

ATE5 Chapter 130 Automatic Transmission/Transaxle Unit Repair

Opening Your Class

| KEY ELEMENT | EXAMPLES |
|---|--|
| Introduce Content | 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. |
| 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 learning objectives to students as listed below: <ol style="list-style-type: none">1. Discuss the steps involved in removing and disassembling the automatic transmission/transaxle.2. Describe how to reassemble and reinstall an automatic Transmission/transaxle. |
| Establish the Mood or Climate | Provide a WELCOME , 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 the 5th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

LINK CHP 130: [ATE5 Chapter Images](#)

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1. SLIDE 1 CH130 AUTOMATIC

TRANSMISSION/TRANSAXLE UNIT REPAIR

2. SLIDE 2 EXPLAIN Figure 130-1 (a) This Saturn did not shift correctly and one technician was ready to replace the unit; however, another technician thought that the problem could be due to a fault in the valve body

Check for ADDITIONAL VIDEOS & ANIMATIONS @

<http://www.jameshalderman.com/>

WEB SITE IS CONSTANTLY UPDATED

Videos

DISCUSSION: Have the students talk about the 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.

3. SLIDE 3 EXPLAIN Figure 130-1 (b) Removing valve body shows the non-planetary gears used in the Saturn automatic transaxle.
4. SLIDE 4 EXPLAIN Figure 130-1 (c) The valve body was disassembled and a broken pressure regulator spring was found to be the cause of the customer concern.

DISCUSSION: Have the students talk about transmission diagnosis. What tests would they have done to diagnose the problem shown in **FIGURE 130-1?**

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?

5. SLIDE 5 EXPLAIN Figure 130-2 transmission identification number on the side of the unit. The information on this tag is needed when ordering parts, as there are often several versions of same transmission used in similar vehicles and the differences could affect the parts needed.

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QUESTION



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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.

FIGURE 130-2

DEMONSTRATION: Show students how to calculate repair costs. Mention that technicians are a cost of sale. If there is no sale there is no cost.

HANDS-ON TASK: Have the students look up R&R time for an automatic transmission/transaxle on vehicles of their choice. Have them figure shop labor cost to remove & reinstall that vehicle's unit when the shop rate is \$95 per hour. Remind them to make sure that unit needs to come out for repair or parts replacement.

DISCUSSION: Have the students discuss various safety issues to check when removing a transmission. What are some things that can go wrong?

6. **SLIDE 6 EXPLAIN Figure 130-3** A chain and holding fixture being used on this front-wheel-drive vehicle to support the engine when the transaxle is removed.
7. **SLIDE 7 EXPLAIN Figure 130-4** A transaxle being supported by a transmission jack prior to removal of the unit from underneath the vehicle.

HANDS-ON TASK: Have the students describe the procedures for R & R Transmission. Grade students on completeness and accuracy.

HANDS-ON TASK: Have the students remove an automatic transmission or transaxle from a vehicle. Grade them on the safety procedures they use and their ability to perform the job.

ON-VEHICLE NATEF TASK: Remove and reinstall automatic transmission/transaxle.

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INSTRUCTOR NOTE: You need to decide on what types of UNITS to R & R: You may want to have students remove both a transmission and a transaxle or just a transaxle, which is the more difficult.

DEMONSTRATION: Show the students how to remove a torque converter. Point out to them how to inspect the pump drive tangs and also how to inspect the torque converter bolt threads.

HANDS-ON TASK: Have the students research the vehicles that a GM 6T70 & Ford 6F50 transaxle fit. In what years were this transmission and this transaxle used?

DISCUSSION: Have the students talk about Order of Disassembly of the unit. What is best way to determine correct order of disassembly?

8. SLIDE 8 EXPLAIN Figure 130-5 holding fixture makes working on a transmission easier

Point out to that a holding fixture is a very valuable for disassembly & reassembly

9. SLIDE 9 EXPLAIN Figure 130-6 A special tool being used to check the end play of the stator inside the torque converter
10. SLIDE 10 EXPLAIN FIGURE 130-7 cutaway of torque converter clutch showing paper-thin friction material

HANDS-ON TASK: Have the students inspect a FLEXPLATE. Make sure they inspect for cracks and the condition of the starter ring gear.

DISCUSSION: Have the students discuss what problems may occur with a cracked flexplate. What symptoms could there be? What will happen to the vehicle? **REVIEW TECH TIP FROM PG. 1600**

DISCUSSION: Have the students discuss the many special tools needed to rebuild an automatic transmission. Let them know that some are to make the job possible and others are

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to make job easier. Which tools make job possible?

