



## DEM143 Brakes

### Course Information

Credits	3
Campus	Washburn Institute of Technology
Address	5724 SW Huntoon
City/State/Zip	Topeka, Kansas 66604
Office Fax	785-273-7080

### Description

Brakes will cover the theory and operations of hydraulic and air brake systems, teaching troubleshooting, disassembly, inspection and adjustments of hydraulic and air brake systems, including ABS. (KBOR Aligned)

Common light, medium and heavy truck hydraulic and air brake systems and components are highlighted. Operation, maintenance, inspection, diagnosis, wear pattern interpretation, failure analysis, reconditioning, disassembly, re-assembly are covered. Specifies requirements and testing procedures of Federal Standard FMVSS 105 (hydraulic brakes) and FMVSS 121 (air brakes) are included.

### Textbooks

**MHT - Shrink-wrapped Package: Tasksheet Manual Includes Systems & Engines / TWO Year Online Access**  
**Pack** Publisher: CDX 9781284099874

**OPTIONAL** (in addition to above):

Fundamentals of Medium/Heavy Duty Commercial Vehicle Systems <i>Text-Hard (paper) edition</i>	CDX 9781284041163
Fundamentals of Medium/Heavy Duty Diesel Engines <i>Text-Hard (paper) edition</i>	CDX 9781284067057

### Student Learning Outcomes:

- A. Communicate effectively
- B. Integrate technology
- C. Learn effectively
- D. Demonstrate cooperative teamwork skills
- E. Apply safety in the workplace
- F. Think critically and creatively
- G. Demonstrate responsible work ethics



## Competencies

Rating	Tasks Covered in this Course	Source
XXX	<b>Brakes (KBOR Aligned Tasks)</b>	
	1. Identify air brakes	KBOR
	2. Inspect air brakes	KBOR
	3. Diagnose air brakes	KBOR
	4. Repair air brakes	KBOR
	5. Identify hydraulic brakes	KBOR
	6. Inspect hydraulic brakes	KBOR
	7. Diagnose hydraulic brakes	KBOR
	8. Repair hydraulic brakes	KBOR
XXX	<b>For every task in Brakes, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.</b>	<b>NATEF</b>
XXX	<b>The first task in Brakes is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.</b>	<b>NATEF</b>
XXX	<b>III. BRAKES</b>	<b>NATEF</b>
XXX	<b>A. Air Brakes</b>	<b>NATEF</b>
XXX	<b>1. Air Supply and Service Systems</b>	<b>NATEF</b>
	1. Identify poor stopping, air leaks, premature wear, pulling, grabbing, dragging, or balance problems caused by supply and service system malfunctions; determine needed action.	P-1
	4. Inspect air compressor drive gear, belts and coupling; adjust or replace as needed.	P-3
	9. Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed.	P-1
	11. Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed.	P-1
	12. Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed.	P-1
	13. Inspect and test brake relay valves; replace as needed.	P-1
	14. Inspect and test quick release valves; replace as needed.	P-1
	15. Inspect and test tractor protection valve; replace as needed.	P-1

	16. Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed.	P-1
	17. Inspect and test low pressure warning devices, wiring, and connectors; repair or replace as needed.	P-1
	18. Inspect and test air pressure gauges, lines, and fittings; replace as needed.	P-2
XXX	<b>2. Mechanical/Foundation Brakes</b>	
	5. Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs.	P-2
	6. Inspect and measure brake shoes or pads; perform needed action.	P-1
	7. Inspect and measure brake drums or rotors; perform needed action.	P-1
XXX	<b>3. Parking Brakes</b>	
	1. Inspect and test parking (spring) brake chamber diaphragm and seals; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations.	P-1
	2. Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed.	P-1
	3. Inspect and test parking (spring) brake application and release valve; replace as needed.	P-1
	5. Identify and test anti compounding brake function.	P-1
XXX	<b>B. Hydraulic Brakes</b>	<b>NATEF</b>
XXX	<b>1. Hydraulic System</b>	<b>NATEF</b>
	1. Identify poor stopping, premature wear, pulling, dragging, balance, or pedal feel problems caused by the hydraulic system; determine needed action.	
	2. Inspect and test master cylinder for internal/external leaks and damage; replace as needed.	P-1
	3. Inspect hydraulic system brake lines, flexible hoses, and fittings for leaks and damage; replace as needed.	P-1
	4. Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed.	P-3
	5. Inspect and test brake pressure differential valve and warning light circuit switch, bulbs/LEDs, wiring, and connectors; repair or replace as needed.	P-2
	6. Inspect disc brake caliper assemblies; replace as needed.	P-1
	7. Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type.	P-1
XXX	<b>2. Mechanical/Foundation Brakes</b>	<b>NATEF</b>
	1. Identify poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems caused by mechanical components; determine needed action.	P-2
	2. Inspect and measure rotors; perform needed action.	P-1

