**Manual Drivetrains and Axles 9th Edition**

**Chapter 13 –** **Drive Axle and Differential Diagnosis and Service**

**CHAPTER SUMMARY:**

1. Drive Axle Service, Drive Axle Lubrication, Drive Axle Diagnosis, and In-The-Shop Inspections

2. On-Vehicle Service Operations, Pinion Shaft Seal Replacement, and Differential Carrier Service

3. Differential Assembly Service, Drive Pinion Shaft, and Carrier Assembly and Setup

4. Limited Slip Differential Service

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**OBJECTIVES:**

1. Perform the maintenance needed to keep a drive axle operating properly.

2. Describe the steps involved in drive axle service.

3. Discuss drive axle lubrication.

4. Discuss drive axle diagnosis.

5. Discuss the procedures for in-the-shop inspections.

6. Explain the on-vehicle service operations.

7 Explain the procedure for differential carrier service and differential assembly service.

8 Explain pinion depth shim selection and drive pinion bearing preload adjustment.

9 Explain the steps to adjust backlash and carrier bearing preload.

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**RESOURCES:** (All resources may be found at http://www.jameshalderman.com)

1. Task Sheet: Drive Axle Shaft Service

2. Task Sheet: Drive Axle Flange Runout and Axle End Play

3. Task Sheet: Drive Axle Shaft Wheel Studs

4. Task Sheet: Drive Axle Seals, Bearings and Retainers

5. Task Sheet: Differential Noise Diagnosis

6. Task Sheet: Differential Fluid Leaks

7. Task Sheet: Pinion Seal Replacement

8. Task Sheet: Ring Gear Runout

9. Task Sheet: Differential Assembly Inspection

10. Task Sheet: Drive Pinion Depth

11. Task Sheet: Drive Pinion Bearing Preload

12. Task Sheet: Differential Side Bearing Preload

13. Task Sheet: Ring and Pinion Tooth Pattern

14. Task Sheet: Differential Pinion Gears and Case

15. Task Sheet: Differential Case Assembly

16. Task Sheet: Limited Slip Differential Diagnosis

17. Task Sheet: Check, Drain and Refill Differential Case

18. Task Sheet: Limited Slip Differential Rotating Torque

19. Chapter PowerPoint

20. Crossword Puzzle and Word Search

21. Videos: [(A3) Manual Drive Train Axles Videos](https://jameshalderman.com/a3_vid_lib_page/)

22. Animations: [(A3) Manual Drive Train Axles Animations](https://jameshalderman.com/a3_anim_lib_page/)

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**Chapter 13 –** **Drive Axle and Differential Diagnosis and Service**

**ACTIVITIES:**

1. Task Sheet: Drive Axle Shaft Service

2. Task Sheet: Drive Axle Flange Runout and Axle End Play

3. Task Sheet: Drive Axle Shaft Wheel Studs

4. Task Sheet: Drive Axle Seals, Bearings and Retainers

5. Task Sheet: Differential Noise Diagnosis

6. Task Sheet: Differential Fluid Leaks

7. Task Sheet: Pinion Seal Replacement

8. Task Sheet: Ring Gear Runout

9. Task Sheet: Differential Assembly Inspection

10. Task Sheet: Drive Pinion Depth

11. Task Sheet: Drive Pinion Bearing Preload

12. Task Sheet: Differential Side Bearing Preload

13. Task Sheet: Ring and Pinion Tooth Pattern

14. Task Sheet: Differential Pinion Gears and Case

15. Task Sheet: Differential Case Assembly

16. Task Sheet: Limited Slip Differential Diagnosis

17. Task Sheet: Check, Drain and Refill Differential Case

18. Task Sheet: Limited Slip Differential Rotating Torque

19. Crossword Puzzle and Word Search

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**ASSIGNMENTS:**

1. Chapter crossword and word search puzzles.

2. Complete end of chapter 10 question quiz.

3. Complete multiple choice and short answer quizzes downloaded from the website.

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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:**

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