



APTA BTS-BMT-RP-003-10, Rev. 1

Published: October 1, 2010

First Revision: October 6, 2016

APTA Bus Maintenance Training
Working Group

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Abstract: This *Recommended Practice* provides guidelines for establishing a standardized bus maintenance training program related to the ASE certification syllabus for transit bus and coach air brake systems.

Keywords: ABS, air brakes, air disc brakes, air tanks, anti-lock brakes, Automotive Service Excellence (ASE) H4, ATC, foundation brakes, friction coefficient, relay valves, S-cam, slack adjuster, transit, wedge brakes, wheel bearing, wheel component

Summary: This *Recommended Practice* provides transit bus maintenance training and transit bus maintenance departments with information to evaluate, develop or enhance current training programs for the diagnosis, repair and maintenance of transit bus brake systems. In addition, this document allows user departments to instruct/prepare transit bus technicians and mechanics for the H4 Automotive Service Excellence (ASE) Transit Bus Brake Systems Test. Individual operating agencies should modify these guidelines to accommodate their specific equipment and mode of operation.

Scope and purpose: This *Recommended Practice* reflects the consensus of the APTA Bus Standards Program members in conjunction with transit labor organizations, including ATU and TWU, on the subject material, manuals, textbooks, test equipment, methods and procedures that have provided the best performance record based on the experiences of those present and participating in meetings of the program task forces and working groups. APTA recommends the use of this document by organizations that have a training department or conduct training for the maintenance of transit buses, organizations that contract with others for transit bus maintenance training, and organizations that influence how training for transit bus maintenance is conducted.

This document represents a common viewpoint of those parties concerned with its provisions, namely operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any standards, recommended practices or guidelines contained herein is voluntary. In some cases, federal and/or state regulations govern portions of a transit system's operations. In those cases, the government regulations take precedence over this standard. The North American Transit Service Association and its parent organization APTA recognize that for certain applications, the standards or practices, as implemented by individual agencies, may be either more or less restrictive than those given in this document.

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Participants

The American Public Transportation Association greatly appreciates the contributions of the **Bus Transit Standards Diesel Engines Working Group**, which provided the primary effort in the drafting of this document.

At the time this standard was completed, the working group included the following members:

Co-Chair, *Bob Hykaway, ATU*
Co-Chair, *Dennis Cristofaro, CTA*

John Burke, TWU Local 100
Jack Clark, TLC
Mark Dalton, King Co Metro
Donald Davis, Metro Minn-St Paul
Darryl Desjarlais, New Flyer Ind.
Dan Engelkes, Rockford MTA
David Gerber, ATU Local 85
Jeff Hunt, ATU Local 757

James Lindsay, ATU Local 1277
Ken Mall, EDSI
Edward Owens, TWU Local 234
Tony Pilewski, ATU Local 85
Hector Ramirez, TWU Local 100
Robert Romaine, TWU
Joe Seitz, Maryland Transit
John Webster, ATU Local 382

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1. Learning environment

For best application of this *Recommended Practice*, a combination of classroom lectures, mentoring, practical training and practice tests should be included in the training program.

2. Computer skills

Basic computer skills are now a standard for transit bus technicians. Basic skills and knowledge in the operation of a computer in a Microsoft Windows environment are essential.

3. Course descriptions and objectives

The learning objectives listed below have been developed through a labor-management committee of subject matter experts (SMEs). The Learning Objective Levels represent 100 (introductory), 200 (intermediate) and 300 (advanced) levels. Within each level, the learning objectives are organized in the recommended order of instruction. When a transit bus mechanic demonstrates proficiency in the learning objectives, he or she should be capable of attaining ASE Transit Bus Technician Certification.

- **Modules A1, A2 and A3: Air Systems 101, 201, 301:** The objective of these courses is to familiarize the employee with the basics of air system components and operation, basic troubleshooting techniques for the air system, enhanced understanding of theory and proper operation, and all necessary actions required to restore the air system to OEM specifications.
- **Modules B1, B2 and B-3: Mechanical/Foundation 101, 201, 301:** The objective of these courses is to provide the employee with a basic understanding of transit bus foundation brake system components and operation, how to perform basic troubleshooting techniques for a transit bus foundation brake system through an enhanced understanding of theory and proper operation, and how to perform all necessary actions required to restore the foundation brake system to OEM specifications.
- **Modules C1, C2 and C3: Parking/Emergency Brake Systems 101, 201, 301:** The objective of these courses is to provide the employee with a basic understanding of transit bus parking/emergency brake system components and operation, how to perform basic troubleshooting procedures for transit bus parking/emergency brake systems through an enhanced understanding of theory and proper operation, and how to perform all necessary actions required to restore the parking/emergency brake system to OEM specifications.
- **Modules D1, D2 and D3: Wheel Bearings & Seals 101, 201, 301:** The objective of these courses is to provide the employee with a basic understanding of components and proper operation of wheel bearings and seals, how to perform basic troubleshooting procedures for wheel bearings and seals through an enhanced understanding of proper operation, and how to perform all necessary actions required to restore the wheel bearings and seals to OEM specifications.

