

## Instructional/Task Analysis

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

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

### SECTION A: INTRODUCTION

#### Unit 1–A: Introduction to Brakes

1. Terms and definitions
2. Purposes of the brake system
3. Scientific principles that affect brake systems
4. Types of brake systems
5. Operation of a hydraulic brake system
6. Operation of an air brake system
7. Comparison of hydraulic and air brake systems
8. Types of brake fluid
9. Guidelines for handling and storing brake fluid
10. Purposes of troubleshooting and failure analysis
11. Steps in failure analysis
12. Signs of brake failure
13. Common causes of brake failure
14. Safety procedures to follow when working on brakes
15. Overview of asbestos and safety guidelines to follow when working around asbestos
16. Specialty brake tools and equipment
17. Diagnose and determine possible causes of general brake problems
18. Identify features for assigned vehicle
19. Move vehicle and prepare for service
20. Check brake fluid level and condition and inspect for leaks

# Instructional/Task Analysis

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### Unit 2–A: Wheel Bearings and Seals

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|---|--|
| 1. Terms and definitions                    | 15. Evaluate worn and damaged wheel bearings and seals                   |
| 2. Purposes of wheel bearings               | 16. Select appropriate replacement wheel bearings and seals              |
| 3. Parts of a wheel bearing                 | 17. Remove, inspect, clean, replace, and adjust wheel bearings and seals |
| 4. Parts of wheel and hub assemblies        |  |
| 5. Common wheel bearing defect              |  |
| 6. Reasons for bearing failures             |  |
| 7. Wheel bearing problems                   |  |
| 8. Types of wheel bearing lubricants        |  |
| 9. Guidelines for servicing wheel bearings  |  |
| 10. Guidelines for adjusting wheel bearings |  |
| 11. Purposes of wheel seals                 |  |
| 12. Types of wheel seals                    |  |
| 13. Causes of sealing failure               |  |
| 14. Guidelines for installing wheel seals   |  |

### Unit 3–A: Antilock Brake Systems

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| 1. Terms and definitions                                       | 10. Diagnose and determine possible causes of ABS problems |
| 2. Purposes of antilock brake systems                          | 11. Inspect, test, and service an antilock brake system    |
| 3. Basic parts of an antilock brake system                     | 12. Troubleshoot antilock brake system problems            |
| 4. Basic operation of an antilock brake system                 |  |
| 5. Ways to describe antilock brake systems                     |  |
| 6. ABS time line   |  |
| 7. Methods of testing ABS valves                               |  |
| 8. Most common problems associated with antilock brake systems |  |
| 9. Signs of antilock brake failure                             |  |

## Instructional/Task Analysis

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### SECTION B: HYDRAULIC BRAKES

#### Unit 1–B: Hydraulic Foundation Drum Brakes

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|--|---|
| 1. Terms and definitions                                   | 13. Remove, clean, inspect, and measure a brake drum              |
| 2. Components of a drum brake assembly                     | 14. Remove, inspect, and replace brake shoes and related hardware |
| 3. Functions of drum brake assembly components             | 15. Replace brake drum and adjust brake clearance                 |
| 4. Drum and hub assembly defects                           |   |
| 5. Parts of a brake shoe                                   |   |
| 6. Functions of brake shoe parts                           |   |
| 7. Types of brake shoe applications                        |   |
| 8. Brake shoe materials                                    |   |
| 9. Brake shoe defects                                      |   |
| 10. Drum brake hardware and their uses                     |   |
| 11. Adjustment of drum brake assemblies                    |   |
| 12. Conditions to inspect in drum brake adjustment systems |   |

#### Unit 2–B: Hydraulic Foundation Disc Brakes

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| 1. Terms and definitions   | 13. Remove, clean, and inspect a caliper and pad assembly        |
| 2. Parts of a front disc brake   | 14. Inspect, measure, remove, and reinstall a rotor assembly     |
| 3. Parts of a rear disc brake  | 15. Reinstall caliper and pad assembly and check brake operation |
| 4. Parts of a brake caliper  |  |
| 5. Functions of disc brake assembly components                             |  |
| 6. Types of brake calipers   |  |
| 7. Rotor defects   |  |
| 8. Methods of assembling brake pads  |  |
| 9. Brake pad defects   |  |
| 10. Methods of determining wear on brake pads                              |  |
| 11. Functions of noise suppressants and hardware components of a brake pad |  |
| 12. Safety guidelines for disc brake service                               |  |

