

# Diesel Technology: Steering and Suspension

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## Instructional/Task Analysis

**Related Information: What  
the Student Should Know**

**Application: What the  
Student Should Be Able to Do**

### SECTION A: CHASSIS, TIRES, AND WHEELS

#### Unit 1–A: Cab Components

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|--|--|
| 1. Terms and definitions                         | 15. Inspect, test, and adjust cab air suspension components and determine needed repairs |
| 2. Basic cab designs                             |  |
| 3. Optional features on cabs                     |  |
| 4. Vehicle identification numbers                | 16. Inspect, test, and adjust driver's air seat components and determine needed repairs  |
| 5. Parts of a cab exterior                       |  |
| 6. Parts of a cab interior                       |  |
| 7. Cab instruments and controls                  |  |
| 8. Emergency safety equipment located in the cab |  |
| 9. Types of driver seats                         |  |
| 10. Main components of an air-suspended seat     |  |
| 11. Components of seat belts                     |  |
| 12. Types of cab mounts                          |  |
| 13. Types of cab lifting/tilting mechanisms      |  |
| 14. Safety rules to follow when working on cabs  |  |

#### Unit 2–A: Tires, Rims, and Wheels

1. Terms and definitions
2. Functions of tires, rims, and wheels
3. Materials used for tires, rims, and wheels
4. Types of tire construction
5. Types of tires
6. Parts of a radial tubeless tire
7. Types of tire damage
8. Radial tire wear conditions
9. Tire matching and mixing

## Instructional/Task Analysis

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### Related Information: What the Student Should Know

### Application: What the Student Should Be Able to Do

#### Unit 2–A: Tires, Rims, and Wheels (cont.)

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|---|---|
| 10. Types of rims   | 19. Diagnose unusual tire wear patterns, check tire pressure, and measure and match tires             |
| 11. Tire and rim sizes  |   |
| 12. Basic types of wheels   | 20. Diagnose tire/wheel vibration, inspect mounting hardware, and check tire/wheel runout and balance |
| 13. Mounting hardware for wheels  |   |
| 14. Types of rim and wheel damage                                       |   |
| 15. Wheel tightening sequences  |   |
| 16. Tire and wheel assembly runout and balancing                        |   |
| 17. Safety precautions to follow when servicing tires, rims, and wheels |   |
| 18. Tire maintenance  |   |

#### Unit 3–A: Chassis Components

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|---|--|
| 1. Terms and definitions                          | 18. Inspect and install or repair frame, hangers, brackets, and cross members            |
| 2. Basic chassis components                       |  |
| 3. Parts of a frame assembly                      | 19. Check and inspect vehicle frame alignment  |
| 4. Frame construction                             |  |
| 5. Frame reinforcements                           | 20. Inspect and service fifth wheel assemblies, pintle hitch, kingpin, and trailer plate |
| 6. Common procedures performed on frames          | 21. Couple and uncouple fifth wheel  |
| 7. Guidelines for working on frames               |  |
| 8. Things to check on frames                      |  |
| 9. Frame fasteners                                |  |
| 10. Causes of stress leading to frame damage      |  |
| 11. Practices to follow in frame repairs          |  |
| 12. Basic procedure for checking alignment        |  |
| 13. Purpose of a fifth wheel                      |  |
| 14. Basic types of fifth wheel mounting plates    |  |
| 15. Basic types of fifth wheel locking mechanisms |  |
| 16. Main components of a typical fifth wheel      |  |
| 17. Parts of a trailer                            |  |

# Instructional/Task Analysis

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## **SECTION B: STEERING**

### **Unit 1–B: Steering Column and Manual Steering Gear**

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| 1. Terms and definitions   | 13. Diagnose and troubleshoot problems on the steering column and steering gear assembly |
| 2. Purposes of a steering column and steering gear assembly              |  |
| 3. Basic types of steering columns                                       | 14. Remove steering wheel, inspect, repair, or replace to proper alignment position      |
| 4. Parts of a standard steering column and manual steering gear assembly | 15. Remove, disassemble, and remount the steering gear assembly                          |
| 5. Parts of a tilt/telescoping steering column assembly                  | 16. Perform steering gear adjustments  |
| 6. Parts of a universal joint  | 17. Inspect and replace pitman arm on steering gear assembly                             |
| 7. Basic types of manual steering gears                                  | 18. Inspect and replace steering u-joints  |
| 8. Operation of manual steering gears                                    |  |
| 9. Common problems or complaints on manual steering gears                |  |
| 10. Common adjustments made on manual steering gears                     |  |
| 11. Specialty tools used for work on steering systems                    |  |
| 12. Common lubricants used in steering gear assemblies                   |  |

### **Unit 2–B: Power Steering Systems**

1. Terms and definitions
2. Purposes of power steering systems
3. Basic components of a power steering assembly
4. Basic differences between manual steering and power steering
5. Common types of power steering systems
6. Parts of a integral power steering assembly
7. Parts of a semi-integral power steering assembly

# Instructional/Task Analysis

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## Related Information: What the Student Should Know

