

# ATE5 Chapter 129 Automatic Transmission/Transaxle Diagnosis & In-Vehicle Service

## Opening Your Class

KEY ELEMENT	EXAMPLES
<b>Introduce Content</b>	This course or class provides complete coverage of the components, operation, design, and troubleshooting. It correlates material to task lists specified by ASE and NATEF and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, Real World Fixes, Videos, Animations, and NATEF Task Sheet references.
<b>Motivate Learners</b>	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.
<b>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.</b>	Explain learning objectives to students as listed below: <ol style="list-style-type: none"><li>1. Explain the process of diagnosing transmission problems.</li><li>2. Discuss the procedures for performing in-vehicle service.</li></ol>
<b>Establish the Mood or Climate</b>	Provide a <i>WELCOME</i> , Avoid put downs and bad jokes.
<b>Complete Essentials</b>	Restrooms, breaks, registration, tests, etc.
<b>Clarify and Establish Knowledge Base</b>	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 the 5<sup>th</sup> Edition Chapter Images found on Jim's web site @**

**[www.jameshalderman.com](http://www.jameshalderman.com)**

**LINK CHP 129: [ATE5 Chapter Images](#)**

## ICONS



## Chapter 129 Diagnosis In-Vehicle SVC

### 1. SLIDE 1 CH129 AUTOMATIC TRANS DIAGNOSIS & IN-VEHICLE SERVICE

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

### Videos

[Transmission Fluid Exchange \(View\) \(Download\)](#)

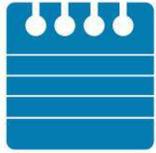
**DISCUSSION:** Have the students discuss how important proper fluid condition and level are for correct transmission operation. Can you diagnose transmission condition based on fluid condition?

2. **SLIDE 2 EXPLAIN Figure 129-1** 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.
3. **SLIDE 3 EXPLAIN Figure 129-2** “Add” mark on most automatic transmission dipsticks indicates the level is down 0.5 quart (0.5 liter). Always follow the instructions stamped or printed on the dipstick.

**HANDS-ON TASK: FIGURE 129-2:** 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.

**DISCUSSION:** Have the students talk about things that contaminate fluid. How could water or coolant get into the transmission? What would this do to an automatic transmission?

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**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?

**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 the students talk about the 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:** Demonstrate how a **scan tool** can be used to command shifts in an electronically controlled transmission.

**HANDS-ON TASK:** Have the students **hook up a scan tool** to a 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.

**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?

4. **SLIDE 4 EXPLAIN Figure 129-3** Use all shift modes when diagnosing automatic transmission/transaxle concerns to help pinpoint the area where fault is located.
5. **SLIDE 5 EXPLAIN Figure 129-4** Most factory or factory-level scan tools are capable of bidirectional control of the automatic transmission or transaxle

**HANDS-ON TASK:** Have students **hook up a scan tool** to a 1996, or newer, vehicle and watch transmission data. Do any changes occur when shifter is changed through the gears?

**FIGURE 129-4 & 5**

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6. **SLIDE 6 EXPLAIN** Figure 129-5 Tech 2 scan tool is able to display shift solenoid current. Use this information & check service information for specified current to help diagnose shift solenoid-related faults.

**DEMONSTRATION:** Hook up a scan tool to a 1996, or newer, vehicle and observe engine data. Using information on **Pg 1589 CHART 129-2** as a guide, have students tell you whether data on vehicle is within parameters.

**HANDS-ON TASK:** Have students hook up a scan tool to a 1996, or newer, vehicle & observe transmission data. Have them document vehicle values and compare them to values given in **Chart 129-2**. Are vehicle values similar to chart values?

7. **SLIDE 7 EXPLAIN** Figure 129-6 Checking service information for how to perform diagnosis on an automatic transmission fault is a wise step

8. **SLIDE 8 EXPLAIN** Figure 129-7 torque converter clutch (TCC) solenoid

9. **SLIDE 9 EXPLAIN** Figure 129-8 This 4-cylinder GM has a stall speed of about 2350 RPM. Notice that the gear selector is in drive and the speedometer is reading zero

**DISCUSSION:** Have the students discuss the diagnostic procedures used with an electronically controlled transmission or transaxle as compared to those for a hydraulically controlled transmission. Is one type of transmission easier to diagnose than the other?

Point out to students that asking other technicians for help can be beneficial in figuring out a difficult problem. Most technicians are helpful, and all are problem solvers. A single technician can't know it all.

**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.

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**DEMONSTRATION OPTIONAL:** Perform a converter stall test on a vehicle. Have students look up what the results should be. Are the results within specification? Remind students that a stall test can be dangerous if the brakes fail. Review safety procedures and remind students to check the manufacturer's recommended service procedures.