# Instructional/Task Analysis

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## Related Information: What the Student Should Know

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### Unit 3–B: Hydraulic System

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|--|---|
| 1. Terms and definitions   | 15. Interpret hydraulic system diagrams                                   |
| 2. Components of a hydraulic system                                    | 16. Interpret brake light system circuit diagrams                         |
| 3. Functions of hydraulic system components                            | 17. Test hydraulic system and inspect for leaks; determine needed repairs |
| 4. Parts of a brake pedal  | 18. Bleed and/or flush the hydraulic brake system                         |
| 5. Parts of a combination brake valve                                  | 19. Remove, inspect, and repair or replace the hydraulic brake valve      |
| 6. Functions of a combination brake valve                              | 20. Remove, inspect, and repair or replace the master cylinder            |
| 7. Brake valve defects   | 21. Create flare and double flare fittings                                |
| 8. Methods of bleeding the hydraulic system                            | 22. Remove and repair or replace the wheel cylinder                       |
| 9. Parts of a master cylinder  | 23. Check and adjust the parking brake                                    |
| 10. Types of wheel cylinders   | 24. Check operation of brake light switch; adjust or replace as needed    |
| 11. Types of brake lines   |   |
| 12. Types of brake line connections                                    |   |
| 13. Types of parking brakes  |   |
| 14. Switch operation for brake lights and brake failure warning lights |   |

### Unit 4–B: Power Assist Units and Related Components

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|---|---|
| 1. Terms and definitions  | 11. Inspect and test the power assist system and emergency brake back-up system; determine needed repairs |
| 2. Purpose of a power assist unit                                     |   |
| 3. Basic types of power assist units                                  | 12. Remove, inspect, and repair or replace the power assist unit  |
| 4. Parts of a vacuum power assist unit                                |   |
| 5. Parts of a hydraulic power assist unit                             | 13. Check operation of brake failure lights and braking warning devices; repair or replace as needed      |
| 6. Functions of the basic parts of power assist units                 |   |
| 7. Most common problems associated with power assist units            |   |
| 8. Adjustment of the brake booster push rod                           |   |
| 9. Operation of emergency back-up systems                             |   |
| 10. Use of brake fluid and power steering fluid on power assist units |   |

## Instructional/Task Analysis

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

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### SECTION C: AIR BRAKES

#### Unit 1–C: Air Foundation Brakes

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| 1. Terms and definitions                                   | 19. Inspect, service, and adjust slack adjuster on front axle  |
| 2. Basic components that make up air foundation brakes     | 20. Inspect, test, service, and replace service brake chamber  |
| 3. Types of air foundation brakes                          | 21. Remove, inspect, and replace brake shoes, drum, and hardware for s-cam drum foundation brakes      |
| 4. Parts of a cam foundation brake                         | 22. Remove, inspect, and replace brake shoes, drum, and hardware for wedge-type drum foundation brakes |
| 5. Parts of a wedge foundation brake                       | 23. Inspect, clean, and measure brake calipers, pads, and rotors; replace pads if needed               |
| 6. Parts of a disc foundation brake                        |  |
| 7. Types of shoe assembly anchors                          |  |
| 8. Brake linings, blocks, and pads                         |  |
| 9. Guidelines for relining brakes                          |  |
| 10. Types of brake drum assembly arrangements              |  |
| 11. Types of slack adjusters                               |  |
| 12. Advantages of automatic slack adjusters                |  |
| 13. Parts of slack adjusters                               |  |
| 14. Guidelines for working on slack adjusters              |  |
| 15. Parts of a service brake chamber                       |  |
| 16. Operation of a typical service brake chamber           |  |
| 17. Guidelines for working on service brake chambers       |  |
| 18. Main check points for inspecting foundation components |  |

#### Unit 2–C: Air Supply System

1. Terms and definitions
2. Components of the air supply system
3. Basic functions of the air supply components
4. Parts of a compressor
5. Characteristics of compressors
6. Loading and unloading process.

