South Central College

AST 1613 Brakes

Course Outcome Summary

Course Information

Description This course will cover the principles of friction and braking systems, disc and drum brakes, parking brakes, and power assist units. Emphasis will be placed on system operation, diagnosis, repair, and maintenance of various types of braking systems. (Prerequisite: Admission into the Automotive Service program and AST1112 or instructor approval)

Total Credits 3

Total Hours 72

Types of Instruction

Instruction Type	Credits/Hours
Lecture	1.5/24
Lab	1.5/48

Pre/Corequisites

Admission into the Automotive Service program

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Exhibit professionalism

Learning Objectives

Identify brake related health hazards
Exhibit proper safety procedures

2. Identify brake system operation

Learning Objectives

Indentify and interpret brake system concern; determine necessary action
Remove, clean, and inspect wheel bearings, repack,replace seals, install hub and adjust bearings
Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS)

Diagnose wheel bearing noises ,wheel shimmy and vibration concerns; determine necessary action
Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action
Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action
Install wheel, torque lug nuts, and make final checks and adjustments

3. Diagnose hydraulic system operation using Pascal's Law

Learning Objectives

Inspect, test, and/or replace and adjust height of load sensing proportioning valve
Inspect and test or replace metering, proportioning, pressure differential, and combination valves
Install wheel, torque lug nuts, and make final checks and adjustments

4. Identify drum brake components and their functions

Learning Objectives

Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates
Remove, inspect, clean and measure brake drum; determine necessary action
Machine a brake drum; measure final drum diameter
Remove, inspect, rebuild or install new wheel cylinder
Reinstall and lubricate or replace brake shoes, hardware, and adjusters
Pre-adjust brake shoes and parking brake; before installing brake drums or drum/hub assemblies and wheel bearings
Diagnose drum brake noise and performance problems
Install wheel, torque lug nuts, and make final checks and adjustments

5. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action

Learning Objectives

Replace a brake bleeder screw
Fabricate brake lines using proper material and flaring procedures (double flare and ISO); replace hoses, fittings, and supports
Install wheel, torque lug nuts, and make final checks and adjustments

6. Identify disc brake components and their functions

Learning Objectives

Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action
Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action
Remove, inspect disc brake pads, retaining hardware and pad wear indicator system operation; determine necessary action
Remove, clean, inspect mounting surface; measure rotor thickness, lateral runout, and thickness variation; determine necessary action
Refinish a disc brake rotor off vehicle; measure final rotor thickness and install
Disassemble and clean caliper, inspect parts for wear, rust, scoring, damage, replace seals and worn parts
Reassemble, lubricate, and install caliper, pads, and related hardware; seat pads, inspect for leaks
Retract caliper piston and re-adjust with integrated parking brake system
Diagnose disc brake noise and performance problems
Install wheel, torque lug nuts, and make final checks and adjustments

7. Check a master cylinder for internal / external leaks and proper operation

Learning Objectives

Remove, bench bleed, and replace a master cylinder
Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification
Fill master cylinder with recommended fluid, burnish disc pads, and check system for leaks
Install wheel, torque lug nuts, and make final checks and adjustments

8. Bleed brake system with pressure, vacuum, or surge

Learning Objectives

Explain diagonally split brake system operation

Manually bleed or flush a brake system, test brake fluid for contamination
Install wheel, torque lug nuts, and make final checks and adjustments

9. Explain vacuum and hydraulic assist unit operation

Learning Objectives

Measure and adjust brake pedal height, travel, free play (as applicable), and master cylinder pushrod length; determine necessary action
Test brake pedal free travel with and without engine running to verify proper power booster operation.
Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster
Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action
Diagnose power brake vacuum assist operation
Inspect and test hydraulically assisted power brake system for leaks and proper operation
Install wheel, torque lug nuts, and make final checks and adjustments

10. Check parking brake operation and adjust as needed

Learning Objectives

Check parking brake system and components for wear, binding, and corrosion; clean, lubricate, adjust, and/or replace as needed
Describe automatic parking brake release system operation

11. Identify, inspect, and test or replace components of park brake and brake light warning system

Learning Objectives

Check operation of stop light system; determine necessary action
Identify components that turn on the red brake warning light
Diagnose red brake warning light system

SCC Accessibility Statement

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Additional information and forms can be found at: www.southcentral.edu/disability

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