

Automatic Transmissions and Transaxles, 7e

Chapter 11 Continuously Variable Transmissions

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers Automatic Transmissions and Transaxles 7th Edition. It correlates material to task lists specified by ASE and ASE Education (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.

NOTE: This lesson plan is based on automatic Transmissions & Transaxle 6th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

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ICONS



Ch11 Continuously Variable Transmissions

1. SLIDE 1 Continuously Variable Transmissions

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Videos

At the beginning of this class, you can download the crossword puzzle & Word Search from http://www.jameshalderman.com/books_a2.html to familiarize your class with the terms in this chapter & then discuss them

DOWNLOAD Crossword Puzzle

DOWNLOAD Word Search Puzzle







2. SLIDE 2 **EXPLAIN** FIGURE 11–1 typical CVT transaxle cutaway showing the torque converter and CVT belt.
3. SLIDE 3 **EXPLAIN** FIGURE 11–2 A belt and pulley CVT uses variable-width pulleys to provide an infinite number of speed ratios.
4. SLIDE 4 **EXPLAIN** FIGURE 11–3 Engine speed and vehicle speed of a CVT transaxle compared to a typical six-speed conventional automatic transaxle.









EXPLAIN FREQUENTLY ASKED QUESTION:






What Is It Like to Drive a Vehicle Equipped with CVT?

5. SLIDE 5 **EXPLAIN** FIGURE 11–4 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.

DISCUSSION: HAVE THE STUDENTS TALK ABOUT HOW A VEHICLE EQUIPPED WITH A CVT WILL DRIVE A LITTLE DIFFERENTLY THAN A VEHICLE WITH A CONVENTIONAL AUTOMATIC

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     	<p>TRANSMISSION OR TRANSAXLE. WHAT ARE SOME DRIVING ADVANTAGES OF A CVT?</p> <p>DISCUSSION: DISCUSS CVT VARIABLE DIAMETER PULLEYS. WHAT FUNCTION DO THESE PULLEYS DO THAT PLANETARY GEAR SETS PERFORM IN TRANSMISSIONS TRANSAXLES?</p> <p>DEMONSTRATION: 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>DISCUSSION: DISCUSS CVT VARIABLE DIAMETER PULLEYS. WHAT FUNCTION DO THESE PULLEYS DO THAT PLANETARY GEAR SETS PERFORM IN TRANSMISSIONS TRANSAXLES?</p> <ol style="list-style-type: none"> SLIDE 6 EXPLAIN FIGURE 11-5 A Typical push-type CVT belt construction. SLIDE 7 EXPLAIN FIGURE 11-6 The pull chain looks similar to a silent chain. SLIDE 8 EXPLAIN FIGURE 11-7 Block diagram showing the relationship between the TCM, electrical actuators, valve body, and hydraulic actuators for a CVT transmission. <p>EXPLAIN CHART 11-1</p> <ol style="list-style-type: none"> SLIDE 9 EXPLAIN FIGURE 11-8 (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 SLIDE 10 EXPLAIN FIGURE 11-9 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.

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	<p>11. SLIDE 11 EXPLAIN FIGURE 11–10 Honda CVT power flow in park (P) and neutral (N).</p> <p>12. SLIDE 12 EXPLAIN FIGURE 11–11 Honda CVT operation in drive (D) or low (L).</p> <p>13. SLIDE 13 EXPLAIN FIGURE 11–12 Location of the Honda CVT start clutch.</p>
	<p>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?</p>
	<p>DISCUSSION: DISCUSS HONDA CVT USED AS PART OF HEV SYSTEM. WHY WOULD A CVT BE USED FOR HYBRID VEHICLE?. DISCUSS WHY A START CLUTCH IS NEEDED. WHAT DOES A START CLUTCH REPLACE AN AUTOMATIC TRANSMISSION?</p>
	<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>14. SLIDE 14 EXPLAIN FIGURE 11–13 pressure tap locations as found on a Dodge Caliber CVT transaxle.</p> <p>15. SLIDE 15 EXPLAIN FIGURE 11–14 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>EXPLAIN CASE STUDY: The Case of the Delayed Shift Subaru</p>
	<p>16. SLIDE 16 EXPLAIN FIGURE 11–15 The “fix” to customer concern was to perform a relearn procedure using gear selector following instructions found in TSB.</p>

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    	<p>EXPLAIN WARNING: The pressure can exceed 1,000 PSI (6,900 kPa) and a leak from the tester could cause personal injury. Always uses a high-pressure gauge and follow the OEM recommended procedures.</p> <p>ON-VEHICLE ASE Education TASK: DESCRIBE OPERATIONAL CHARACTERISTICS OF A CONTINUOUSLY VARIABLE TRANSMISSION (CVT).</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>EXPLAIN CHART 2</p>