

Automatic Transmissions and Transaxles, 7e

Chapter 16 Valve Bodies and Valve Body Service

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 purpose and function of the valve body.3. Describe the parts and operations of a valve body.4. Discuss valve body service and replacement procedures.
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 7th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com
DOWNLOAD CHP 16: Chapter Images

ICONS



Ch16 Valve Bodies and Valve Body Service

1. SLIDE 1 Valve Bodies and Valve Body Service

Check for **ADDITIONAL VIDEOS & ANIMATIONS**
@ <http://www.jameshalderman.com/>
WEB SITE IS CONSTANTLY UPDATED

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 16–1** (a) An exploded and (b) cutaway view of the valve body from a four-speed transaxle. Note the various valve groups and how they are retained in their bore.
3. **SLIDE 3 EXPLAIN FIGURE 16–2** If the valve body is moved to a vertical position, steel valves should slide freely from the bore. Be prepared to catch the valves when making this check.










EXPLAIN CASE STUDY: The Case of the Stalling Ford







EXPLAIN FREQUENTLY ASKED QUESTION: How Is a Solenoid Tested That Has a Diode Across the Leads?

4. **SLIDE 4 EXPLAIN FIGURE 16–3** A valve body being washed and air dried in a parts washer. It will be cleaned again when the two major parts are separated.
5. **SLIDE 5 EXPLAIN FIGURE 16–4** A sheet of stiff paper has been folded to create this simple valve holder. Note that a valve group can be placed in order and be labeled.

ICONS	Ch16 Valve Bodies and Valve Body Service
     	<p>6. SLIDE 6 EXPLAIN FIGURE 16–5 (a) Ohmmeter A is checking for a grounded solenoid coil; the reading should be infinite. Ohmmeter B is measuring the coil resistance; it should be within the specifications for this solenoid. (b) Connecting a solenoid to a 12-V battery should cause it to operate. Make sure the battery is connected using the correct polarity in case the solenoid has an internal diode..</p> <p>EXPLAIN TECH TIPS:</p> <p>Solenoids Are Wear Items</p> <p>Technician-Made Valve Body Organizer</p> <p>Do Not Use a Magnet on Check Balls</p> <p>DISCUSSION: DISCUSS NEED TO REGULATE HYDRAULIC PRESSURE. WHAT WOULD HAPPEN IF PRESSURE WAS NOT REGULATED?</p> <p>DEMONSTRATION: SHOW AN EXAMPLE OF A BALANCE VALVE. WHAT WILL HAPPEN IF THE SPRING BREAKS OR IS WEAK?</p> <p>DEMONSTRATION: SHOW A VALVE BODY AND VARIOUS PARTS, SUCH AS THE SEPARATOR PLATE & VALVES. WHAT IS VALVE BODY'S PURPOSE? TALK ABOUT THE FUNCTIONS OF CHECK BALLS AND SEPARATOR PLATE. WHAT IF THE VALVE BODY WAS WARPED OR WERE NOT TORQUED CORRECTLY? WHAT EFFECT WOULD DIRTY FLUID HAVE ON VALVE BODY OPERATION?</p> <p>HANDS-ON TASK: HAVE THE STUDENTS TRACE SEVERAL WORMHOLE PATHS THROUGH THE TRANSMISSION. CAN THEY TELL WHERE THE FLUID IS BEING DIRECTED & WHAT IT WILL DO?</p> <p>1-2 Upshift, Minimum Throttle (View) (Download)</p> <p>2-3 Shift Valve, Coast Downshift (View) (Download)</p> <p>2-3 Shift Valve, Full Throttle Downshift (View) (Download)</p> <p>2-3 Shift Valve, Light Throttle Downshift (View) (Download)</p> <p>2-3 Shift Valve, Light Throttle Upshift (View) (Download)</p> <p>2-3 Shift Valve, Wide Open Throttle Upshift (View)</p>

ICONS	Ch16 Valve Bodies and Valve Body Service
   	<p><u>(Download)</u></p> <p><u>2-3 Shift Valve (View) (Download)</u></p> <p><u>Air Test Transmission No Test Plate (View) (Download)</u></p> <p><u>Auto Transmission Shift Element (View) (Download)</u></p> <p><u>Check One Way Clutch (View) (Download)</u></p> <p><u>EPC Solenoid (View) (Download)</u></p> <p><u>Inspect Valve Body (View) (Download)</u></p> <p><u>Normally Closed Solenoid 1 (View) (Download)</u></p> <p><u>Orifice with Check Valve (View) (Download)</u></p> <p><u>Orifice (View) (Download)</u></p> <p><u>Power Flow, ZF 9HP (View) (Download)</u></p> <p><u>Shift Solenoid Operation (View) (Download)</u></p> <p><u>Shift Valve Forces (View) (Download)</u></p> <p><u>SHIFT VALVE (VIEW) (DOWNLOAD)</u></p> <ol style="list-style-type: none"> 7. SLIDE 7 EXPLAIN FIGURE 16-6 Air should not be able to flow through this solenoid if it is not activated. If it is connected to a 12-V battery, it should make a “click,” and air should be able to flow through it. 8. SLIDE 8 EXPLAIN FIGURE 16-7 Using assembly lube is a great way to keep check balls in place during the reassembly of the valve body. 9. SLIDE 9 EXPLAIN FIGURE 16-8 The valve body bolts should be tightened in order, starting from the center and working in an outward spiral. <p>EXPLAIN TECH TIPS:</p> <p>The Shop Light Trick</p> <p>Check Manual Valve Operation</p> <p>DEMONSTRATION: SHOW THE STUDENTS AN EXAMPLE OF A ONE-WAY VALVE. SHOW THEM HOW IT WORKS BY MOVING THE CHECK BALL AGAINST SPRING. WHAT WOULD HAPPEN IF THE VALVE WERE STUCK OPEN?</p> <p>DISCUSSION: DISCUSS PURPOSE OF CHECK VALVES IN A VALVE BODY. WHAT ADVANTAGES DO STEEL CHECK VALVES HAVE?</p>