## Application: What the Student Should Be Able to Do

### Unit 2–B: Power Steering Systems (cont.)

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|--|--|
| 8. Power steering gear and valve operation flow for right turn, neutral position, and left turn steering maneuvers | 15. Diagnose, test, and troubleshoot problems on a power steering system                 |
| 9. Common types of lubricants used in power steering systems   | 16. Remove and repair/replace power steering gear  |
| 10. Types of lines used on power steering assemblies   | 17. Rebuild power steering gear  |
| 11. Basic types of power steering reservoirs   | 18. Remove and replace power steering pump; adjust belt if used                          |
| 12. Types of hydraulic pumps used on power steering systems  | 19. Inspect, clean, disassemble, and rebuild power steering pump; replace worn parts     |
| 13. Means of mounting power steering pumps   | 20. Test and repair/replace flow control/pressure relief valve(s) on power steering pump |
| 14. Common pump problems and possible causes   | 21. Fill and bleed the power steering system   |

### Unit 3–B: Steering Axle Components

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| 1. Terms and definitions                       | 15. Select wheel bearings and seals                                      |
| 2. Steering axle components                    | 16. Remove, inspect, clean, replace, and adjust wheel bearings and seals |
| 3. Steering linkage                            | 17. Repair or replace a steering knuckle assembly                        |
| 4. Parts of a steering knuckle assembly        | 18. Inspect and replace tie rod ends                                     |
| 5. Lubricants used on steering axle components | 19. Diagnose and troubleshoot the steering axle assembly                 |
| 6. Typical steering axle problems and causes   |  |
| 7. Purposes of wheel bearings                  |  |
| 8. Parts of a wheel bearing                    |  |
| 9. Wheel bearing defects                       |  |
| 10. Guidelines for servicing wheel bearings    |  |
| 11. Guidelines for adjusting wheel bearings    |  |
| 12. Purposes of wheel seals                    |  |
| 13. Types of wheel seals                       |  |
| 14. Guidelines for installing wheel seals      |  |

# Instructional/Task Analysis

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**Related Information: What the Student Should Know**

**Application: What the Student Should Be Able to Do**

## **SECTION C: SUSPENSION**

### **Unit 1–C: Front Suspension**

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|---|---|
| 1. Terms and definitions                              | 12. Inspect front suspension components                   |
| 2. Purposes of front suspension                       | 13. Remove and replace front spring suspension components |
| 3. Front suspension components                        |   |
| 4. Functions of front suspension components           |   |
| 5. Basic designs of springs                           |   |
| 6. Types of front spring assembly ends                |   |
| 7. Dimensions and load ratings of spring assemblies   |   |
| 8. Types of spring eyes                               |   |
| 9. Shapes of u-bolts                                  |   |
| 10. Dimensions of u-bolts                             |   |
| 11. Identification and measurement of shock absorbers |   |

### **Unit 2–C: Rear Spring Suspension**

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|---|---|
| 1. Terms and definitions                              | 10. Inspect rear spring suspension components |
| 2. Purposes of rear suspension                        |   |
| 3. Types of springs                                   | 11. Replace rear spring suspension components |
| 4. Rear suspension components                         |   |
| 5. Functions of rear spring suspension components     |   |
| 6. Types of rear spring assembly ends                 |   |
| 7. Dimensions required for ordering spring assemblies |   |
| 8. Load rating of spring assemblies                   |   |
| 9. Failure of spring assemblies                       |   |

## Instructional/Task Analysis

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### Related Information: What the Student Should Know

### Application: What the Student Should Be Able to Do

#### Unit 3–C: Rear Beam Suspension

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|--|--|
| 1. Terms and definitions                                   | 7. Inspect rear beam suspension components |
| 2. Purposes of rear beam suspension                        |  |
| 3. Basic models of rear beam suspensions                   |  |
| 4. Basic beam components                                   |  |
| 5. Functions of basic components of rear beam suspensions  |  |
| 6. Operation of rear beam suspension models and components |  |

#### Unit 4–C: Rear Air Suspension

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|--|---|
| 1. Terms and definitions   | 11. Inspect, test, and replace an air spring  |
| 2. Purposes of rear air suspension                               | 12. Inspect and test an air suspension system, replace the leveling valve, and adjust frame (ride) height |
| 3. Air suspension components                                     |   |
| 4. Functions of air suspension components                        |   |
| 5. Types of air springs  |   |
| 6. Parts of an air spring  |   |
| 7. Procedure for identifying appropriate replacement air springs |   |
| 8. Basic valves used on rear air suspensions                     |   |
| 9. Air ports of a leveling valve                                 |   |
| 10. Common causes of air spring failures                         |   |

## Instructional/Task Analysis

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### Related Information: What the Student Should Know

### Application: What the Student Should Be Able to Do

#### Unit 5–C: Vehicle Alignment

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|--|--|
| 1. Terms and definitions                           | 13. Perform pre-alignment checks                                   |
| 2. Purposes of vehicle alignment                   | 14. Check camber and kingpin inclination; determine needed repairs |
| 3. Required times to perform front wheel alignment | 15. Check caster; adjust or repair as needed                       |
| 4. Toe-in and toe-out                              | 16. Check toe; adjust as needed                                    |
| 5. Caster  | 17. Check rear axle alignment; adjust or repair as needed          |
| 6. Camber  | 18. Measure and adjust pinion angle                                |
| 7. Kingpin inclination                             |  |
| 8. Maximum turning angle                           |  |
| 9. Turning radius angle (Ackermann angle)          |  |
| 10. Axle alignment                                 |  |
| 11. Pinion angle adjustment                        |  |
| 12. Minor and a major front wheel alignment        |  |