# 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–C: Air Supply System (continued)

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|---|---|
| 7. Characteristics of governors                         | 18. Identify and connect components in an air supply system                             |
| 8. Methods of providing clean air to the compressor     | 19. Service the reservoir and check valve function, build-up time, and cut-out pressure |
| 9. Parts and ports of an air dryer (desiccant type)     | 20. Inspect and service belt-driven compressor and associated lines                     |
| 10. Characteristics of air dryers                       | 21. Inspect, service, and time gear-driven compressor, valves, and associated lines.    |
| 11. Cycles that occur in the operation of the air dryer | 22. Inspect and service air dryer system; repair or replace as needed                   |
| 12. Optional devices that may be used on supply systems |   |
| 13. Characteristics of supply reservoirs                |   |
| 14. Valves and switches used on the air supply system   |   |
| 15. Functions of supply system valves and switches      |   |
| 16. Basic characteristics of air brake valves           |   |
| 17. Types of lines used on the air supply system        |   |

### Unit 3–C: Air Service Circuits

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| 1. Terms and definitions                                   | 10. Other valves that may be used on service circuits  |
| 2. Comparison of service circuits                          | 11. Identify and connect components in the air service circuits  |
| 3. Components of the secondary service circuit             | 12. Inspect and test brake application (foot) valve, fittings, and mounts; adjust or replace as needed |
| 4. Components of the primary service circuit               | 13. Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed  |
| 5. Functions of service circuit components                 | 14. Inspect and test relay valve; replace as needed  |
| 6. Parts of a brake application valve and treadle assembly | 15. Inspect and test quick release valve; replace as needed  |
| 7. Characteristics of the brake application valve          |  |
| 8. Parts and ports of a quick release valve                |  |
| 9. Parts and ports of a relay valve                        |  |

## Instructional/Task Analysis

### Related Information: What the Student Should Know

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

#### Unit 4–C: Special Circuits

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|--|---|
| 1. Terms and definitions   | 20. Identify and connect components in a truck brake system   |
| 2. Purposes of special circuits for a truck brake system                 | 21. Identify and connect components in a tractor brake system   |
| 3. Components of the parking circuit                                     | 22. Inspect and test parking brake hand (control) valve; replace as needed                                  |
| 4. Components of the emergency circuit                                   | 23. Inspect and test inversion valve; replace as needed   |
| 5. Components of the anti-compounding circuit                            | 24. Inspect and test anti-compounding circuit equipped with Quick Release (QR) 1-C; replace as needed       |
| 6. Conditions in which compounding can occur                             | 25. Inspect and test trailer air supply valve; replace as needed  |
| 7. Functions of special circuit components of the truck brake system     | 26. Inspect and test trailer brake control valve (hand valve); replace as needed                            |
| 8. Special circuit components of the truck brake system                  | 27. Inspect and test tractor protection valve; replace as needed  |
| 9. Parts and ports of a system park control valve                        | 28. Check operation of parking brake; remove, inspect, and replace parking (spring brake) chamber as needed |
| 10. Characteristics of the system park control valve                     |   |
| 11. Ports of an inversion valve  |   |
| 12. Parts and ports of a spring brake (rear axles)                       |   |
| 13. Operation of spring brakes   |   |
| 14. Regulatory requirements of parking and emergency circuits (FMVSS121) |   |
| 15. Components of the tractor brake system                               |   |
| 16. Functions of truck/tractor circuit components                        |   |
| 17. Parts and ports of a hand control valve                              |   |
| 18. Parts and ports of a tractor protection valve                        |   |
| 19. Parts and ports of a trailer air supply valve                        |   |

# 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: Trailer Air Brake Systems

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| <ol style="list-style-type: none"><li>1. Terms and definitions</li><li>2. Types of gladhands</li><li>3. Components of the trailer air brake system</li><li>4. Functions of the components of the trailer air brake system</li><li>5. Components of the dollie system</li><li>6. Components of the trailer full function valve system</li><li>7. Ports of a full function valve</li></ol> | <ol style="list-style-type: none"><li>8. Identify and connect components of a trailer full function air brake system</li><li>9. Inspect and test tractor trailer gladhands; repair or replace as needed</li><li>10. Inspect and test trailer brake full function valve; replace as needed</li></ol> |
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