












Automatic Transmissions and Transaxles, 7e









Chapter 7 Clutches and Bands






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. Identify the components of a multiple-disc driving clutch and describe its operation.3. Identify the components of a one-way driving clutch and describe its operation.4. Discuss holding clutches and bands.5. Explain shift quality.
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 7: Chapter Images

ICONS	Ch07 Clutches and Bands
          	<p>1. SLIDE 1 Clutches and Bands</p> <p>Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE IS CONSTANTLY UPDATED</p> <p><u>Videos</u></p> <p>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</p> <p>DOWNLOAD Crossword Puzzle DOWNLOAD Word Search Puzzle</p> <p>2. SLIDE 2 EXPLAIN FIGURE 7-1 multiple-disc clutch can hold, or drive a member of a gear set.</p> <p>3. SLIDE 3 EXPLAIN FIGURE 7-2 A sectioned view of a multiple-disc clutch. Note the piston to apply the clutch and the spring(s) to release it</p> <p>4. SLIDE 4 EXPLAIN FIGURE 7-3 The apply piston is released (left) by the coil springs. Fluid pressure moves the piston to apply the clutch (right).</p> <p><u>Auto Transmission Clutch Operation (View) (Download)</u> <u>Pressure Balanced Clutch (View) (Download)</u> <u>Electronic Clutch Control (View) (Download)</u> DEMONSTRATION: SHOW THE STUDENTS A DISASSEMBLED CLUTCH PACK AND IDENTIFY A FRICTION PLATE AND A STEEL PLATE.</p> <p>DEMONSTRATION: SHOW EXAMPLES OF APPLY DEVICES SUCH AS A TRANSMISSION BAND, MULTIPLE-PLATE CLUTCH, & ONE-WAY CLUTCH. THEN INSTALL A BAND AROUND A DRUM AND SHOW THE STUDENTS HOW IT WILL HOLD A DRUM & CHANGE REACTION MEMBER IN PLANETARY</p>

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	<p>DEMONSTRATION: SHOW FRICTION PLATE AND A STEEL PLATE, NOTING THAT THE FRICTION PLATE'S SPLINES ARE ON THE INNER EDGE, AND THE STEEL PLATE'S SPLINES ARE ON OUTER EDGE.</p>
  <p>QUESTION</p>	<p>DISCUSSION: DISCUSS HOW A CLUTCH PACK APPLIES AND RELEASES. WHAT WILL HAPPEN IF THE CLUTCH RELEASES TOO SLOWLY?</p>
  <p>QUESTION</p>	<p>DISCUSSION: DISCUSS HOW FLUID TRAVELS AROUND THE TRANSMISSION THROUGH VARIOUS PASSAGES TO ACCOMPLISH DIFFERENT TASKS. WHAT WOULD HAPPEN IF THERE WERE NO FLUID PASSAGES?</p>
	<p>5. SLIDE 5 EXPLAIN FIGURE 7-4 Friction plates often have a groove pattern to help wipe fluid away, dissipate heat, eliminate clutch noise, and change friction qualities during apply and release. A smooth plate is the coolest and slowest to apply and the waffle plate will apply the fastest.</p>
	<p>6. SLIDE 6 EXPLAIN FIGURE 7-5 Most clutches included in overhaul kits use paper as the basis for the lining material.</p>
	<p><u>Clutch Piston Remove and Replace (View)</u> <u>(Download)</u></p>
	<p>7. SLIDE 7 EXPLAIN FIGURE 7-6 A typical clutch piston area is determined by subtracting the area of the inner diameter from the area of the outer-circle diameter.</p>
	<p>8. SLIDE 8 EXPLAIN FIGURE 7-7 Some clutch pistons use a middle seal so the piston will have two working areas.</p>
	<p>9. SLIDE 9 EXPLAIN FIGURE 7-8 The baffle that supports the return springs also forms a chamber for release pressure. The clutch is released when fluid pressure enters this chamber as pressure is released from the apply side of the piston.</p>
	<p>10. SLIDE 10 EXPLAIN FIGURE 7-9 Pressurized oil is sent to the apply side of the piston to force the clutch discs together.</p>
	<p>11. SLIDE 11 EXPLAIN FIGURE 7-10 Clutch stack clearance is adjusted using either the large or the small flange (backing plate). Other clutches may use a selective snap ring.</p>

