGS FOR MILD, MEDIUM, AND FULL HYBRID VEHICLES? REMIND STUDENTS OF SAFETY PRECAUTIONS REQUIRED FOR WORKING ON HYBRID ELECTRIC VEHICLES</p>
	<p>27. SLIDES 27-28 EXPLAIN Summary</p>