	3. Inspect and measure disc brake pads; inspect mounting hardware; perform needed action.	P-1
<b>XXX</b>	<b>3. Power Assist Units</b>	<b>NATEF</b>
	1. Identify stopping problems caused by the brake assist (booster) system; determine needed action.	P-3
	2. Inspect, test, repair, or replace hydraulic brake assist (booster), hoses, and control valves; determine proper fluid type.	P-3
	3. Check emergency (back-up, reserve) brake assist system.	P-3
<b>XXX</b>	<b>C. Air and Hydraulic Antilock Brake Systems (ABS) and Automatic Traction Control (ATC)</b>	<b>NATEF</b>
	2. Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or electronic service tool(s); determine needed action.	P-1
	3. Identify poor stopping and wheel lock-up problems caused by failure of the antilock brake system (ABS); determine needed action.	P-1
	4. Test and check operation of antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action.	P-1
	5. Test antilock brake system (ABS) wheel speed sensors and circuits ; adjust or replace as needed.	P-1
	7. Observe automatic traction control (ATC) warning light operation; determine needed action.	P-3
	8. Diagnose automatic traction control (ATC) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action.	P-3
	9. Verify power line carrier (PLC) operations.	P-2
<b>XXX</b>	<b>The first task in Preventive Maintenance is to listen to and verify operator's concern, review past maintenance documents, and record condition on appropriate document.</b>	<b>NATEF</b>
<b>XXX</b>	<b>1. Air Brakes (PMI Tasks - NATEF)</b>	<b>NATEF</b>
	1. Check operation of parking brake.	P-1
	2. Record air governor cut-in and cut-out setting (psi).	P-1
	3. Check operation of air reservoir/tank drain valves.	P-1
	4. Check air system for leaks (brakes released).	P-1
	5. Check air system for leaks (brakes applied).	P-1
	6. Test one-way and double-check valves.	P-1
	7. Check low air pressure warning devices.	P-1
	8. Check emergency (spring) brake control/modulator valve, if applicable.	P-1
	9. Check tractor protection valve.	P-1
	10. Test air pressure build-up time.	P-1
	11. Inspect coupling air lines, holders, and gladhands.	P-1

	12. Check brake chambers and air lines for secure mounting and damage.	P-1
	13. Check operation of air drier.	P-1
	14. Inspect and record brake shoe/pad condition, thickness, and contamination.	P-1
	15. Inspect and record condition of brake drums/rotors.	P-1
	16. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.	P-1
	17. Check operation and adjustment of brake automatic slack adjusters (ASA); check and record push rod stroke.	P-1
	18. Lubricate all brake component grease fittings.	P-1
	19. Check condition and operation of hand brake (trailer) control valve, if applicable.	P-2
	20. Perform antilock brake system (ABS) operational system self-test.	P-1
	21. Drain air tanks and check for contamination.	P-1
	22. Check condition of pressure relief (safety) valves.	P-1
<b>XXX</b>	<b>2. Hydraulic Brakes (PMI Tasks - NATEF)</b>	
	1. Check master cylinder fluid level and condition.	P-1
	2. Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.	P-1
	3. Check parking brake operation; inspect parking brake application and holding devices; adjust as needed.	P-1
	4. Check operation of hydraulic system: pedal travel, pedal effort, pedal feel.	P-1
	5. Inspect calipers for leakage, binding and damage.	P-1
	6. Inspect brake assist system (booster), hoses and control valves; check reservoir fluid level and condition.	P-1
	7. Inspect and record brake lining/pad condition, thickness, and contamination.	P-1
	8. Inspect and record condition of brake rotors.	P-1
	9. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.	P-1

## **Guidelines for Success** (See Program Syllabus for additional information.)

### **Assessment Plan**

Assessment is an integral part of the educational process at Washburn Tech and accurate feedback is an important tool in continuously improving the institution's technical programs. Students can expect to participate in assessment activities prior to entry into programs, within specific courses and following program completion for specific fields of study.

### **Grading Rationale**

Student progress is evaluated by means that include, but not limited to:

- Lab Work (40%)
- Professional Behavior (30%)
- Classroom Activities/Homework (10%)
- Quizzes & Tests (10%)
- Final Exams (10%)

### **Grading Scale**

90-100% A  
80-89% B  
70-79% C  
60-69% D  
59% or less F

### **Attendance**

Attendance is a key part of success in the program and in the workplace. Students are to arrive for class on time and be prepared to learn. Absences or tardiness will negatively impact grades. Missed time cannot be made up. Many assignments and labs cannot be "made-up" if missed. The options to make-up missed work or to accept late work is at the discretion of the instructor.

### **Disability**

The Americans with Disabilities Act (ADA) Office is responsible for assisting in arranging accommodations and for identifying resources at Washburn Institute of Technology for persons with disabilities. Qualified students with disabilities MUST self-identify by completing an application. In addition students must provide appropriate medical documentation to the ADA coordinator to be eligible for accommodations. New requests for accommodations should be submitted at least two months or more prior to the date the accommodations are needed. However, please contact the ADA office as soon as a need may arise. Depending on the accommodation request, four to eight weeks lead time may be needed for timely and effective provision of accommodations.

The ADA Office coordinates and assists in arranging accommodations it deems appropriate for eligible students on a case-by-case basis. If you are a student with a disability that may substantially limit your ability to participate in any of our classes and you believe that you will need accommodations, it is your responsibility to contact:

### **ADA Coordinator**

**Phone: 785-670-3365** Email: [gloria.christian@washburn.edu](mailto:gloria.christian@washburn.edu)

It is the policy of Washburn Institute of Technology to assure equal employment and educational opportunity to qualified individuals without regard to race, color, sex, age, ancestry, marital or parental status, disability, religion, national origin, or sexual orientation/gender identity. Contact Pam Foster, Morgan Hall, Room Washburn University (785-670-1509), and [pam.fosterel@washburn.edu](mailto:pam.fosterel@washburn.edu)