

Automatic Transmissions and Transaxles, 7e

Chapter 13 Transmission Condition Diagnosis

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. 1. Prepare for ASE Automatic Transmissions (A2) certification test content area "A" (General Transmission and Transaxle Diagnosis). 2. Outline the procedures in verifying customer concern. 3. Outline the procedures involved in diagnosing fluid level and condition. 4. Outline the procedures in retrieving diagnostic trouble codes and checking for technical service bulletins. 5. Outline the procedures in scan tool testing. 6. Outline the procedures in visual inspections. 7. Outline the procedures in finding the root cause.
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
DOWNLOAD CHP 13: Chapter Images

ICONS	Ch13 Transmission Condition Diagnosis
          QUESTION   QUESTION	1. SLIDE 1 Transmission Condition Diagnosis Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE IS CONSTANTLY UPDATED <u>Videos</u> 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 13–1 Selecting all of the shift modes of an automatic transmission/transaxle helps pinpoint the area where the fault is located. EXPLAIN CHART 13-1 3. SLIDE 3 EXPLAIN FIGURE 13–2 A typical automatic transmission dipstick (fluid level indicator). Many use a clip to keep it from being forced upward due to pressure changes inside the automatic transmission. A firm seal also helps keep water from getting into the fluid, which can cause severe damage to the clutches and bands. DISCUSSION: HAVE THE STUDENTS DISCUSS IMPORTANCE OF ACCURATE DIAGNOSIS WHEN REPAIRING AUTOMATIC TRANSMISSIONS & TRANSAXLES. REVIEW CHECKS LIKE FLUID, SCAN TOOL DIAGNOSIS, & PRESSURE TESTING AS WAYS TO DETERMINE CAUSE OF SYMPTOMS. DISCUSSION: DISCUSS HOW IMPORTANT PROPER FLUID CONDITION AND LEVEL ARE FOR CORRECT TRANSMISSION OPERATION. CAN YOU DIAGNOSE TRANSMISSION CONDITION BASED ON FLUID CONDITION?

ICONS	Ch13 Transmission Condition Diagnosis
     	EXPLAIN CASE STUDY: The Slipping Dodge Truck SLIDE 4 EXPLAIN FIGURE 13–3 The “add” mark on most automatic transmission dipsticks indicates the level is down 0.5 quart (0.5L). Always follow the instructions stamped or printed on the dipstick. SLIDE 5 EXPLAIN FIGURE 13–4 temperature of automatic transmission fluid is displayed on a factory or factory-level scan tool. It may require that vehicle be driven under a load for the fluid to reach the specified temperature and can often be achieved by simply allowing the engine to idle. EXPLAIN WARNING: Any fluid that comes out of the fluid level opening will be extremely hot. Personal injury or a vehicle fire can be caused by ATF leaking or spilling onto a hot exhaust system. SLIDE 6 EXPLAIN FIGURE 13–5a The fluid level indicator is reached from under the vehicle on this Ford 6R80 rear-wheel-drive transmission. B. The level indicator can be removed after removing the plug, and then the fluid level can be read on the stick. SLIDE 7 EXPLAIN FIGURE 13–6 Fluid level on sealed units (without a dipstick) is checked by removing level plug, which can be mounted in bottom or side of pan or in case. It is normal for some fluid to drip from this type of level indicator because normal operation of the transmission causes fluid to fill the stand pipe. HANDS-ON TASK: HAVE STUDENTS CHECK FLUID LEVEL IN AN AUTOMATIC TRANSMISSION OR TRANSAXLE. HAVE THEM READ THE INFORMATION ON DIPSTICK & FOLLOW ANY DIRECTIONS STAMPED THERE. MAKE SURE THEY IDENTIFY CORRECT FLUID FOR TRANSMISSION Check Fluid Level, No Dipstick (View) (Download) TRANSMISSION FLUID EXCHANGE (VIEW) (DOWNLOAD)

