

















Automatic Transmissions and Transaxles, 6e











Chapter 16 Valve Bodies and Valve Body Service






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 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.

ICONS	Ch16 Valve Bodies and Valve Body Service
       	<p>1. SLIDE 1 VALVE BODIES & VALVE BODY SERVICE</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 4-5 EXPLAIN Valve Body</p> <p>6. SLIDE 6 EXPLAIN FIGURE 16–1 A typical valve body as installed on a GM 4T65-E transaxle.</p> <p><u>DISCUSSION:</u> DISCUSS NEED TO REGULATE HYDRAULIC PRESSURE. WHAT WOULD HAPPEN IF PRESSURE WAS NOT REGULATED?</p> <p><u>DEMONSTRATION:</u> SHOW AN EXAMPLE OF A BALANCE VALVE. WHAT WILL HAPPEN IF THE SPRING BREAKS OR IS WEAK?</p> <p><u>DEMONSTRATION:</u> SHOW A VALVE BODY AND VARIOUS PARTS, SUCH AS THE SEPARATOR PLATE & VALVES. WHAT IS <u>VALVE BODY'S PURPOSE?</u> 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>7. SLIDES 7-9 EXPLAIN Valve Body</p> <p>10. SLIDE 10 EXPLAIN FIGURE 16–2 A typical upper valve body showing the fluid passages ("worm holes").</p> <p>11. SLIDE 11 EXPLAIN FIGURE 16–9 (a) An orifice will cause a pressure drop as fluid flows through; (b) when the flow stops, the pressure on both sides of the orifice will be the same.</p> <p><u>HANDS-ON TASK:</u> HAVE THE STUDENTS TRACE SEVERAL WORMHOLE PATHS THROUGH THE TRANSMISSION. CAN THEY TELL WHERE THE FLUID IS BEING DIRECTED & WHAT IT WILL DO?</p>

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	<p>12. SLIDE 12 EXPLAIN Valve Body</p> <p>13. SLIDE 13 EXPLAIN FIGURE 16-5 Operation of the valve controls fluid flow to the actuator. It can (a) block operation, (b) cause apply, or (c) cause release.</p> <p>14. SLIDE 14 EXPLAIN FIGURE 16-7 Check balls are used in the valve body to allow hydraulic circuits to share a common passage.</p>
	<p><u>DEMONSTRATION:</u> SHOW THE STUDENTS AN EXAMPLE OF A <u>ONE-WAY VALVE</u>. SHOW THEM HOW IT WORKS BY MOVING THE CHECK BALL AGAINST SPRING. WHAT WOULD HAPPEN IF THE VALVE WERE STUCK OPEN?</p>
	<p>15. SLIDE 15 EXPLAIN FIGURE 16-8 When fluid flows through this shuttle valve from port B to port C, the check ball moves over to close port A (left). Fluid flow from port A will close port B (right).</p>
	<p><u>DISCUSSION:</u> DISCUSS PURPOSE OF <u>CHECK VALVES</u> IN A VALVE BODY. WHAT ADVANTAGES DO STEEL CHECK VALVES HAVE? WHAT WOULD HAPPEN IF A CHECK VALVE GOT STUCK?</p>
	<p>16. SLIDE 16 EXPLAIN FIGURE 16-10 typical valve body showing some of the valve and solenoids as well as the clips and pins used to retain the parts in valve body.</p> <p>17. SLIDES 17-18 EXPLAIN Valve Body</p>
	<p><u>DISCUSSION:</u> DISCUSS THE DIFFERENCE BETWEEN A TCM (TRANSMISSION CONTROL MODULE) AND PCM (POWERTRAIN CONTROL MODULE). WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF THESE DESIGNS? WHAT IS CAN?</p>
	<p><u>DEMONSTRATION:</u> POINT OUT THE LOCATION OF VARIOUS <u>PCM INPUTS</u> SUCH AS THROTTLE POSITION, CRANKSHAFT POSITION, MASS AIRFLOW, AND MANIFOLD ABSOLUTE PRESSURE. WILL A POORLY RUNNING ENGINE AFFECT TRANSMISSION OPERATION?</p>
	<p><u>HANDS-ON TASK:</u> HAVE THE STUDENTS DOWNLOAD A WIRING DIAGRAM FOR AN ELECTRONICALLY CONTROLLED TRANSMISSION OR TRANSAXLE AND TRACE PCM OR TCM TRANSMISSION CONTROL CIRCUITS</p>

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	<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.</p>
	<p>HOW CAN A SHIFT SOLENOID BE TESTED? 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 <u>4L65-E</u></p>
	<p>19. SLIDE 19 EXPLAIN FIGURE 16-3 rooster comb is the detent that helps retain the manual valve in the various positions in the valve body.</p>
	<p>DEMONSTRATION: SHOW <u>MANUAL VALVE</u> AND HOW IT WORKS IN A VALVE BODY. WHAT WILL HAPPEN IF SHIFT LINKAGE WERE OUT OF ADJUSTMENT?</p>
	<p>20. SLIDE 20 EXPLAIN FIGURE 16-4 typical shift valve has a spring to move valve to a downshift position where throttle pressure works with this spring. When governor pressure gets high enough, valve will move to an upshift position.</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>21. SLIDE 21 EXPLAIN Valve Body 22. SLIDE 22 EXPLAIN FIGURE 16-15a exploded view of valve body from a 4-speed transaxle. Note various valve groups and how they are retained in their bore.</p>
	<p>23. SLIDE 23 EXPLAIN FIGURE 16-15b cutaway view of valve body from a four-speed transaxle. Note various valve groups and how they are retained in their bore.</p>
	<p>OPTIONAL HANDS-ON TASK: HAVE THE STUDENTS USE SCAN TOOL TO MONITOR CRITICAL PCM & TCM INPUTS. HAVE THE STUDENTS MAKE NOTE OF FIVE KEY INPUT VALUES AT IDLE.</p>

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	<p>24. SLIDE 24 EXPLAIN Valve Body</p>
	<p>25. SLIDE 25 EXPLAIN FIGURE 16–16 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.</p> <p>26. SLIDES 26-27 EXPLAIN Valve Body</p>
	<p>DISCUSSION: HAVE THE STUDENTS DISCUSS THE FACT 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 THE STUDENTS HOW TO <u>DISASSEMBLE AND INSPECT A VALVE BODY</u>. SHOW THEM HOW TO INSPECT THE VALVE BORES FOR EXCESSIVE WEAR.</p>
	<p>NATEF TASK: INSPECT, MEASURE, CLEAN, AND REPLACE VALVE BODY (INCLUDES SURFACES, BORES, SPRINGS, VALVES, SLEEVES, RETAINERS, BRACKETS, CHECKVALVES/BALLS, SCREENS, SPACERS, AND GASKETS).</p>
	<p>28. SLIDES 28-30 EXPLAIN Summary</p>