

# Automotive Technology 6<sup>th</sup> Edition

## Chapter 130 – Drive Axles and Differentials

### Lesson Plan



#### **CHAPTER SUMMARY:**

1. Drive axles, parts of a differential, differential gear ratios, and open differentials
  2. Limited slip differentials, differential components, and differential axle bearings
  3. Differential identification and determining the axle ratio of a differential
  4. Rear end noise diagnosis, differential inspection, and tooth contact pattern test
  5. Differential disassembly, pinion shaft replacement, drive pinion depth, and pinion gear preload
  6. Checking and correcting backlash and setting side bearing preload
  7. Reassembly of the differential assembly and differential lubrication
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#### **OBJECTIVES:**

1. Describe the operation of a differential and the gear ratios set types.
  2. Compare the operation of a standard open differential and a limited slip differential.
  3. Describe the components of a differential and the types of bearings used in drive axles.
  4. Explain how to identify, determine the axle ratio, diagnose, inspect, and disassemble a differential.
  5. Explain how to set the drive pinion depth and replace the pinion shaft bearing.
  6. Describe the procedure to check backlash and set the preload for pinion gears and side bearings.
  7. Discuss differential lubricants.
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**RESOURCES:** (All resources may be found at <http://www.jameshalderman.com>) Internet access required to hyperlink.

1. Task Sheet ASE (A3-A-2) P-1, (A3-E-1.3) P-1: Differential Fluid Check
  2. Task Sheet ASE (A3-E-1.4) P-2: Differential Noise Diagnosis
  3. Task Sheet ASE (A3-E-1.1) P-1: Drive Axle Fluid Leaks
  4. Task Sheet ASE (A3-E-1.5) P-2: Pinion Seal Replacement
  5. Task Sheet ASE (A3-E-1.6) P-3: Ring Gear Runout
  6. Task Sheet ASE (A3-E-1.7) P-3: Differential Assembly Inspection
  7. Task Sheet ASE (A3-E-1.8) P-3: Drive Pinion Depth
  8. Task Sheet ASE (A3-E-1.9) P-3: Drive Pinion Bearing Preload
  9. Task Sheet ASE (A3-E-1.10) P-3: Differential Side Bearing Preload
  10. Task Sheet ASE (A3-E-1.11) P-3: Ring and Pinion Tooth Pattern
  11. Task Sheet ASE (A3-E-1.12) P-3: Differential Pinion Gears and Case
  12. Task Sheet ASE (A3-E-1.13) P-3: Differential Case Assembly
  13. Task Sheet ASE (A3-E-2.1) P-3: Limited Slip Differential Diagnosis
  14. Task Sheet ASE (A3-E-2.2) P-3: Limited Slip Differential Rotating Torque
  15. Chapter PowerPoint
  16. Chapter Crossword Puzzle and Word Search
  17. Videos: [\(A3\) Manual Drive Train Axles Videos](#)
  18. Animations: [\(A3\) Manual Drive Train Axles Animations](#)
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#### **ACTIVITIES:**

1. Task Sheet ASE (A3-A-2) P-1, (A3-E-1.3) P-1: Have students complete Differential Fluid Check Task Sheet.
  2. Task Sheet ASE (A3-E-1.4) P-2: Have students complete Differential Noise Diagnosis Task Sheet.
  3. Task Sheet ASE (A3-E-1.1) P-1: Have students complete Drive Axle Fluid Leaks Task Sheet.
  4. Task Sheet ASE (A3-E-1.5) P-2: Have students complete Pinion Seal Replacement Task Sheet.
  5. Task Sheet ASE (A3-E-1.6) P-3: Have students complete Ring Gear Runout Task Sheet.
  6. Task Sheet ASE (A3-E-1.7) P-3: Have students complete Differential Assembly Inspection Task Sheet.
  7. Task Sheet ASE (A3-E-1.8) P-3: Have students complete Drive Pinion Depth Task Sheet.
  8. Task Sheet ASE (A3-E-1.9) P-3: Have students complete Drive Pinion Bearing Preload Task Sheet.
  9. Task Sheet ASE (A3-E-1.10) P-3: Have students complete Differential Side Bearing Preload Task Sheet.
  10. Task Sheet ASE (A3-E-1.11) P-3: Have students complete Ring and Pinion Tooth Pattern Task Sheet.
  11. Task Sheet ASE (A3-E-1.12) P-3: Have students complete Differential Pinion Gears and Case Task Sheet.
  12. Task Sheet ASE (A3-E-1.13) P-3: Have students complete Differential Case Assembly Task Sheet.
  13. Task Sheet ASE (A3-E-2.1) P-3: Have students complete Limited Slip Differential Diagnosis Task Sheet.
  14. Task Sheet ASE (A3-E-2.2) P-3: Have students complete Limited Slip Differential Rotating Torque Task Sheet.
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#### **ASSIGNMENTS:**

1. Chapter crossword and word search puzzles.
  2. Complete end of chapter 10 question quiz.
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#### **CLASS DISCUSSION:**

1. Review and group discussion chapter [Frequently Asked Questions](#) and [Tech Tips](#) sections.
  2. Review and group discussion of the five (5) chapter [Review Questions](#).
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#### **NOTES AND EVALUATION:**