ICONS	Ch13 Transmission Condition Diagnosis
   	DISCUSSION: DISCUSS THINGS THAT CONTAMINATE FLUID. HOW COULD WATER OR COOLANT GET INTO TRANSMISSION? WHAT WOULD THIS DO TO AUTOMATIC TRANSMISSION? HANDS-ON TASK: USING THE CORRECT SERVICE INFORMATION OR OWNER'S MANUAL, HAVE STUDENTS FIND THE PROPER PROCEDURE FOR CHECKING FLUID LEVEL IN A SPECIFIC VEHICLE. IS THERE A DIPSTICK? EXPLAIN CASE STUDY: The Automatic VW - SLIDE 8 EXPLAIN FIGURE 13–7 Fluid condition can be checked by placing a sample on clean, white, absorbent paper. Clean fluid will spread out and leave only a wet stain. Dirty fluid will leave deposits of foreign material. - SLIDE 9 EXPLAIN FIGURE 13–8 If the ATF looks like a strawberry milkshake, then transmission/transaxle will require to be overhauled and the source of the coolant or the water found and corrected.
   	EXPLAIN 2 FREQUENTLY ASKED QUESTIONS: What Is Wrong When the ATF Looks Like a Strawberry Milkshake? HANDS-ON TASK: HAVE STUDENTS USE APPROPRIATE SERVICE INFORMATION TO LOOK UP TSBS FOR A SPECIFIC VEHICLE. THIS INFORMATION, ALONG WITH ANY DIAGNOSTIC TROUBLE CODES (DTC) VEHICLE HAS, WILL BE HELPFUL IN REPAIRING VEHICLE. DISCUSSION: TALK ABOUT TRANSMISSION DIAGNOSIS. WHAT TESTS WOULD THEY HAVE DONE TO DIAGNOSE VEHICLE DOES NOT MOVE IN DRIVE? - SLIDE 10 EXPLAIN FIGURE 13–9 OBD-II DTC identification format - SLIDE 11 EXPLAIN FIGURE 13–10 A “C” diagnostic trouble code was stored along with a note “symptom 71” which gives additional information about the possible cause of this serial data fault code being set.

ICONS	Ch13 Transmission Condition Diagnosis
        	EXPLAIN TECH TIP: Look for DTCs in “Body” and “Chassis” Auto Transmission Scan Tool (View) (Download) TEST DRIVING VEHICLE WITH CUSTOMER IS VITAL. OFTEN CUSTOMER’S CONCERN IS NOT THE SAME AS THAT OF A TECHNICIAN DURING A TEST DRIVE. DISCUSSION: DISCUSS IMPORTANCE OF TAKING A TEST DRIVE AND ASKING THE VEHICLE OWNER A LOT OF QUESTIONS TO HELP WITH THE DIAGNOSTIC PROCEDURE. AFTER CHECKING FLUID LEVEL AND CONDITION, WHAT ARE THE DIAGNOSTIC STEPS TO TAKE? DEMONSTRATION: SHOW HOW A SCAN TOOL CAN BE USED TO COMMAND SHIFTS IN ELECTRONICALLY CONTROLLED TRANSMISSION. HANDS-ON TASK: HAVE STUDENTS HOOK UP A SCAN TOOL TO 1996, OR NEWER, VEHICLE AND SCAN FOR ENGINE/TRANSMISSION DTCs. NOTE ANY CODES PRESENT. TALK ABOUT DTCs. JUST BECAUSE A CODE IS SET DOES NOT MEAN THAT COMPONENT IS BAD. CORRECT DIAGNOSIS AFTER A CODE IS SET IS IMPORTANT. NATEF TASK: DIAGNOSE ELECTRONIC TRANSMISSION/TRANSAXLE CONTROL SYSTEMS USING APPROPRIATE TEST EQUIPMENT AND SERVICE INFORMATION 12. SLIDE 12 EXPLAIN FIGURE 13–11 After checking for stored diagnostic trouble codes (DTCs), the wise technician checks service information for any technical service bulletins (TSBs) that may relate to the vehicle being serviced EXPLAIN CHART 13-3 13. SLIDE 13 EXPLAIN FIGURE 13–12 The J2534 pass-through reprogramming system does not need a scan tool to flash the PCM on most 2004 and newer vehicles.

