Automatic Transmissions and Transaxles, 6e

Chapter 6 Power Flow Through Transmission Gear Sets

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. 1. Prepare for ASE Automatic Transmissions (A2) certification test content area "A" (General Transmission and Transaxle Diagnosis). 2. Explain how power can be transferred through planetary gear sets to produce the various ratios. 3. Discuss the Simpson gear set and identify the different types of Simpson gear trains. 4. Discuss the Ravigneaux gear set. 5. Explain the operation of the LePelletier gear train.
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	Ch6 Power Flow Thru Transmission Gear Sets
	1. SLIDE 1 POWER FLOW THROUGH TRANSMISSION GEAR SETS 2. SLIDES 2-3 EXPLAIN OBJECTIVES Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE IS CONSTANTLY UPDATED
	4. SLIDES 4-5 EXPLAIN Rules of Power Transfer 6. SLIDE 6 EXPLAIN FIGURE 6–1 A typical planetary gear set showing the terms that are used to describe each member
DEMO	DEMONSTRATION: SHOW PLANETARY GEAR SET. ID PARTS: SUN GEAR, PLANETARY CARRIER, & RING (ANNULUS) GEAR
	7. SLIDE 7 EXPLAIN FIGURE 6–2 A typical planetary gear set showing the planet carrier which supports all of the pinion gears (also called planet pinion gears)
	SAFETY CAUTION PARTS ON A PLANETARY GEAR SET CAN BE VERY SHARP AND CAN CAUSE PERSONAL INJURY. ALSO WARN STUDENTS THAT PLANETARY GEAR SETS HAVE MANY PINCH POINTS THAT ALSO CAN CAUSE INJURY
	HANDS-ON TASK: HAVE THE STUDENTS IDENTIFY PARTS ON PLANETARY GEAR SET. GRADE THEM ON THEIR ABILITY TO CORRECTLY IDENTIFY PARTS INCLUDING SUN GEAR, PLANETARY CARRIER, & RING (ANNULUS) GEAR
GEAR REDUCTION	PGS 1, Reduction PGS 2, Rev Reduction PGS 3, Reduction PGS 4, Rev OD PGS 5, OD PGS 6, OD PGS 7, Direct Drive

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	8. SLIDE 8 EXPLAIN FIGURE 6–3 A Simpson planet gear set is composed of two ring gears and two planet carrier assemblies that share one sun gear. **9. SLIDES 9-12 EXPLAIN** Simpson Gear Train Transmission **13. SLIDE 13 EXPLAIN FIGURE 6–9** Type 1 gear set is a three-speed Simpson gear train that uses bands to hold the sun gear and reaction carrier. Note that the reaction carrier can also be held by a one-way clutch. **14. SLIDE 14 EXPLAIN FIGURE 6–10** The one-way clutch of this type 1 gear set serves as the reaction member in first gear with the gear selector in Drive (D1). The low-reverse band is applied in manual first (M1) to allow engine compression braking.
DEMO	**DEMONSTRATION: USING A PLANETARY GEAR SET, DEMONSTRATE FOR STUDENTS WHEN 3 GEARS ARE USED AND WHEN 2ND GEAR MOVED IN DRIVEN GEAR BECOMES DRIVE GEAR TO 3RD GEAR**
QUESTION	**DISCUSSION: DISCUSS WHAT AN INPUT MEMBER, A REACTION MEMBER, AND OUTPUT MEMBER ARE. ARE THESE MEMBERS ALWAYS THE SAME IN A PLANETARY GEAR SET?**
	HANDS-ON TASK: HAVE STUDENTS WORK IN GROUPS TO EXPERIMENT WITH A PLANETARY GEAR SET. ASK THEM TO HOLD AND DRIVE DIFFERENT PARTS OF THE GEAR SET TO SEE WHAT THE RESULTS WILL BE. ASK THEM TO DETERMINE WHEN A GEAR REDUCTION, A 1:1 RATIO, OR AN OVERDRIVE WILL OCCUR.
	15. SLIDES 15-17 EXPLAIN Ravigneaux Gearsets **18. SLIDE 18 EXPLAIN FIGURE 6–18** Types 9, 10, 11, and 12 gear sets illustrate the different three- and four-speed gear train arrangements that use a single Ravigneaux gear set
	19. SLIDE 19 EXPLAIN FIGURE 6–20 The full-throttle shift sequence for a type 12 transmission showing the apply devices and the output shaft speed at the 1–2, 2–3, and 3–4 upshifts and reverse
	20. SLIDE 20 EXPLAIN LePelletier Gear Train

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	21. **SLIDE 21 EXPLAIN FIGURE 6–21a** A schematic view of a type 13, LePelletier six-speed gear set. 22. **SLIDE 22 EXPLAIN FIGURE 6–21b** clutch application chart. 23. **SLIDE 23 EXPLAIN FIGURE 6–22** A type 13 shift sequence.
QUESTION	**DISCUSSION: DISCUSS AND COMPARE RAVIGNEAUX GEAR SET, LAPELLETIER GEAR SET, & SIMPSON GEAR SET. WHAT ARE ADVANTAGES AND DISADVANTAGES, IF ANY, OF DIFFERENT GEAR SETS? IS A PLANETARY GEAR CAPABLE OF PRODUCING AN OVERDRIVE?**
	HANDS-ON TASK: IDENTIFY WHAT MODEL OF TRANSMISSION OR TRANSAXLE (GM 4L80E) THEIR OWN OR THEIR PARENTS' VEHICLE HAS IN IT. HAVE THE STUDENTS DETERMINE WHAT THE NUMBERS AND LETTERS MEAN FOR VEHICLE
	Power Flow, 6T70/6F50 Power Flow, Allison 1000, 5-Speed Power Flow, Lepelletier Six-Speed Power Flow, Overdrive Four-Speed #1 Power Flow, Overdrive Four-Speed #2 Power Flow, Overdrive Four-Speed #3 Power Flow, Ravigneaux Four-Speed Power Flow, Simpson Geartrain Power Flow, Simpson Geartrain + Overdrive Power Flow, Two-Mode Hybrid Transmission Power Flow, Toyota A 750E
QUESTION	**DISCUSSION: DISCUSS AUTOMATIC TRANSAXLES. WHAT DOES AN AUTOMATIC TRANSAXLE INCLUDE? IN WHAT APPLICATIONS CAN AUTOMATIC TRANSAXLES BE USED?**
QUESTION	**DISCUSSION: DISCUSS AUTOMATIC TRANSMISSION USED IN HONDA OR A SATURN. WHAT IS DIFFERENT ABOUT THIS TYPE OF AUTOMATIC TRANSMISSION?**

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	**HANDS-ON TASK:** HAVE THE STUDENTS LOCATE IN THE ON-LINE SERVICE INFORMATION, DETAILS ABOUT THE OPERATION OF A SATURN OR HONDA NON-PLANETARY TRANSAXLE AND HAVE THEM SELECT A SPOKESPERSON WHO WILL EXPLAIN THE ADVANTAGES AND DISADVANTAGES OF THIS DESIGN COMPARED TO A STANDARD AUTOMATIC TRANSAXLE USING PLANETARY GEARSETS.
	Honda 4-Speed Automatic Transaxle
	24. SLIDES 24-28 EXPLAIN Summary