

Automatic Transmissions and Transaxles, 6e

Chapter 9 Electronic Transmission Controls

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. Explain the procedure for monitoring engine load and vehicle speed for the proper functioning of hydraulically controlled transmission/ transaxles.3. Explain how the automatic transmissions/ transaxles are controlled electronically.4. Explain the function of sensors and switches for electronic control of transmission.5. Identify the types of transmission solenoids.6. Discuss adaptive strategies and controls for electronically controlled automatic transmissions/transaxles.
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

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1. SLIDE 1 ELECTRONIC TRANSMISSION CONTROLS

2. SLIDES 2-4 EXPLAIN OBJECTIVES

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5. SLIDES 5-8 EXPLAIN Hydraulically Controlled Transmission

9. SLIDE 9 EXPLAIN FIGURE 9-1 The throttle valve (TV) cable on a 4T-60 transaxle.

Basic Hydraulic System

Pressure Regulator Valve

10. SLIDE 10 EXPLAIN FIGURE 9-2 vacuum modulator moves the modulator valve depending on the vacuum of the engine. A heavy load on the engine causes the vacuum to be lower than when the engine is operating under a light load. The spool valve applies mainline pressure to the boost sleeve of the pressure regulator valve, which causes the mainline pressure to increase.

Simple Hydraulic Shifts

Governor Operation

11. SLIDE 11 EXPLAIN FIGURE 9-3 governor assembly is used on older hydraulically controlled automatic transmissions/transaxles to control shift points based on vehicle speed.

1-2 Upshift, Minimum Throttle

2-3 Shift Valve, Coast Downshift

2-3 Shift Valve, Full Throttle Downshift

2-3 Shift Valve, Light Throttle Downshift

2-3 Shift Valve, Light Throttle Upshift










2-3 Shift Valve, Wide Open Throttle Upshift

2-3 Shift Valve

Hydraulic Controlled Manual Shifts

Hydraulic Shift Control

Manual Valve

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	<p><u>Shift Valve</u> <u>Shuttle Valve</u> <u>Shift Valve Forces</u></p>
	<p>12. SLIDE 12 EXPLAIN Transmission Control Volume</p>
 QUESTION	<p><u>DISCUSSION:</u> DISCUSS <u>SHIFT MODES</u> THAT MOST AUTOMATIC TRANSMISSIONS & TRANSAXLES INCLUDE. WHAT IS A COMMON NAME FOR A GEAR SELECTOR? <u>FIGURE 68-13</u></p>
 QUESTION	<p><u>DISCUSSION:</u> DISCUSS IMPORTANCE OF OPERATING A VEHICLE IN THE PROPER <u>SHIFT MODE</u> AT THE PROPER TIME. WHICH GEARS ARE USED ON GENTLE, LONG, OR STEEP GRADES?</p>
	<p>13. SLIDES 13-15 EXPLAIN Sensors</p>
	<p><u>Electronic Clutch Control</u> <u>Electronic/Hydraulic Shift Control</u> <u>Electronic Transmission Control</u></p>
	<p>16. SLIDES 16-17 EXPLAIN Transmission Solenoids 18. SLIDE 18 EXPLAIN FIGURE 9–13a normally closed solenoid blocks fluid flow when it is off while opening the exhaust; and when it is on, it opens the valve.</p>
	<p>19. SLIDE 19 EXPLAIN FIGURE 9–13b normally open solenoid allows fluid flow when it is off; and when it is on, it closes the valve while opening the exhaust.</p>
	<p><u>Mechanical Diode</u> <u>Manual Lever Position Switch (MLPS)</u> <u>Normally Closed Solenoid 1</u> <u>Normally Closed Solenoid 2</u> <u>Shift Solenoid Operation</u> <u>Simple Electronic Controlled Shifts</u></p>

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20. SLIDE 20 EXPLAIN FIGURE 9–14 The signal from the TCM can cause the EPC solenoid to change the pressure regulator valve to adjust line pressure.

21. SLIDE 21 EXPLAIN FIGURE 9–15 Line pressure increases as the duty cycle of the EPC solenoid decreases.

EPC Solenoid

HANDS-ON TASK: PULSE WIDTH IS MEASURED IN HERTZ. HERTZ ARE OFTEN DISPLAYED IN MILLISECONDS. HOW MANY MILLISECONDS IN A SECOND? HAVE STUDENTS DETERMINE SPEED OF ELECTRICITY. UNDERSTANDING SPEED OF ELECTRICITY HELPS UNDERSTAND HOW ELECTRONICS CAN OPERATE SO FAST.

22. SLIDES 22-23 EXPLAIN Adaptive Strategies and Controls

24. SLIDE 24 EXPLAIN FIGURE 9–20 A scan tool display showing the adaptive (TAP) pressure changes at various throttle positions.

DEMONSTRATION: SHOW HOW TO USE A SCAN TOOL TO CHECK & DIAGNOSE A TCC

HANDS-ON TASK: BASED ON DEMO HAVE STUDENTS USE A SCAN TOOL TO CHECK & DIAGNOSE A TCC

25. SLIDES 25-26 EXPLAIN Summary