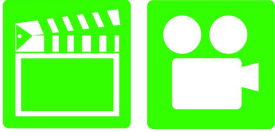


Manual Drive Train and Axles 1st Edition

Chapter 8 Manual Transmission/Transaxle Diagnosis and Service Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of Manual Drive Trains and Axles . 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 the Manual Drivelines and Axles (A2) ASE certification test content area "C" (Transmission/Transaxle Diagnosis and Repair).2. Explain how to perform transaxle/transmission maintenance operations.3. Explain manual transaxle/transmission diagnosis.4. Discuss the procedure for transaxle/transmission removal and replacement.5. Discuss the procedure for transaxle/transmission overhaul.
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



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1. SLIDE 1 MANUAL TRANSMISSION TRANSAXLE DIAGNOSIS & SERVICE

2. SLIDES 2-3 EXPLAIN OBJECTIVES

Check for **ADDITIONAL VIDEOS & ANIMATIONS**
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4. SLIDE 4 EXPLAIN Performing Transaxle/Transmission Maintenance Operations

5. SLIDE 5 EXPLAIN FIGURE 8-1a Transaxles and transmissions use dipstick/level plug to check oil level.

6. SLIDE 6 EXPLAIN FIGURE 8-1b To determine the fluid level, insert a finger into the opening and feel for the fluid level.

7. SLIDE 7 EXPLAIN FIGURE 8-2a Operate the shift levers through all of the gears with the engine off and again with it running.

8. SLIDE 8 EXPLAIN FIGURE 8-2b If necessary, adjust the shift linkage following the vehicle manufacturer's specified procedure.

9. SLIDE 9 EXPLAIN FIGURE 8-3 The enlarged views of the inner CV joints show that the engine and transaxle are misaligned; they should be moved toward the right.

DISCUSSION: DISCUSS IMPORTANCE OF USING PROPER FLUID FOR EACH TRANSMISSION THEY ARE WORKING ON. HAVE THEM DISCUSS WHY DIFFERENT FLUIDS ARE RECOMMENDED FOR DIFFERENT TRANSMISSIONS.















NATEF TASK DRAIN AND REFILL MANUAL TRANSMISSION/TRANSAXLE AND FINAL DRIVE UNIT





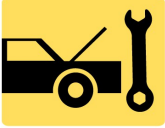

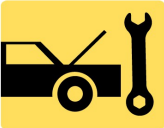



10. SLIDE 10 EXPLAIN Manual Transaxle/Transmission
Diagnosis

11. SLIDE 11 EXPLAIN Chart 8-1 Typical manual transmission/transaxles faults and some possible causes.

12. SLIDE 12 EXPLAIN FIGURE 8-5 When performing a visual inspection, check for "rust dust," which is evidence of a worn components such as universal joints.

13. SLIDE 13 EXPLAIN Chart 8-2 Typical noises and

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 	<p>their causes plus possible items to look for to solve these noise concerns</p> <p><u>NATEF TASK</u> DIAGNOSE FLUID LOSS, LEVEL, AND CONDITION; DETERMINE NECESSARY ACTION</p>
 	<p><u>NATEF TASK</u> DIAGNOSE TRANSAXLE FINAL DRIVE ASSEMBLY; DETERMINE NECESSARY ACTION. REMOVE, INSPECT, MEASURE, ADJUST, AND REINSTALL FINAL DRIVE PINION</p>
	<p>14. SLIDES 14-19 EXPLAIN Procedure for Transaxle/Transmission Removal and Replacement</p>
	<p><u>DEMONSTRATION:</u> SHOW STUDENTS HOW TO SUPPORT THE ENGINE DURING TRANSMISSION REMOVAL. SHOW THEM HOW TO SUPPORT ENGINE FROM BELOW AND FROM ABOVE.</p>
  <p>QUESTION</p>	<p><u>DISCUSSION:</u> DISCUSS IMPORTANCE OF SUPPORTING ENGINE PROPERLY. ASK THEM TO DISCUSS DAMAGE THAT CAN HAPPEN TO ENGINE IF IT IS NOT SUPPORTED PROPERLY. ASK STUDENTS TO DISCUSS SAFETY FACTORS INVOLVED IN PROPERLY SUPPORTING ENGINE.</p>
	<p>20. SLIDE 20 EXPLAIN FIGURE 8-7 A transaxle being removed from underneath a vehicle and being supported by a transmission jack.</p> <p>21. SLIDE 20 EXPLAIN FIGURE 8-8 A tail shaft housing plug is being used to help keep the transmission fluid from leaking as the transmission is being removed from the vehicle.</p>
 	<p><u>NATEF TASK</u> INSPECT POWERTRAIN MOUNTS</p>
 	<p><u>NATEF TASK</u> REMOVE AND REINSTALL TRANSMISSION/TRANSAXLE</p>
	<p>22. SLIDE 20 EXPLAIN Transaxle/Transmission Overhaul</p> <p>23. SLIDE 20 EXPLAIN FIGURE 8-9 service parts kit for</p>

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         	<p>Borg-Warner T5 trans: bearings, seals, and snap rings.</p> <p>24. SLIDE 20 EXPLAIN FIGURE 8–10 Using a holding fixture is a great way to support the transaxle during disassembly and reassembly</p> <p><u>DEMONSTRATION:</u> SHOW PROPER PROCEDURE FOR DISASSEMBLING THE TRANSMISSION AND INSPECTING PARTS FOR WEAR</p> <p><u>DEMONSTRATION:</u> SHOW THE IMPORTANCE OF INSPECTION BEFORE DISASSEMBLE. EXPLAIN THAT AT TIMES DAMAGE AS SIMPLE AS A BAD GEAR CAN OUTWEIGH THE COST OF A NEW TRANSMISSION BY TIME YOU CONSIDER LABOR FOR REBUILDING. SHOW STUDENTS THE PROPER WAY TO REMOVE SNAP RINGS. EXPLAIN THAT THERE IS ALWAYS A CORRECT TOOL FOR JOB.</p> <p><u>SAFETY:</u> WITH COVER OFF OF TRANSMISSION AND SOMEONE TURNING OUTPUT OR INPUT SHAFT, BE CAREFUL OF STUDENTS GETTING THEIR FINGERS PINCHED BETWEEN GEARS.</p> <p><u>HANDS-ON TASK:</u> HAVE STUDENTS MOVE SYNCHRONIZERS INTO PLACE TO SEE HOW THE GEARS ARE ENGAGED. HAVE THE STUDENTS PLACE CORRECT SYNCHRONIZER INTO PLACE TO ACHIEVE REVERSE.</p> <p><u>NATEF TASK</u> DISASSEMBLE AND REASSEMBLE TRANSMISSION OR TRANSAXLE COMPONENTS.</p> <p><u>NATEF TASK</u> INSPECT TRANSMISSION TRANSAXLE CASE AND RELATED PARTS; DETERMINE NECESSARY ACTION</p> <p>25. SLIDE 20 EXPLAIN FIGURE 8–11 Most transaxles use formed-in-place gaskets that tend to glue the case and covers together. This unit has a slot to allow prying without damaging the gasket surfaces</p>

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26. SLIDE 20 EXPLAIN FIGURE 8-12 Removing the side cover allows access to the shift forks and differential assembly.

27. SLIDES 27-28 EXPLAIN Summary