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- **Module E1, E2 and E3:** ABS/ATC 101, 201, 301: The objective of these courses is to provide the employee with a basic understanding of ABS/ATC components and operation, how to perform basic troubleshooting procedures for ABS/ATC systems through an enhanced understanding of theory and proper operation, and how to perform all necessary actions required to restore ABS/ATC system to OEM specifications.

4. Exam requirements

The minimum acceptable grade to pass the course and all practical tests is 75 percent. Students must pass written tests with a minimum grade of 80 percent.

5. ASE test content summary

TABLE 1
Specifications for Transit Bus Air Brakes Test

| Content Area | Questions in Test | Percent of Test |
|--|--------------------------|------------------------|
| A. Air Supply and Service Systems Diagnosis and Repair | 24 | 48% |
| B. Mechanical/Foundation Brakes Diagnosis and Repair | 14 | 28% |
| C. Parking Brakes Diagnosis and Repair | 7 | 14% |
| D. Wheel Bearings Diagnosis and Repair | 5 | 10% |
| Total | 50 | 100% |

Please see Appendix B for the full list of ASE course tasks that should be covered during the training course.

References

National Institute for Automotive Service Excellence (ASE) website. <http://www.ase.com/>

Abbreviations and acronyms

| | |
|--------------|--|
| ABS | antilock brake system |
| ASE | Automotive Service Excellence |
| ATC | automatic traction control |
| ATU | Amalgamated Transit Union |
| DMM | digital multimeter |
| DTC | diagnostic trouble code |
| ECU | electronic control units |
| EDSI | Educational Data Systems, Inc. |
| FMVSS | Federal Motor Vehicle Safety Standards |
| NATSA | North American Transit Service Association |
| OJT | on-the-job training |
| PM | preventive maintenance |
| psi | pounds per square inch |
| TWU | Transport Workers Union |

Document history

| Document Version | Working Group Vote | Public Comment/ Technical Oversight | CEO Approval | Policy & Planning Approval | Publish Date |
|------------------|--------------------|-------------------------------------|---------------|----------------------------|-----------------|
| First published | | | | | October 1, 2010 |
| First revision | June 1, 2016 | July 7, 2016 | Sept. 6, 2016 | Sept. 30, 2016 | October 6, 2016 |
| Second revision | | | | | |

Appendix A: Transit Bus Brakes Learning Objectives

| 101 SAFETY | |
|---|--|
| Learning Objectives | ASE Task Reference |
| Describe general safety procedures | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A2, A21, A22, A23, A24, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |
| Demonstrate use of personal protective equipment | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, A21, A22, A23, A24, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |
| Demonstrate proper use of spring parking brake (release and cage) | B3, C1, C2, C3 |

| 101 VEHICLE LIFTING & HOISTING | |
|--|---|
| Learning Objectives | ASE Task Reference |
| Locate the safe jacking points on a vehicle | A14, A15, A16, A17, A18, A19, A21, A22, A23, A24, B1, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D6 |
| Demonstrate safe hoist and jack working procedures | A14, A15, A16, A17, A18, A19, A21, A22, A23, A24, B1, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |
| Properly and safely secure vehicle with hoist safety jacks | A14, A15, A16, A17, A18, A19, A21, A22, A23, A24, B1, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |
| Demonstrate safe lifting procedures | A14, A15, A16, A17, A18, A19, A21, A22, A23, A24, B1, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |

| 101 THEORY & UNDERSTANDING | |
|--|---|
| Learning Objectives | ASE Task Reference |
| Identify basic brake system components | A1, A14, A15, A16, A17, A18, A19, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3 |
| Describe operation of foundation brake system | A1, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C3 |
| Describe the importance of replacing components with similar components | A1, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A22, A23, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, D1, D2, D4, D5 |
| Describe why grease or oil on brake shoes can cause pulling or grabbing brakes | A1, A21, B1, B2, B8, B9, D2, D4, D5 |
| Describe how temperature affects brake performance | A1, B1, B3, B8, B9 |
| Describe causes of overheated brakes | A1, B1, B3, B8, B9 |
| Explain the purpose of the belt tension gauge | A4 |
| Describe the operation of double check valve and relay valve | A1, A9, A11, B1, B2, C2 |
| Describe the function of anti-compounding | A1, A11, A13, B1, B3, C2 |
| Use air schematics to troubleshoot brake system | A1, A6, A8, A14, A15, A16, A17, A18, A19, A21, A23, A24, B1, B3, C2 |
| Read and interpret brake-related electrical schematics | A8, A9, A12, A14, A16, A17, A19, A20, A21, A22, A23, A24 |