ICONS	Ch16 Valve Bodies and Valve Body Service
	<p>10. SLIDE 10 EXPLAIN FIGURE 16–9 A check ball should seal off light from coming through the spacer plate. A problem is indicated if light shines through an opening alongside of the check ball.</p>
	<p>Orifice with Check Valve (View) (Download) Orifice (View) (Download) Shuttle Valve (View) (Download)</p>
	<p>VACUUM TEST VALVE BODY (VIEW) (DOWNLOAD)</p> <p>11. SLIDE 11 EXPLAIN FIGURE 16–10 The manual valve is moved by the shift lever and held in position by the detent lever (cam).</p>
	<p>DISCUSSION: DISCUSS DIFFERENCE BETWEEN A TCM (TRANSMISSION CONTROL MODULE) AND PCM (POWERTRAIN CONTROL MODULE). WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF DESIGNS? WHAT IS CAN?</p>
	<p>DEMONSTRATION: POINT OUT THE LOCATION OF VARIOUS PCM INPUTS SUCH AS THROTTLE POSITION, CRANKSHAFT POSITION, MASS AIRFLOW, AND MANIFOLD ABSOLUTE PRESSURE. WILL A POORLY RUNNING ENGINE AFFECT TRANSMISSION OPERATION?</p>
	<p>HANDS-ON TASK: HAVE THE STUDENTS DOWNLOAD A WIRING DIAGRAM FOR AN ELECTRONICALLY CONTROLLED TRANSMISSION OR TRANSAXLE AND TRACE PCM OR TCM TRANSMISSION CONTROL CIRCUITS</p>
	<p>DISCUSSION: HAVE THE STUDENTS TALK ABOUT THE ADVANTAGES THAT AN ELECTRONICALLY CONTROLLED TRANSMISSION HAS OVER A HYDRAULICALLY CONTROLLED TRANSMISSION.</p>
	<p>DEMONSTRATION: SHOW EXAMPLES OF ELECTRONIC SHIFT SOLENOIDS. APPLY VOLTAGE TO THE SOLENOIDS SO THAT THE STUDENTS CAN SEE EXACTLY HOW SOLENOID MOVES A VALVE. HOW CAN A SHIFT SOLENOID BE TESTED?</p>
	<p>HANDS-ON TASK: OPTIONAL HANDS-ON TASK: HAVE THE STUDENTS USE A HYDRAULIC FLOW CHART AND COLORED PENCILS TO INDICATE WHERE FLUID FLOW CAUSES A 3-4 UPSHIFT IN A 4L65-E</p>

ICONS	Ch16 Valve Bodies and Valve Body Service
	<p>DEMONSTRATION: SHOW MANUAL VALVE AND HOW IT WORKS IN A VALVE BODY. WHAT WILL HAPPEN IF SHIFT LINKAGE WERE OUT OF ADJUSTMENT?</p>
	<p>DEMONSTRATION: SHOW HOW A SPOOL VALVE OPERATES IN A VALVE BODY. DEMONSTRATE CLOSE TOLERANCE THAT THE VALVE HAS WITH THE BORE. EMPHASIZE THAT SMOOTH VALVE MOVEMENT IS VITAL FOR PROPER OPERATION.</p>
	<p>HANDS-ON TASK: HAVE STUDENTS USE SCAN TOOL TO MONITOR CRITICAL PCM & TCM INPUTS. HAVE THE STUDENTS MAKE NOTE OF FIVE KEY INPUT VALUES AT IDLE.</p>
	<p>DISCUSSION: DISCUSS THAT VALVES AND SPRINGS CONTROL ALL SHIFT FUNCTIONS IN A HYDRAULICALLY CONTROLLED TRANSMISSION. WHAT PROBLEMS CAN DIRT OR CONTAMINATED FLUID CAUSE?</p>
	<p>DEMONSTRATION: SHOW HOW TO DISASSEMBLE AND INSPECT A VALVE BODY. SHOW THEM HOW TO INSPECT THE VALVE BORES FOR EXCESSIVE WEAR.</p>
	<p>ASE Education TASK: INSPECT, MEASURE, CLEAN, AND REPLACE VALVE BODY (INCLUDES SURFACES, BORES, SPRINGS, VALVES, SLEEVES, RETAINERS, BRACKETS, CHECKVALVES/BALLS, SCREENS, SPACERS, AND GASKETS).</p>