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    	<p>12. SLIDE 12 EXPLAIN FIGURE 7–11 When this transmission is in first gear, the sun gear and unlined plates of the front clutch rotate counterclockwise while the hub and lined plates of this clutch rotate clockwise. Any drag will produce heat that can cause clutch burnout.</p> <p><u>Measure Clutch Plate Clearance - Dial Indicator (View) (Download)</u></p> <p><u>Measure Clutch Plate Clearance - Feeler Gauge (View) (Download)</u></p> <p>13. SLIDE 13 EXPLAIN FIGURE 7–12 When pushing against a stationary book, the static friction resists motion. Pushing against the same book while it is sliding is easier because the dynamic friction is less.</p> <p>EXPLAIN FREQUENTLY ASKED QUESTION: What Is Wet Friction?</p> <p>14. SLIDE 14 EXPLAIN FIGURE 7–13 (a) Roller one-way clutch in released (free) position. When the inner roller clutch race rotates faster than the outer support, the rollers move out of the wedge and are free to rotate, thereby unlocking the one-way clutch. (b) Roller oneway clutch in the locked (held) position. Note how the rollers are wedged into the ramp that is machined into the outer support.</p> <p>15. SLIDE 15 EXPLAIN FIGURE 7–14 (a) The sprag in the holding (locked) position. Note how the long portion of the sprag is wedged between the inner and outer race. (b) The sprag in the released position. The inner race is free to rotate faster than the outer race.</p> <p>16. SLIDE 16 EXPLAIN FIGURE 7–15 A mechanical diode. The struts can move out of the pocket plate to engage the notch plate, and this will lock the pocket plate. The pocket plate can overrun in the opposite direction.</p> <p>17. SLIDE 17 EXPLAIN FIGURE 7–16 clutch hub and sprag clutch should rotate freely in a counterclockwise direction but should lock up in the opposite direction.</p> <p>DEMONSTRATION: SHOW THE STUDENTS EXAMPLES OF HOLDING CLUTCH & DRIVING CLUTCH.</p>

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	<p>DEMONSTRATION: SHOW ONE-WAY CLUTCH. SHOW HOW IT TURNS ONE WAY, BUT NOT THE OTHER. WHAT WILL HAPPEN IF THE ONE-WAY CLUTCH FAILS?</p>
	<p><u>One Way Roller Clutch (View) (Download)</u> <u>Sprag Clutch (View) (Download)</u> <u>Mechanical Diode (View) (Download)</u></p>
  <p>QUESTION</p>	<p>DISCUSSION: HAVE THE STUDENTS COMPARE ROLLER CLUTCH & SPRAG TO SEE THE DIFFERENCE BETWEEN. IS ONE BETTER THAN THE OTHER?</p>
	<p>EXPLAIN FREQUENTLY ASKED QUESTION: What Is a Clutch-to-Clutch Type Transmission?</p>
	<p>18. SLIDE 18 EXPLAIN FIGURE 7–17 The 41TE transaxle low/reverse clutch is a holding clutch. Note the splines in the case for the clutch plates.</p>
	<p>19. SLIDE 19 EXPLAIN FIGURE 7–18 Transmission bands come in several designs and thicknesses.</p>
	<p>20. SLIDE 20 EXPLAIN FIGURE 7–19 (a) This band uses an adjustable anchor that allows the clearance to be easily adjusted. (b) Note that the apply lever will increase apply force.</p>
	<p>HANDS-ON TASK: HAVE THE STUDENTS RAISE VEHICLE ON A LIFT USING PROPER SAFETY PROCEDURES. ASK THEM TO DETERMINE WHETHER THE BANDS CAN BE ADJUSTED WITH THE TRANSMISSION IN VEHICLE.</p>
	<p><u>Auto Transmission Band & Servo Operation (View) (Download)</u></p>
	<p>21. SLIDE 21 EXPLAIN FIGURE 7–20 servo uses hydraulic pressure to move a piston, which applies band.</p>
	<p>22. SLIDE 22 EXPLAIN FIGURE 7–21 One end of a band is held stationary and other end is attached to servo.</p>
	<p>23. SLIDE 23 EXPLAIN FIGURE 7–22 In this example, the band is applied when 1–2 shift valve pressure pushes upward on the servo piston (top). It will release when 2–3 shift valve pressure pushes the piston downward (bottom). Note the larger area above the piston</p>

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 	<p>24. SLIDE 24 EXPLAIN FIGURE 7-23 A band accumulator piston and spring being removed from a GM 4T65-E.</p> <p>DISCUSSION: HAVE STUDENTS TALK ABOUT THE PURPOSE OF AN ACCUMULATOR. WHAT MIGHT HAPPEN TO A CLUTCH OR A BAND IF THERE WERE NO ACCUMULATOR?</p> <p>25. SLIDE 25 EXPLAIN FIGURE 7-24 Two cushion plates: The Belleville plate has a coned shape; the wave plate has a wavy shape. Both of them will flatten slightly as the clutch is applied.</p>