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| Learning Objectives | ASE Task Reference |
|---|--|
| Demonstrate wheel bearing adjustment procedures | D1, D2, D3, D4, D5 |
| Describe the environmental issues related to working with solvents and cleaning equipment | B1, B2, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |
| Describe the importance of using proper lubricants and lubrication procedures | B1, B3, B4, B5, B6, B7, D1, D2, D3, D4, D5 |
| Explain brake block friction rating | A1, B1, B2, B8, B10 |
| Determine if brakes are within wear limits | A1, B1, B4, B5, B6, B7, B8, B9, B10 |
| Demonstrate machine tool knowledge | B10 |
| Describe the function of spring brake chambers | A1, B1, B3, C1, C2, C3 |
| Demonstrate understanding of local disposal regulations | C1 |
| Demonstrate procedures for replacing/changing spring brake | B3, C1, C3 |
| Describe the operation of the air system and brake-control valves | A1, A4, A6, A8, A9, A10, A11, A13, A14, A15, A16, A17, A18, A19, A21, A23, A24, B1, B2, B3, C2 |
| Describe the operation of the SR-1 spring brake control valve | A15, B1, C2 |
| Describe the operation of the emergency spring brake release system | A18, C1, C2, C3 |
| Describe release and caging procedures for different types of spring brake chambers | B3, C1, C3 |
| Describe brake system road tests procedures | A1, A24, B1, B2, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |
| Identify system types: wedge, S-cam and air system (valves) | |

101 PROCEDURES, INSPECTIONS & TESTING

| Learning Objectives | ASE Task Reference |
|---|--|
| Demonstrate use of hand tools | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |
| Check for water and oil in supply tanks | A1, A3, A5, A9 |
| Demonstrate proper procedure to drain air tanks | A3, A15, A16, A17 |
| Check for water, oil and coolant in ping tanks | A1, A3, A9 |
| Perform air buildup test | A1, A2, A3, A5, A6, A7, A8, A9, A16, A17 |
| Identify proper torque specs using service manuals | B6, B7, B8, B9, C1, C2, D1, D2, D3, D4, D5 |
| Identify proper system specifications using service manuals | A2, A4, A6, A14, A15, A16, A17, A18, A19, A20, A21, A22, A23, A24, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |

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| Learning Objectives | ASE Task Reference |
|--|--------------------------------|
| Perform preventive maintenance procedures related to wheel bearings and hubs | |
| Demonstrate use of micrometer | B1, B9, B10 |
| Check for proper slack operation | A1, B1, B2, B3, B4, B5, B7, C1 |

102 THEORY & UNDERSTANDING

| Learning Objectives | ASE Task Reference |
|--|---------------------------|
| Interpret wheel bearing failure analysis | D1, D2, D3, D4, D5 |

102 PROCEDURES, INSPECTIONS & TESTING

| Learning Objectives | ASE Task Reference |
|--|--|
| Balance brakes | A1, A10, A13, A17, B1, B2, B3, B4, D3 |
| Inspect foundation (mechanical) brake components | A1, B1, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, D1, D2, D3 |
| Inspect push rod travel | A1, A7, A21, B1, B2, B3, B4, B5, B6, C1 |
| Inspect for worn components | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A22, A23, A24, B1, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, D2, D3, D4, D5 |
| Inspect and identify failed or damaged air lines | A1, A2, A5, A7, A17, A19, C2 |
| Inspect pressure relief valves | A1, A6, A8 |
| Check for carbon buildup in the supply line | A1, A2, A5, A7 |
| Measure belt tension using belt tension gauge on compressor drive belt | A14 |
| Use torque wrench to inspect tensioner on compressor belt | A14 |
| Use straight edge to check pulley alignment on compressor pulley | A14 |
| Inspect for worn or damaged belts on compressor drive | A14 |
| Check for proper routing of brake hoses | A5, A7, A14, A15, A16, A17, A18, A19, B6, B7, C1, C2 |
| Inspect air dryer system | A9 |
| Check application valve for leaks using soapy water or air leak detector | A1, A7, A10 |
| Check brake pedal for proper operation | A1, A10, B1 |
| Check for proper exhaust of brake valve and quick-release valves | A1, A10, A13, A14, C2 |
| Demonstrate proper brake component adjustment procedures | A1, B1, B2, B3, B4, B5, B6, B7, C1, D1, D2, D3, D4 |
| Inspect and replace air supply, oil and coolant lines | A5 |

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103 THEORY & UNDERSTANDING

| Learning Objectives | ASE Task Reference |
|---|--|
| Identify brake-specific tools; demonstrate proper use | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A20, A21, A22, A23, A24, B2, B5, B6, B7, B9, B10, C3, D1, D2, D3, D4, D5 |

103 PROCEDURES, INSPECTIONS & TESTING

| Learning Objectives | ASE Task Reference |
|--|--|
| Identify proper diameter and length of lines and hoses for replacement | A1, A2, B1, C2 |
| Perform oil splatter test at discharge of air compressor | A1, A3, A5, A9 |
| Check for proper operation of check valves (single and double) | A1, A2, A9, A11, A14, A15 |
| Perform brake reline | B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, D1, D2, D3, D4, D5 |
| Adjust governors (120 to 125 psi cut-out) | A2, A6, A9 |
| Check cut-in and adjust cut-out | A2, A6, A9 |
| Test pressure protection valves (not FMVSS 121 test specific) | A6, A8 |
| Replace air dryer | A9 |
| Crimp hose and lines using proper collar; replace fittings | A5, A7, A15, A16, A17, A18, A19, B3, C2 |
| Cut hose to proper length for proper routing | A5, A7, A15, A16, A17, A18, A19, B3, C3 |
| Install fittings to manufacturer's specs using appropriate tools | A5, A7, A8, A9, A10, A11, A13, A15, A16, A17, A18, A19, B3, C2 |
| Check application pressure at front and rear | A1, A10, A13, B1, B2, B3, |
| Check supply pressure with proper gauge | A1, A2, A3, A8, A10, A13 B1, B2, B3, C2 |
| Use digital multimeter (DMM) to inspect park brake light switch | A12 |
| Use wire crimpers to make electrical connection | A8, A9, A12, A16, A17, A19 |
| Solder wires | A8, A9, A12, A16, A17, A20 |
| Splice wires | A8, A9, A12, A16, A17, A21 |
| Attach electrical connector ends | A8, A9, A12, A16, A17, A22 |
| Perform leak test under pressure | A1, A2, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, B1, B3, C1, C2 |
| Cut push rod to proper length | B1, B3, C1 |
| Demonstrate how to adjust brake when repairs are complete | B2, B3, B4, B5, B6, C1 |