HANDS-ON TASK: Have the students **BEGIN Disassembly of Automatic Transmission or Transaxle**. Grade students on their ability to organize parts for reassembly and complete task.

ON-VEHICLE NATEF TASK: Disassemble, clean, & inspect transmission or transaxle. **Page 439**

11. **SLIDE 11 EXPLAIN Figure 130-8** A typical separator plate. Check holes over check balls to make sure that the metal balls have not caused damage to the separator plate during operation.
12. **SLIDE 12 EXPLAIN Figure 130-9** Check that all valves are free to move, and look for signs that valves have caused wear to valve bore. This causes fluid to leak around valves, which can also cause shifting problems. If the bore is found to be worn, then the valve body will require repair using specialized tools or replacement.

DEMONSTRATION: Show the students how to **disassemble and inspect a valve body**. Show them how to inspect the valve bores for excessive wear. **FIGURES 130-8 & 9**

ON-VEHICLE NATEF TASK (A2-C-3) Inspect & service valve body assembly. **(P-2) Page 440**

13. **SLIDE 13 EXPLAIN Figure 130-10** Two slide hammers are often used to remove a pump from older automatic transmissions.
14. **SLIDE 14 EXPLAIN Figure 130-11** A special puller is usually specified to remove aluminum pumps from automatic transmission/transaxles. Alignment pins (arrows) are used to properly align the gasket and pump on the case during reassembly.
15. **SLIDE 15 EXPLAIN Figure 130-12** Checking a transmission pump assembly for wear using a feeler gauge. Compare the reading to factory specifications

DISCUSSION: Have the students talk about special procedures required to **Remove Front Pump**. What special tools may be needed to do

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this? **FIGURES 130-10 & 11**

HANDS-ON TASK: Have the students **Disassemble Front Pump Assembly**. Have them measure pump for wear and compare these measurements to specification. Is the pump good?

DISCUSSION: Have the students discuss best methods for **cleaning** various transmission parts. What will happen if water is allowed to remain in an automatic transmission or transaxle?

DISCUSSION: Have the students talk about **inspecting valve body**. Can a worn valve body be repaired? Can problems that were engineered into the valve body be corrected?

16. SLIDE 16 EXPLAIN Figure 130-13 A straight-blade screwdriver can help remove the snap ring that is used to retain the frictions and steels in the clutch pack.

HANDS-ON TASK: Have the students **disassemble clutch packs** of unit they are working on. Have them note condition of clutch discs and whether they need to be replaced. Can steels be reused? **FIGURE 130-13**

17. SLIDE 17 EXPLAIN Figure 130-14 A compressor tool is usually necessary to compress the springs of the clutch piston to remove the snap ring.

HANDS-ON TASK: Have students remove **clutch piston**, using special tools if needed. Point out that compressed air can be used to remove piston once snap ring is removed, but hands and fingers need to be kept clear to avoid injury. **FIGURE 130-14**

DISCUSSION: Have the students talk about the tool shown in **FIGURE 130-14**. Is a similar tool needed for their unit? Can you make this tool instead of buying it?

HANDS-ON TASK: Have the students inspect piston return springs, pistons, and seals. Ask them to note any problems they see. Then have students inspect hard parts such as drums, hubs, shells, and planetary assemblies. Remind them to use factory specifications to measure and inspect parts.

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ON-VEHICLE NATEF TASK: Inspect servo piston bore, piston and seals; determine necessary action. **Page 441**

Talk about updating transmission parts to fix design flaws. Many transmission problems can be repaired in this way

DISCUSSION: Have the students talk about finding **replacement parts** for an automatic transmission or transaxle. Do all parts, such as hard parts, need to be new? How much less does a used planetary gear set cost than a new one?

18. **SLIDE 18 EXPLAIN Figure 130-15** The ring gear has damaged gear teeth. This entire planetary gear set must be replaced because the damage also affected the gear teeth of the planetary pinion gears and the sun gear.

19. **SLIDE 19 EXPLAIN Figure 130-16** Pinion gear end play can be checked using a feeler gauge

ON-VEHICLE NATEF TASK: Inspect planetary gear assembly; determine necessary action. **Page 451**

HANDS-ON TASK: Have students **CREATE PARTS LIST** made by inspecting their unit and go to a parts website to price all parts needed to overhaul their unit.

HANDS-ON TASK: Have the students completely **reassemble** transmission or transaxle they have been working on. Assess their ability to correctly reassemble the unit and complete the project.