ICONS	Ch13 Transmission Condition Diagnosis
        	EXPLAIN FREQUENTLY ASKED QUESTION: What Is Meant by Flashing a Module? 14. SLIDE 14 EXPLAIN FIGURE 13–13 TECH 2 scan tool is the factory scan tool used on GM vehicles. 15. SLIDE 15 EXPLAIN FIGURE 13–14 An OTC Genesis being used to troubleshoot a vehicle. This scan tool can be used on most makes and models of vehicles and is capable of diagnosing other computer systems in the vehicles such as automatic transmissions. 16. SLIDE 16 EXPLAIN FIGURE 13–15 A Snap-on scan tool is able to shift the transmission and display pressure control (PC) solenoid current (amperes). DEMONSTRATION: SHOW HOW TO USE A SCAN TOOL TO CHECK AN AT HANDS-ON TASK: HAVE THE STUDENTS CONNECT A SCAN TOOL TO A LAB VEHICLE TO CHECK THE AT OPERATION DISCUSSION: AFTER DEMONSTRATING HOW TO COMMAND TRANSMISSION TO SHIFT WITH A SCAN TOOL, HAVE STUDENTS DISCUSS RESULTS OF TEST. DID TRANSMISSION SHIFT AS EXPECTED? IF NOT, WHAT SYSTEM OF THE TRANSMISSION IS NOT WORKING CORRECTLY? EXPLAIN TECH TIP: Use All Resources 17. SLIDE 17 EXPLAIN FIGURE 13–16 clutch fill volume index displayed on Chrysler wiTECH scan tool. DEMONSTRATION: SHOW THE LOCATION OF TRANSMISSION ID TAGS ON SEVERAL TRANSMISSIONS AND REVIEW WHAT THE NUMBERS & LETTERS STAND FOR. HANDS-ON TASK: HAVE THE STUDENTS FIND TAG NUMBER ON AN AUTOMATIC TRANSMISSION OR TRANSAXLE. HAVE THEM WRITE THIS NUMBER & YEAR, MAKE, MODEL, AND VIN FOR TRANSMISSION IDENTIFICATION.

ICONS	Ch13 Transmission Condition Diagnosis
       	EXPLAIN CASE STUDY: The Starbucks Syndrome EXPLAIN TECH TIP: Chassis Ears 18. SLIDE 18 EXPLAIN FIGURE 13–17 Chassis ear microphones attached to various under-vehicle components using the integral clamps. The sound is transmitted wirelessly to the receiver inside the vehicle where an assistant technician can listen for noises while the vehicle is being driven. EXPLAIN CASE STUDY: The Case of the Noisy Neon EXPLAIN CHART 13-4 DISCUSSION: HAVE STUDENTS DISCUSS REPAIRS THAT CAN BE DONE WITH TRANSMISSION STILL IN VEHICLE. WHAT PARTS AND COMPONENTS CAN BE REPLACED WITH TRANSMISSION/TRANSAXLE STILL IN VEHICLE? 19. SLIDE 19 EXPLAIN FIGURE 13–18 A broken flexplate that made a lot of noise and then the engine would not crank when it finally broke. 20. SLIDE 20 EXPLAIN FIGURE 13–19 This is a normal amount of wear material in the bottom of an automatic transmission pan. 21. SLIDE 21 EXPLAIN FIGURE 13–20 A visual inspection of the transmission electrical connector ensures that the terminals are clean and in good condition as well as being completely engaged 22. SLIDE 22 EXPLAIN FIGURE 13–21 TCM terminals 16 and 17 receive B+ when the transmission relay is energized <u>Stall Test (View) (Download)</u> <u>TRANSMISSION PRESSURE TEST (VIEW) (DOWNLOAD)</u>