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201 THEORY & UNDERSTANDING

| Learning Objectives | ASE Task Reference |
|---|---------------------------|
| Describe operation of antilock brake system (ABS) | A20, A21, A22, A23, A24 |

201 PROCEDURES, INSPECTIONS & TESTING

| Learning Objectives | ASE Task Reference |
|---|-----------------------------|
| Use electronic reader to read brake fault codes | A1, A20, A21, A22, A23, A24 |
| Troubleshoot brake fade | A1, B1, B2, B3, B8, B9 |
| Troubleshoot overheated brakes | A1, B1, B2, B3, B8, B10 |
| Conduct air compressor performance test | A2 |
| Check for air compressor intake restriction | A2, A5 |

202 THEORY & UNDERSTANDING

| Learning Objectives | ASE Task Reference |
|--------------------------------------|---------------------------|
| Describe how air builds up in system | A2, A6 |

202 PROCEDURES, INSPECTIONS & TESTING

| Learning Objectives | ASE Task Reference |
|---|--|
| Attach pneumatic gauges and interpret reading | A1, A12, A13, A14, A15, A16, A17, A18, A19, B1, C1, C2 |
| Troubleshooting check valves | A1, A2, A8, A11, A14, A15, B1, C2 |
| Rebuild air dryer | A8, A9 |
| Troubleshoot application pressure front and rear | A1, A6, A8, A10, A11, A13, A17, B12 |
| Troubleshoot supply pressure with gauge | A1, A6, A8, A10, A11, A13, B1, B2, B3, C2 |
| Troubleshoot delivery pressure with gauge | A1, A6, A8, A10, A11, A13, B1, B2, B3, C3 |
| Check and adjust brake pedal | A10, B1 |
| Troubleshoot operation of double check valve and relay valve | A11, A13, A14, A15, B1, B2, C2 |
| Troubleshoot function of anti-compounding | A11, A13, B1, B3 |
| Troubleshoot using leak test under pressure | A1, A2, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, B1, B3, C1, C2 |
| Troubleshoot exhaust of brake valve and quick-release valves | A1, A13, B1, C2 |
| Inspect ABS systems | A20, A21, A22, A23, A24 |
| Diagnose automatic traction control (ATC) electronic controls | A20, A22, A23 |
| Conduct brake efficiency test and explain findings | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, B1, B2, C1, C2 |
| Troubleshoot spring brake release (SR-1) | C1, C2 |
| Troubleshoot using road-test results | B1, B2, C1, C2, D1, D2, D3, D4, D5 |

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| 203 PROCEDURES, INSPECTIONS & TESTING | |
|---|---|
| Learning Objectives | ASE Task Reference |
| Inspect worn components and conduct failure analysis | A1, A4, A5, A22, A23, A24, B1, B2, B3, B4, B5, B6, B7, B8, B9, C1, C2, D1, D2, D4, D5 |
| Check gear mechanism | A4 |
| Inspect cam drive, gear and flywheel housing | |
| Check fuel injection pump timing after air compressor replacement | |
| Use test results for troubleshooting | A1, A14, A15, A16, A17, A18, A19, A20, A21, A22, A23, A24, B1, B2, B3, C1, C2 |
| Diagnose ABS faults using supplied equipment and reference material | A20, A21, A22, A23, A24 |
| Adjust ABS components | A22 |
| Replace ABS wiring and sensors | A22, A23 |
| Adjust ATC components | A20 |
| Replace ATC wiring and sensors | A22, A23 |
| Use lathe to machine drums and rotors | B9, B10 |