ON-VEHICLE NATEF TASK (A2-C-5) Assemble automatic transmission/transaxle **(P-1)** **Page 442**

20. **SLIDE 20 EXPLAIN Figure 130-17** All clutch packs should be checked for proper clearance. Here, a feeler (thickness) gauge is used to check the clearance to make sure it is within factory specifications

21. **SLIDE 21 EXPLAIN Figure 130-18** Checking clutch pack clearance using a dial indicator. This method is used when a feeler gauge cannot be inserted to check for proper clearance

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HANDS-ON TASK: Have students assemble a clutch pack. Have them check the clutch clearance and verify that it is within specification. If it is not, what needs to be done to achieve clearance specification? **FIGURES 130-17 & 18**

ON-VEHICLE NATEF TASK: Inspect clutch drum piston and pressure plate; determine necessary action. **Page 455**

ON-VEHICLE NATEF TASK: Measure clutch pack clearance and air check clutch assembly; determine necessary action. **Page 456**

ON-VEHICLE NATEF TASK: Inspect clutch drum and internal parts; determine necessary action. **Page 458**

DEMONSTRATION: Show the students how to perform an air check to see if a clutch pack is sealing. What would happen if a leaking clutch pack were installed? **FIGURE 130-20**

22. **SLIDE 22 EXPLAIN Figure 130-19** Air testing a clutch pack before installing it into an automatic transmission or transaxle.
23. **SLIDE 23 EXPLAIN Figure 130-20** Both the inner and outer seals are checked when air testing a clutch pack assembly
24. **SLIDE 25 EXPLAIN Figure 130-21** A typical brass bushing used in an automatic transmission

ON-VEHICLE NATEF TASK: Inspect bushings; determine necessary action. **Page 450**

25. **SLIDE 25 EXPLAIN Figure 130-22** Service information states that this **one-way roller clutch** should be installed as shown. Check by holding the outer race so that the inner race is free to rotate counterclockwise as shown.

HANDS-ON TASK: Have students inspect all of the **one way clutches** in their transmissions. What would happen if a one-way clutch were installed backwards? **FIGURE 130-22**

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ON-VEHICLE NATEF TASK (A2-C-21) Inspect rollers and sprag clutches; determine necessary actions. **(P-1) Page 457**

26. **SLIDE 26 EXPLAIN** Figure 130-23 A special clamp makes removal and reinstallation of this clutch pack easier

ON-VEHICLE NATEF TASK Inspect case bore and mating surfaces; determine necessary action **Page 452**

ON-VEHICLE NATEF TASK Inspect oil seals and ring grooves **Page 449**

27. **SLIDE 27 EXPLAIN** Figure 130-24 Using an alignment clamp to assemble both pump halves. To ensure proper alignment, many experts recommend lightly tapping the outer edges of the pump while tightening the clamp.

HANDS-ON TASK: Have the students reassemble the **pump assembly** they took apart earlier, using any special tools that are required.

28. **SLIDE 28 EXPLAIN** Figure 130-25 A dial indicator being used to measure the end play of an input shaft. If the end play is not within factory specifications, the unit may not have been assembled correctly.

ON-VEHICLE NATEF TASK (A2-C-10) Measure endplay or preload; determine necessary action **(P-1) Page 447**

ON-VEHICLE NATEF TASK (A2-C-11) Inspect, measure, and replace thrust washer and bearings **(P-2) Page 448**

HANDS-ON TASK: Have the students reassemble all the subassemblies they have disassembled and inspected. Make sure they take notes on any replacement part (s) that are needed.

ON-VEHICLE NATEF TASK (A2-C-16) Inspect transaxle drive chain, sprockets, and gears; determine necessary action. **(P-2) Page 453**

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ON-VEHICLE NATEF TASK (A2-C-17, A3-C-14) Inspect, repair, or replace transaxle final drive components. (P-2, P-3) Page 454

DEMONSTRATION: Show how to check the backlash in the final drive of a transaxle.

DISCUSSION: Talk with the students about how to inspect a tapered roller bearing & race. Where is the tapered roller bearing used?

ON-VEHICLE NATEF TASK Inspect and replace external seals and gaskets. Page 437

29. **SLIDE 29 EXPLAIN** Figure 130-26 Blue assembly lube.

30. **SLIDE 30 EXPLAIN** Figure 130-27 A valve body being tested on a valve body tester. While it takes some setup time to adapt each valve body to the proper hoses, this type of machine can find valve body problems before the transmission/transaxle is installed in the vehicle

HANDS-ON TASK: Have the students research the cost of a remanufactured valve body. What is the warranty period on these units?

