










Automatic Transmissions and Transaxles, 6e

Chapter 11 Continuously Variable Transmissions

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. Describe the construction of a continuously variable transmission and discuss its advantages and disadvantages.3. Discuss the electronic controls and operation of a CVT.4. Explain the diagnosis of a CVT, including pressure testing and CVT fluid and noise issues.
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	Ch11 Continuously Variable Transmissions
	<p>1. SLIDE 1 CONTINUOUSLY VARIABLE TRANSMISSIONS</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. SLIDES 4-7 EXPLAIN Continuously Variable Transmission</p>
	<p><u>ANIMATION: CVT OPERATION</u> <u>WWW.MYAUTOMOTIVELAB.COM</u> http://media.pearsoncmg.com/ph/chet/chet_mvautomotivelab_2/animations/A14_Animation/Chapter100_Fig_100_21/ind_ex.htm</p>
 <p>QUESTION</p>	<p><u>DISCUSSION:</u> HAVE THE STUDENTS TALK ABOUT HOW A VEHICLE EQUIPPED WITH A CVT WILL DRIVE A LITTLE DIFFERENTLY THAN A VEHICLE WITH A CONVENTIONAL AUTOMATIC TRANSMISSION OR TRANSAXLE. WHAT ARE SOME DRIVING ADVANTAGES OF A CVT?</p>
	<p>8. SLIDE 8 EXPLAIN FIGURE 11-3 The drive pulley is wide while the driven pulley is narrow for a low ratio vehicle start (left). The ratio changes by making the drive pulley narrow and the driven pulley wider.</p>
 <p>QUESTION</p>	<p><u>DISCUSSION:</u> DISCUSS CVT VARIABLE DIAMETER PULLEYS. WHAT FUNCTION DO THESE PULLEYS DO THAT PLANETARY GEAR SETS PERFORM IN TRANSMISSIONS TRANSAXLES?</p>
 <p>DEMO</p>	<p><u>DEMONSTRATION:</u> USING A VARIABLE-SPEED DRILL PRESS, SHOW STUDENTS THAT BY CHANGING THE PULLEY DIAMETER, YOU CAN CHANGE THE SPEED OF DRILL. THIS WILL HELP THEM UNDERSTAND HOW A CONTINUOUSLY VARIABLE TRANSAXLE OPERATES.</p>
 <p>QUESTION</p>	<p><u>DISCUSSION:</u> DISCUSS CVT VARIABLE DIAMETER PULLEYS. WHAT FUNCTION DO THESE PULLEYS DO THAT PLANETARY GEAR SETS PERFORM IN TRANSMISSIONS TRANSAXLES?</p>

ICONS

Ch11 Continuously Variable Transmissions



9. **SLIDE 9 EXPLAIN FIGURE 11-4** A Typical push-type CVT belt construction.

10. **SLIDE 10 EXPLAIN FIGURE 11-5** The pull chain looks similar to a silent chain.

DISCUSSION: DISCUSS HONDA CVT USED AS PART OF HEV SYSTEM ON SOME HONDAS. WHY WOULD A CVT BE USED FOR A HYBRID VEHICLE? DISCUSS WHY A START CLUTCH IS NEEDED. WHAT DOES A START CLUTCH REPLACE IN AN AUTOMATIC TRANSMISSION?

11. **SLIDES 11-14 EXPLAIN** Electronic Controls and Operations of a CVT

15. **SLIDE 15 EXPLAIN FIGURE 11-6** Block diagram showing the relationship between the TCM, electrical actuators, valve body, and hydraulic actuators for a CVT transmission

DISCUSSION: HAVE STUDENTS TALK ABOUT THE HONDA CVT USED AS PART OF HEV SYSTEM ON SOME HONDAS. WHY WOULD A CVT BE USED FOR A HYBRID VEHICLE?. DISCUSS WHY A START CLUTCH IS NEEDED. WHAT DOES A START CLUTCH REPLACE IN AN AUTOMATIC TRANSMISSION?







16. **SLIDE 16 EXPLAIN FIGURE 11-7** (a) The stepper motor and pulley ratio link with the CVT in low ratio. (b) The stepper motor has extended, moving the ratio link and ratio control valve; this should cause the primary pulley to become narrower to produce a higher ratio.

17. **SLIDE 17 EXPLAIN FIGURE 11-8** Movement of either the stepper motor or primary floating sheave will move the ratio control valve to add or remove fluid from the primary pulley. The secondary valve maintains the necessary pulley pressure on the drive belt

18. **SLIDE 18 EXPLAIN** Diagnosis of a CVT

19. **SLIDE 19 EXPLAIN FIGURE 11-12** The pressure tap locations as found on a Dodge Caliber CVT transaxle

20. **SLIDE 20 EXPLAIN** Diagnosis of a CVT

ICONS	Ch11 Continuously Variable Transmissions
	<p>HANDS-ON TASK: STUDENTS USE ON-LINE SERVICE INFO TO LOOK UP SERVICE PROCEDURES FOR A CVT TRANSMISSION. IS THERE A FILTER TO CHANGE? CAN THE FLUID BE EASILY CHANGED? DOES A CVT USE SPECIAL ATF? HAVE THEM LIST SERVICE PROCEDURES THEY FIND.</p>
	<p>ON-VEHICLE NATEF TASK: DESCRIBE THE OPERATIONAL CHARACTERISTICS OF A CONTINUOUSLY VARIABLE TRANSMISSION (CVT).</p>
	<p>21. SLIDE 21 EXPLAIN FIGURE 11-13 Using the exact fluid recommended by the vehicle manufacturer is the preferred choice when servicing a CVT transaxles.</p>
	<p>DISCUSSION: DISCUSS TYPES OF FLUIDS USED ON CVT UNITS. WHAT FLUIDS ARE USED?</p>
	<p>HANDS-ON TASK: USE ON-LINE SERVICE INFO TO LOOK UP SERVICE PROCEDURES FOR A CVT TRANSMISSION. IS THERE A FILTER TO CHANGE? CAN THE FLUID BE EASILY CHANGED? DOES A CVT USE SPECIAL ATF? HAVE THEM LIST SERVICE PROCEDURES THEY FIND.</p>
	<p>22. SLIDES 22-24 EXPLAIN Summary</p>