Appendix B: ASE transit bus brakes task list

A. Air supply and service systems diagnosis and repair

1. Diagnose poor stopping, pulling, grabbing, dragging and air leak (static and applied) problems caused by supply and service system malfunctions; determine needed repairs.
2. Check air system buildup and recovery time; determine needed repairs.
3. Drain air reservoir tanks; check for oil, water and foreign material; determine needed repairs.
4. Inspect, adjust, align or replace air compressor drive belts, pulleys, tensioners, drive gears and couplings.
5. Inspect, repair or replace air compressor, air cleaner, oil and coolant lines and fittings.
6. Inspect, test, adjust or replace system pressure controls (governor/relief valve), unloader assembly valves, pressure protection valves and filters.
7. Inspect, repair or replace air system lines, hoses, fittings and couplings.
8. Inspect, test, clean or replace air tank relief (pop-off) valves, one-way check valves, drain cocks, automatic drain (spitter) valves, heaters, wiring and connectors.
9. Inspect, clean, repair or replace air drier systems, filters, valves, heaters, wiring and connectors.
10. Inspect, test, adjust, repair or replace brake application (foot/treadle) valve, fittings and mounts; check and adjust brake pedal free play.
11. Inspect, test, clean or replace two-way (double) check valves and anti-compounding valves.
12. Inspect, test, repair or replace stop and parking brake light circuit switches, wiring and connectors.
13. Inspect, test, repair or replace brake relay valve and quick-release valves.
14. Inspect, test, repair or replace interlock system solenoid valves, regulator valves, pressure switches and related components.
15. Inspect, test and replace inversion/emergency (spring) brake control valve(s).
16. Inspect, test, repair or replace low-pressure warning devices.
17. Inspect, test and replace air pressure gauges, lines and fittings.
18. Inspect, test and replace parking brake override valve.
19. Inspect, test, repair or replace towing circuit components.
20. Perform antilock brake system (ABS) warning lamp startup test; determine needed repairs; diagnose hard fault codes/diagnostic trouble codes (DTCs) using scan tool, computer or LEDs; determine needed repairs.
21. Diagnose poor stopping and lockup problems on ABS; determine needed repairs.
22. Test, adjust or replace ABS wheel speed sensors and tone/exciter rings.
23. Test and replace ABS, electronic control units (ECUs) and modulator valves; test, repair and replace wiring and connectors.
24. Verify proper operation of auxiliary (transmission retarder, driveline, exhaust, and engine) braking systems.

B. Mechanical/foundation brakes diagnosis and repair

1. Diagnose poor stopping, brake noise, premature wear, pulling, grabbing or dragging complaints caused by foundation brake, slack adjuster and brake chamber problems; determine needed repairs.
2. Perform deceleration tests on service and parking brake systems.
3. Inspect, test, adjust, repair or replace service brake chambers, diaphragm, clamp, spring, pushrod, clevis and mounting brackets.
4. Inspect, test, adjust, repair or replace manual and automatic slack adjusters.
5. Inspect or replace cams, rollers, shafts, bushings, seals, spacers and retainers.
6. Inspect or replace brake spider, shields, anchor pins, bushings and springs.
7. Inspect, clean, rebuild or replace, and adjust air disc brake caliper assemblies.

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8. Inspect brake shoes, linings or pads; determine needed repairs.
9. Inspect brake drums or rotors; determine needed repairs.
10. Resurface brake drums and linings; resurface rotors.

C. Parking brakes diagnosis and repair

1. Inspect or replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations.
2. Inspect, test or replace parking (spring) brake valves, lines, hoses and fittings.
3. Manually release and cage parking (spring) brakes.

D. Wheel bearings diagnosis and repair

1. Remove and replace axle hub and wheel assembly.
2. Clean, inspect, lubricate or replace wheel bearing assemblies; replace seals and wear rings.
3. Adjust axle wheel bearings in accordance with manufacturer's procedures.
4. Inspect or replace extended service (sealed, close-tolerance and unitized) bearing assemblies; perform initial installation in accordance with manufacturer's procedures.
5. Replace seals and O-rings on planetary axle assemblies; adjust axle end play.

Appendix C: Sample curriculum

Brakes—Module A1

Air System 101

Goal: Participants should understand the basics of air system components and operation.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate safe use of hand tools and related equipment;
- identify air system components;
- understand how to work safely with air system and components;
- demonstrate a basic understanding of principles of operation; and
- demonstrate a basic understanding of transit bus air system physics.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 Procedures, Inspections & Testing
2. 101 Theory & Understanding
3. 101 Safety
4. 101 Theory & Understanding
5. 101 Theory & Understanding

Course description: Participants will receive classroom instruction in which a qualified instructor will go over the basics of air system components and operation, including pertinent physics, component identification, safety issues, applicable tools/equipment and proper usage. Participants should leave the course with a basic understanding of how air systems operate and relevant components to their operation.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have previous experience with vehicle lift equipment and general mechanical knowledge or have taken courses on these topics.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: 4 hours

Target audience: All new and existing mechanics

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: (for some of these we will need to get more specific with identifying specific slides, pages, documents, etc. that apply to this module) Student workbook, manuals, handouts, PowerPoint, homework assignments

- Servicing Spring Brakes DVD—MGM Brakes
- Air Brake Handbook—Bendix (www.bendix.com)
- Bendix—technical library (www.bendix.com)
- PowerPoints (some physics in here)—(Brian Markey--please send and Bruce Dahl)
- Brake Board and/or visual (APTA Rodeo Handbook--Jeff Hoitt--please send)
- Air Handout—(Pete Hallenen)

Instructor:

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/24/09, 3/27/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module A2

Air System 201

Goal: Participants should understand basic troubleshooting techniques for the air system through an enhanced understanding of theory and proper operation.