10. **SLIDE 10 EXPLAIN** Figure 129-9 Sometimes the location of a transmission fluid leak is easy to see, but with others it can be difficult to find the exact location. Look closely at places where O-rings or gaskets are used, as these are most common areas where fluid leaks occur.
11. **SLIDE 11 EXPLAIN** Figure 129-10 A black light being used to locate the source of an automatic transmission fluid leak.

**HANDS-ON TASK:** Have the students raise vehicle on a lift using all safety procedures. Have the students inspect the automatic transmission or transaxle for any fluid leaks. Have them report their findings, along with recommended service.

**DEMONSTRATION:** Show how to add dye to transmission and use a black light to diagnose source of a fluid leak. Warn students that engine coolant will often glow like dye, which could result in misdiagnosis. **FIGURE 129-10**

12. **SLIDE 12 EXPLAIN** Figure 129-11 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.
13. **SLIDE 13 EXPLAIN** Figure 129-12 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

### **PRESSURE TESTING**

**[Transmission Pressure Test \(View\) \(Download\)](#)**

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**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.

**FIGURE 129-11 & CHART 129-4**

**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?

**FIGURE 129-11 & CHART 129-4**

**ON-VEHICLE NATEF TASK:** Diagnose electrical/electronic concerns using principles of electricity. [Page 435](#)

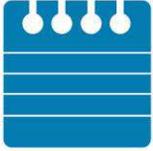
14. **SLIDE 14 EXPLAIN Figure 129-13** Draining the fluid from an automatic transaxle by allowing the fluid to flow into a container after most of the retaining bolts have been removed.
15. **SLIDE 15 EXPLAIN Figure 129-14** This is a normal amount of wear material in the bottom of an automatic transmission pan.

**DISCUSSION:** Have the students discuss need to watch for falling parts when replacing a transmission filter. Some models use check valve that will fall when the filter is removed. What could happen if this check valve is not installed correctly?

**DISCUSSION:** Have the students talk about the importance of correctly installing filter in an automatic transmission. What will happen if filter sucks air?

16. **SLIDE 16 EXPLAIN Figure 129-15** Always check that the filter is secured by a clip or other fastener to keep it from dropping out of location.
17. **SLIDE 17 EXPLAIN Figure 129-16** fluid exchange machine uses engine and transmission pump to force the fluid into machine where old fluid is used to push against a diaphragm, which then forces new fluid back through the transmission. A sight glass is used to show technician the fluid, so the process can be stopped when only clean, new fluid is seen flowing through cooler line.

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If a flush machine is not available, a long hose can be attached to the cooler outlet to a bucket. The engine is started, and new fluid is dumped in until clean fluid comes out of the hose. **FIGURE 129-16**

18. **SLIDE 18 EXPLAIN Figure 129-17** In this case, the cork-rubber gasket is glued to the pan and is ready to be installed. The retaining bolts need to be tightened in sequence, but be aware that overtightening will cause a leak. Also, some manufacturers recommend using only an RTV sealer, but never use an RTV sealer and a gasket together

**HANDS-ON TASK:** Have the students identify the transmission or transaxle in a specific vehicle.

Using a service manual or an oil-pan shape chart may be helpful for their identification process.

19. **SLIDE 19 EXPLAIN Figure 129-18** Adjusting the intermediate band on a Ford A4LD transmission
20. **SLIDE 20 EXPLAIN Figure 129-19** A dim headlight indicates excessive resistance between the battery and the electrical connector to automatic transmission/transaxle
21. **SLIDE 21 EXPLAIN Figure 129-20** A bright headlight indicates that there should be sufficient current flow available at the automatic transmission/transaxle to operate all the solenoids correctly

**DISCUSSION:** Discuss what controls transmission shifting on both hydraulic and electrical automatic transmissions and transaxles. What should all diagnostic tests start with?

**DISCUSSION:** Review with the students what voltage drop is. Also, remind them of Ohm's law:  $\text{Volts} = \text{Current} \times \text{Resistance}$ . How can the wiring of an electronically controlled automatic transmission & transaxle be checked?

Installing several good grounds from transmission to chassis will often fix intermittent electrical issues with an electrically controlled trans.

**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.

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What scan tool data should you look at?

**DISCUSSION:** discuss TCM/PCM will change how shifts are commanded if there is a perceived problem in the TCM/PCM. Could a problem somewhere else in the vehicle also cause the TCM/PCM to do this?

**DISCUSSION:** Discuss with students what problems could arise if the linkage adjustment is not correct. What would happen if transmission did not go all the way into park?

**DEMONSTRATION:** Show the students how to cut open a filter that has been removed from an automatic transmission/transaxle. Often, broken internal parts will get caught in the filter and you may not see them in the of the pan.

**HANDS-ON TASK:** Have students remove oil pan from an automatic transmission and change filter. Remind the students that the old oil can be very hot and cause burns. Make sure students have the correct type and amount of ATF before they begin.

**Crossword Puzzle (Microsoft Word) (PDF)**  
**Word Search Puzzle (Microsoft Word) (PDF)**