DISCUSSION: Have the students discuss the fact that many transmission problems are caused by valve body problems. How will installing a "shift kit" fix these problems? **FIGURE 130-27**

HANDS-ON TASK: Have the students look up the specifications for shift solenoids and then have them measure resistance of some solenoids. Do the devices meet the specifications?

HANDS-ON TASK: Have the students disassemble valve body in electronically controlled transmission or transaxle.

DEMONSTRATION: Demonstrate correct way to flush a torque converter and transmission cooler.

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HANDS-ON TASK: Have students flush a torque converter and transmission cooler

31. **SLIDE 31 EXPLAIN Figure 130-28** An electric motor-driven dynamometer being used to check the operation of a 41 TE transaxle.
32. **SLIDE 32 EXPLAIN Figure 130-29** A gasoline-powered dynamometer being used to test a rear-wheel-drive automatic transmission.

DISCUSSION: Discuss with students how important it is to mark parts and to lay them in order when disassembling a transmission. What are other ways to organize a disassembled transmission? Having the appropriate manual available and taking pictures also helps.

DISCUSSION: Have the students talk about getting transmission or transaxle ready to install in the vehicle. Are there any damaged or leaking external transmission sensors that need to be replaced?

ON-VEHICLE NATEF TASK Remove and reinstall automatic transmission/transaxle. **Page 438**

33. **SLIDE 33 EXPLAIN Figure 130-30** Check the linkage for proper adjustment so that the shift interlock works correctly and the PRNDL is aligned with the transmission range switch.

DISCUSSION: Have students discuss importance of a test drive for a vehicle that has just had transmission installed. Point out to students that if throttle valve cable is not adjusted correctly on a hydraulically controlled transmission, transmission can be damaged. **FIGURE 130-30**

DISCUSSION: Remind the students that many transmission failures are caused by overheating. In what types of vehicles should an external transmission cooler be installed? **FIGURE 130-31**

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34. SLIDE 34 EXPLAIN FIGURE 130-31 An auxiliary automatic transmission fluid cooler installed on a Chevrolet pickup truck used to haul a car trailer.

DEMONSTRATION: Show how to install a torque converter into the transmission. Make sure they understand transmission damage that could occur if converter is not installed correctly.

45. SLIDES 35-70 OPTIONAL R&R 6T70 TRANSAXLE & OVERHAUL.

DISCUSSION: Have the students discuss importance of using a torque wrench when installing flexplate. Warn them that flexplate could eventually crack if bolts are overtightened.

ON-VEHICLE NATEF TASK Measure torque converter endplay; check stator clutch
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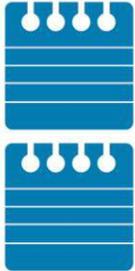
DISCUSSION: Point out to students that when installing a transmission, the wiring harness could GET pinched between engine & bell housing. Talk with students about using a flare wrench to avoid damaging transmission cooler lines when removing them.

DISCUSSION: Have students discuss fact that many computerized vehicles need to go through a relearn procedure after battery has been disconnected. What happens before computer Relearns?

DISCUSSION: DISCUSS problems that can be avoided on many vehicles by hooking up a memory saver before disconnecting battery. Some factory stereos require security code be entered before the stereo will work. If stereo becomes locked, vehicle must be taken to the dealer for an expensive repair.

SAFETY Discuss with students that when removing a transmission, starter should either be removed completely or tied up to prevent it from falling out and damaging wires or starter. This could also cause personal injury.

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DISCUSSION: Discuss with students that suspension parts often are disassembled to remove a transaxle from a vehicle. **Front end alignment** must be done on vehicle after transaxle has been installed.

If axles in a FWD vehicle are removed, outer CV joints must be installed and axle nuts torqued before vehicle can be moved. If vehicle is rolled without axles installed, FWD bearings will be damaged

Point out to students that when removing transmission, they should inspect vehicle for other problems such as oil or coolant leaks. Often these problems are much easier to fix with the transmission or transaxle out of the vehicle.

HANDS-ON TASK: Have students check the alignment on transaxle vehicle after installation

DEMONSTRATION: Show how to install an axle seal in a transaxle without damaging the seal.

HANDS-ON TASK: Have students install an axle seal in a transaxle

DISCUSSION: Talk with students about different methods to **adjust clutch pack clearance.**

Discuss with them that sometimes you can add more clutch plates to make a stronger clutch pack.

HANDS-ON TASK: Have the students research whether the five-pinion planetary gear set used in the **6T75** also can be used as an upgrade in **6T70.**

HANDS-ON TASK: Have students go on a series of road tests with scan tool and gauges installed

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