ICONS	Ch13 Transmission Condition Diagnosis
Education Foundation	23. SLIDE 23 EXPLAIN FIGURE 13–22 The locations (taps) for connecting a pressure gauge to measure the pressure of the various hydraulic circuits are usually found on the side of the automatic transmission/transaxle. Check service information for the exact locations for the vehicle being tested. EXPLAIN CASE STUDY: The Case of the Drips 24. SLIDE 24 EXPLAIN FIGURE 13–23 Six pressure gauges are installed on this vehicle to show students how the pressures vary and how the gauges can be used to find faults or possible problem areas before the unit is removed and disassembled. 25. SLIDE 25 EXPLAIN FIGURE 13–24 A portion of a typical hydraulic schematic showing part of the hydraulic system and pressure tap. 26. SLIDE 26 EXPLAIN FIGURE 13–25 Hydraulic symbols used by domestic vehicle manufacturers. TEST DRIVING VEHICLE WITH CUSTOMER IS VITAL. OFTEN CUSTOMER’S CONCERN IS NOT THE SAME AS THAT OF A TECHNICIAN DURING A TEST DRIVE. DISCUSSION: HAVE STUDENTS REVIEW PURPOSE OF TORQUE CONVERTER CLUTCH. WHAT PROBLEMS COULD ARISE IF THE TCC IS NOT WORKING CORRECTLY? HAVE THE STUDENTS TALK ABOUT WHETHER YOU CAN DIAGNOSE A TORQUE CONVERTER CLUTCH PROBLEM WITH A SCAN TOOL. WHAT SCAN TOOL DATA SHOULD YOU LOOK AT? DISCUSSION: DISCUSS TCM/PCM WILL CHANGE HOW SHIFTS ARE COMMANDED IF THERE IS A PROBLEM IN TCM/PCM. COULD A PROBLEM SOMEWHERE ELSE IN VEHICLE ALSO CAUSE TCM/PCM TO DO THIS? NATEF TASK: PERFORM LOCK-UP CONVERTER SYSTEM TESTS; DETERMINE NECESSARY ACTION.

ICONS	Ch13 Transmission Condition Diagnosis
 QUESTION	DISCUSSION: DISCUSS WHAT IS LOOKED FOR IN A VISUAL INSPECTION? DIAGNOSTIC PROCEDURES USED WITH ELECTRONICALLY CONTROLLED TRANSMISSION/TRANSAXLE COMPARED TO THOSE FOR A HYDRAULICALLY CONTROLLED TRANSMISSION. IS ONE TYPE OF EASIER TO DIAGNOSE THAN THE OTHER?
 ASE Education Foundation	NATEF TASK: DIAGNOSE TRANSMISSION TRANSAXLE GEAR REDUCTION/MULTIPLICATION CONCERNS USING DRIVING, DRIVEN, AND HELD MEMBER (POWER FLOW) PRINCIPLES.
	HANDS-ON TASK: HAVE THE STUDENTS PERFORM A PRESSURE CHECK ON AN AUTOMATIC TRANSMISSION OR TRANSAXLE. MAKE SURE THEY LOOK UP SPECIFICATIONS AND COMPARE THE PRESSURE READINGS TO THE SPECS.
	HANDS-ON TASK: HAVE THE STUDENTS HOOK UP A SCAN TOOL TO A VEHICLE AND LOOK AT TRANSMISSION DATA. ARE THERE ANY PRESSURE READINGS? HAVE THE STUDENTS PERFORM A PRESSURE TEST & COMPARE ACTUAL READINGS TO THE READINGS FOUND ON THE SCAN TOOL. ARE THE SCAN TOOL READINGS ACCURATE?
 ASE Education Foundation	ASEEducation TASK: DIAGNOSE PRESSURE CONCERNS IN A TRANSMISSION USING HYDRAULIC PRINCIPLES (PASCAL'S LAW).
 ASE Education Foundation	ASEEducation TASK: PERFORM PRESSURE TESTS (INCLUDING TRANSMISSIONS/TRANSAXLES EQUIPPED WITH ELECTRONIC PRESSURE CONTROL); DETERMINE NECESSARY ACTION
 ASE Education Foundation	ASEEducation TASK: DIAGNOSE NOISE AND VIBRATION CONCERNS; DETERMINE NECESSARY ACTION.