Objectives:

Upon completion of this course, participants should be able to:

- explain the proper function of an air system at the component level;
- explain basic troubleshooting procedures of air systems components;
- explain preventive maintenance (PM) procedures;
- identify defective components; and
- identify probable causes of failures.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 and 202 Theory & Understanding
2. 101 and 202 Procedures, Inspections & Testing
3. 101 Theory & Understanding – 101 Procedures, Inspections & Testing
4. 203 Procedures, Inspections & Testing

Course description: Participants will receive instruction from a qualified instructor regarding basic troubleshooting and preventive maintenance procedures for an air system, including the identification of defective/worn components and probable causes of failure. This section will be instructor-led with a lot of hands-on/demonstration of components and procedures.

Recommended class size: 4:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken Air System 101 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Target audience: Anyone successfully completing Air System 101 or demonstrating equivalent knowledge/experience

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module A3

Air System 301

Goal: Participants should be able to perform all necessary actions required to restore the air system to OEM specifications.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate advanced troubleshooting/inspection procedures;
- test, remove, replace and adjust components;
- perform preventive maintenance on air system;
- isolate faults;
- interpret schematics (transmission belt–related);
- repair and rebuild components;
- perform performance based brake testing (deceleration); and
- confirm repair/road test (deceleration test).

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 202 Procedures, Inspections & Testing
2. 102 and 103 Procedures, Inspections & Testing
3. 101 and 102 Procedures, Inspections & Testing
4. 201 Procedures, Inspections & Testing
5. 101 Theory & Understanding
6. 202 Procedures, Inspections & Testing
7. 103 and 201 Procedures, Inspections & Testing
8. 202 Procedures, Inspection & Testing

Course description: Participants will be led by a qualified instructor through the process of restoring the air system to OEM specifications. This includes instructor demonstrations and participant practice. This portion is highly interactive and should employ hands-on learning activities.

Recommended class size: 4:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken Air System 201 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Target audience: Anyone successfully completing Air System 201 or demonstrating equivalent knowledge/experience

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module B1

Mechanical/ Foundation 101

Goal: Participants should possess a basic understanding of transit bus foundation brake system components and operation.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate safe use of hand tools and related equipment;
- understand how to work safely with the foundation brake system and components;
- identify foundation brake system components;
- demonstrate a basic understanding of principles of operation; and
- demonstrate a basic understanding of transit bus foundation brake physics.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 Procedures, Inspections & Testing – 103 Theory & Understanding
2. 101 Safety Procedures
3. 101 Theory & Understanding
4. 101 Theory & Understanding
5. 101 and 201 Theory & Understanding

Course description: Participants will receive classroom instruction in which a qualified instructor will go over the basics of mechanical/foundation brake system components and operation, including pertinent physics, component identification, safety issues, applicable tools/equipment and proper usage. Participants should leave the course with a basic understanding of how the foundation/mechanical brake system operates and relevant components to its operation.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have previous experience with vehicle lift equipment and general mechanical knowledge or have taken courses on these topics.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: 4 hours

Target audience: All new and existing mechanics

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/27/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module B2

Mechanical/Foundation 201

Goal: Participants should understand basic troubleshooting techniques for a transit bus foundation brake system through an enhanced understanding of theory and proper operation.

Objectives:

Upon completion of this course, participants should be able to:

- explain the proper function and relationship of the foundation brake system at the component level;
- explain basic troubleshooting procedures for foundation brake systems and components;
- explain basic preventive maintenance (PM) procedures;
- identify defective/worn components; and
- identify probable causes of failures.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 Theory & Understanding
2. 101 Theory & Understanding – 101 Procedures, Inspections & Testing
3. 101 Theory & Understanding – 101 Procedures, Inspections & Testing
4. 101 Theory & Understanding – 102 Procedures, Inspections & Testing
5. 101 Theory & Understanding – 101 and 103 Procedures, Inspections & Testing

Course description: Participants will receive instruction from a qualified instructor regarding basic troubleshooting and preventive maintenance procedures for a foundation brake system, including the identification of defective/worn components and probable causes of failure. This section will be instructor-led with a lot of hands-on/demonstration of components and procedures.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken Mechanical/Foundation 101 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: 4 hours

Target audience: Anyone successfully completing Mechanical/Foundation 101 or demonstrating equivalent knowledge/experience

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module B3

Mechanical/Foundation 301

Goal: Participants should be able to perform all necessary actions required to restore the foundation brake system to OEM specifications.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate advanced troubleshooting/inspection procedures;
- test, remove, replace and adjust components;
- perform preventive maintenance (PM) on foundation brake system;
- repair and rebuild components;
- conduct brake efficiency test; and
- confirm repair and road test.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101,102, 103, 202 and 203 Procedures, Inspections & Testing
2. 103 and 202 Procedures, Inspections & Testing
3. 101 and 102 Procedures, Inspections & Testing
4. 202 Procedures, Inspections & Testing
5. 103 Theory & Understanding – 202 Procedures, Inspections & Testing

Course description: Participants will be led by a qualified instructor through the process of restoring the foundation brake system to OEM specifications. This includes instructor demonstrations and participant practice. This portion is highly interactive and should employ hands-on learning activities.

Recommended class size: 4:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken Mechanical/Foundation 201 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Target audience: Anyone successfully completing Mechanical/Foundation 201 or demonstrating equivalent knowledge/experience

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module C1

Parking/Emergency Brake System 101

Goal: Participants should possess a basic understanding of transit bus parking/emergency brake system components and operation.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate safe use of hand tools and related equipment;
- understand how to work safely with parking/emergency brake system and components;
- identify parking/emergency brake system components;
- demonstrate a basic understanding of principles of operation; and
- demonstrate a basic understanding of transit bus parking/emergency brake physics.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 Safety – 101 Procedures, Inspections & Testing – 101 and 103 Theory & Understanding – 201 and 203 Procedures, Inspections & Testing
2. 101 Theory & Understanding
3. 101 Theory & Understanding
4. 101 and 201 Theory & Understanding
5. 101 and 201 Theory & Understanding

Course description: Participants will receive classroom instruction in which a qualified instructor will go over the basics of parking/emergency brake system components and operation, including pertinent physics, component identification, safety issues, applicable tools/equipment and proper usage. Participants should leave the course with a basic understanding of how the parking/emergency brake system operates and relevant components to its operation.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have previous experience with vehicle lift equipment and general mechanical knowledge or have taken courses on these topics.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: 4 hours

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Target audience: All new and existing mechanics

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/27/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module C2

Parking/Emergency Brake 201

Goal: Participants should understand basic troubleshooting procedures for transit bus parking/emergency brake systems through an enhanced understanding of theory and proper operation.

Objectives:

Upon completion of this course, participants should be able to:

- explain the proper function and relationship of the parking/emergency brake system at the component level;
- explain basic troubleshooting procedures for parking/emergency brake systems and components;
- explain preventive maintenance (PM) procedures;
- identify defective/worn components; and
- identify probable causes of failures.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 Theory & Understanding – 101 Procedures, Inspections & Testing
2. 101 Theory & Understanding – 101 and 202 Procedures, Inspections & Testing
3. 101 Theory & Understanding – 101 and 202 Procedures, Inspections & Testing
4. 102 Procedures, Inspections & Testing
5. 203 Procedures, Inspections & Testing

Course description: Participants will receive instruction from a qualified instructor regarding basic troubleshooting and preventive maintenance procedures for parking/emergency brake systems, including the identification of defective/worn components and probable causes of failure. This section will be instructor-led with a lot of hands-on/demonstration of components and procedures.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken Parking/Emergency Brake Systems 101 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Target audience: Anyone successfully completing Parking/Emergency Brake Systems 101 or demonstrating equivalent knowledge/experience

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module C3

Parking/Emergency Brake 301

Goal: Participants should be able to perform all necessary actions required to restore the parking/emergency brake system to OEM specifications.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate advanced troubleshooting/inspection procedures;
- test, remove, replace and adjust components;
- perform preventive maintenance (PM) on parking/emergency brake system;
- repair and rebuild components;
- conduct parking/emergency brake efficiency test; and
- confirm repair and road test.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 202 Procedures, Inspections & Testing
2. 103 and 202 Procedures, Inspections & Testing
3. 102 and 103 Procedures, Inspections & Testing
4. 202 Procedures, Inspections & Testing
5. 202 Procedures, Inspections & Testing
6. 202 Procedures, Inspections & Testing

Course description: Participants will be led by a qualified instructor through the process of restoring the parking/emergency brake system to OEM specifications. This includes instructor demonstrations and participant practice. This portion is highly interactive and should employ hands-on learning activities.

Recommended class size: 4:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken Parking/Emergency Brake 201 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Target audience: Anyone successfully completing Parking/Emergency Brake 201 or demonstrating equivalent knowledge/experience

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module D1

Wheel Bearings & Seals 101

Goal: Participants should possess a basic understanding of components and proper operation of wheel bearings and seals.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate safe use of hand tools and related equipment;
- demonstrate safe working procedures;
- identify wheel bearing components; and
- demonstrate a basic understanding of principles of operation.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 Procedures, Inspections & Testing
2. 101 Safety
3. 101 Theory & Understanding
4. 101 Theory & Understanding – 202 Procedures, Inspections & Testing

Course description: Participants will receive classroom instruction in which a qualified instructor will go over the basics of wheel bearing and seal components and operation, including component identification, safety issues, applicable tools/equipment and principles of operation. Participants should leave the course with a basic understanding of what wheel bearings and seals are and their role in brake system operations.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have previous experience with vehicle lift equipment and general mechanical knowledge or have taken courses on these topics.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: 4 hours

Target audience: All new and existing mechanics

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module D2

Wheel Bearings & Seals 201

Goal: Participants should understand basic troubleshooting procedures for wheel bearings and seals through an enhanced understanding of proper operation.

Objectives:

Upon completion of this course, participants should be able to:

- explain the proper function and relationship of the wheel bearing and seals;
- explain basic troubleshooting procedures for wheel bearing and seals;
- explain preventive maintenance (PM) procedures for wheel bearings and seals;
- explain probable causes of failures; and
- identify defective/worn components.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 and 102 Theory & Understanding
2. 101 Procedures, Inspections & Testing
3. 101 Procedures, Inspections & Testing
4. 203 Procedures, Inspections & Testing
5. 102 and 203 Procedures, Inspections & Testing

Course description: Participants will receive instruction from a qualified instructor regarding basic troubleshooting and preventive maintenance procedures for wheel bearings and seals, including the identification of defective/worn components and probable causes of failure. This section will be instructor-led with a lot of hands-on/demonstration of components and procedures.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken Wheel Bearings & Seals 101 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Target audience: Anyone successfully completing Wheel Bearings & Seals 101 or demonstrating equivalent knowledge/experience

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module D3

Wheel Bearings & Seals 301

Goal: Participants should be able to perform all necessary actions required to restore the wheel bearings and seals to OEM specifications.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate advanced troubleshooting/inspection procedures;
- perform preventive maintenance (PM) on wheel bearings and seals;
- test, remove, replace, adjust and lubricate components;
- confirm repair; and
- properly use dial indicator to verify end play.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

- 101 Theory & Understanding
- 101 Procedures, Inspections & Testing
- 101 Theory & Understanding, 102 Procedures, Inspections & Testing
- 102 Theory & Understanding, 202 Procedures, Inspections & Testing
- 101 Procedures, Inspections & Testing, 103 Theory & Understanding

Course description: Participants will be led by a qualified instructor through the process of restoring the wheel bearings and seals to OEM specifications. This includes instructor demonstrations and participant practice. This portion is highly interactive and should employ hands-on learning activities.

Recommended class size: 4:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken Wheel Bearings & Seals 201 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Target audience: Anyone successfully completing Wheel Bearings & Seals 201 or demonstrating equivalent knowledge/experience

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module E1

ABS/ATC 101

Goal: Participants should possess a basic understanding of ABS/ATC components and operation.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate safe use of hand tools and related equipment;
- demonstrate safe working procedures;
- identify ABS/ATC components; and
- demonstrate a basic understanding of principles of operation.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101 Safety, 101 Procedure, Inspections & Testing
2. 101 Safety
3. 101 and 201 Theory & Understanding
4. 201 Theory & Understanding – 202 and 203 Procedures, Inspections & Testing

Course description: Participants will receive classroom instruction in which a qualified instructor will go over the basics of ABS/ATC components and operation, including component identification, safety issues, applicable tools/equipment and principles of operation. Participants should leave the course with a basic understanding of ABS/ATC components and operation.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have previous experience with vehicle lift equipment and general mechanical knowledge or have taken courses on these topics.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: 4 hours

Target audience: All new and existing mechanics

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module E2

ABS/ATC 201

Goal: Participants should understand basic troubleshooting procedures for ABS/ATC systems through an enhanced understanding of theory and proper operation.

Objectives:

Upon completion of this course, participants should be able to:

- explain the proper function and relationship of the ABS/ATC systems at the component level;
- explain basic troubleshooting procedures for ABS/ATC systems;
- explain preventive maintenance (PM) for ABS/ATC systems;
- explain probable causes of failures; and
- identify defective/worn components.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 101, 201 and 203 Theory & Understanding
2. 202 Procedures, Inspections & Testing
3. 202 Procedures, Inspections & Testing
4. 203 Procedures, Inspections & Testing
5. 102 and 203 Procedures, Inspections & Testing

Course description: Participants will receive instruction from a qualified instructor regarding basic troubleshooting and preventive maintenance procedures for ABS/ATC systems, including the identification of defective/worn components and probable causes of failure. This section will be instructor-led with a lot of hands-on/demonstration of components and procedures.

Recommended class size: 8:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken ABS/ATC 101 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Target audience: Anyone successfully completing ABS/ATC 101 or demonstrating equivalent knowledge/experience

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.

Brakes—Module E3

ABS/ATC 301

Goal: Participants should be able to perform all necessary actions required to restore ABS/ATC system to OEM specifications.

Objectives:

Upon completion of this course, participants should be able to:

- demonstrate advanced troubleshooting/inspection procedures;
- perform preventive maintenance (PM) on ABS/ATC system;
- test, replace and adjust components;
- properly use diagnostic equipment and interpret data; and
- confirm repair and road test.

Job tasks/learning objectives/OJT checklist:

OJT checklists may be used with the learning objectives listed under the following modules in the training standard:

1. 202 and 203 Procedures, Inspections & Testing

Course description: Participants will be led by a qualified instructor through the process of restoring the ABS/ATC system to OEM specifications. This includes instructor demonstrations and participant practice. This portion is highly interactive and should employ hands-on learning activities.

Recommended class size: 4:1

Prerequisites (previous module and/or demonstrated experience): Participants should have taken ABS/ATC 201 or have equivalent experience.

Delivery method (e.g., lecture, hands-on, online, lab): Hands-on and classroom

Course duration: Not listed

Target audience: Anyone successfully completing ABS/ATC 201 or demonstrating equivalent knowledge/experience

Classroom equipment and supplies: Notepads, pens/pencils, flip chart or whiteboard (and markers), classroom, laptop, projector, highlighters, note cards and name cards

Course materials, training aids and references: Student workbook, manuals, handouts, PowerPoint, homework assignments

Instructor:

Course developer: Kim Harris, EDSI

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Training Syllabus to Instruct/Prepare for the ASE Transit Bus Air Brake Systems Test

Subject matter experts: Contact APTA.

Revision dates: 3/12/09, 3/30/09

Follow-up: Most recent revision should be sent to committee for feedback.

Instructor and course evaluation: Local course evaluation sheets should be used if present.