

AUT 151 (A5)
BRAKE SYSTEMS

COURSE DESCRIPTION:

Prerequisites: None

Corequisites: None

This course covers principles of operation and types, diagnosis, service and repair of brake systems. Topics include drum and disc brakes involving hydraulic, vacuum boost, hydroboost, electrically powered boost, and anti-lock, parking brake systems and emerging brake systems technologies. Upon completion, students should be able to diagnose, service, and repair various automotive braking systems. Course Hours: 60
Lecture Hours 2; Lab Hours 3; Semester Hours Credit 3.

Safety Disclaimer

Automotive work presents many hazards. A moment's carelessness can cause injury to oneself or to others. Such mishaps can occur quickly due, in part, to the nature of the industrial tools used in automotive work. The weight of automobiles and the equipment used to fix them can even cause fatal injuries. Therefore, great care must always be taken in checking out equipment before use, and in using that equipment to work on automobiles.

As we work to insure the safety of everyone in the DTCC automotive lab, it is the instructor's responsibility to introduce students to equipment and to advise them on its safe operation. Those health and safety procedures are also presented in each textbook for each course in the automotive program. **Students are responsible for mastery of that safety information.**

- h. Inspect, test and replace brake warning light system(s) and wiring.
- i. Select, handle, and adjust brake fluid level.
- j. Use a micrometer to measure rotor and drums for minimum/maximum specifications.
- k. Machine rotor and drum
- l. Install brake pad/shoes and brake hardware.
- m. Reinstall wheel, torque lug nuts, and make final checks and adjustments.
- n. Check vacuum supply/power booster operation service as needed.
- o. Inspect, test, and service hydroboost system and accumulator.
- p. Diagnose, adjust, and replace wheel bearings and grease seal.
- q. Test, adjust, service or replace parking brake system components.
- r. Check operation of antilock brakes systems (ABS).
- s. Diagnose antilock brake system electronic controls and components using diagnostic trouble codes.
- t. Adjust and repair antilock brakes systems (ABS) to manufacturer recommendations.

OUTLINE OF INSTRUCTION:

- I. Basic Fundamentals
 - A Hydraulic System
 - 1) Pressure requirements
 - 2) Dual and diagonally split systems
 - B Master and Wheel Cylinders
 - C Drum Brakes
 - D Disc Brakes (Single Piston Floating and Sliding Caliper Design)
 - 1) Advantages
 - 2) Adjustment
 - 3) Special tools
 - 4) Four wheel disc system
 - 5) Multiple piston calipers
 - E Power Brakes
 - F Brake Service Philosophy
 - 1) Should Drums and Rotors on the Same Axle Be Turned the Same Size?
 - 2) How Should Lining Be Broken In?
 - 3) What Constitutes a Complete Brake Job?
 - 4) What Lining Material is Best?
 - 5) How Should Backing Plates and Brake Parts Be Cleaned?
 - G Basic Troubleshooting
- II. Hydraulic Control Devices
 - A Master Cylinder (Tandem)
 - 1) Operation
 - 2) Construction (position of parts)
 - 3) Nomenclature of parts
 - 4) Reconditioning procedures (include cleaning and inspection)
 - 5) Push rod adjustment (effects)
 - 6) Bench bleeding and installation
 - 7) Failure diagnosis
 - 8) Leakage (internal and external)
 - B Step Bore Master Cylinder
 - C Quick Takeup Master Cylinder
 - D Proportioning Valve
 - 1) Purpose
 - 2) Symptoms if defective

- 3) Height sensing type
- 4) Dual proportioning valves
- 5) Electronically controlled
- 6) Servicing
- E Metering Valve
 - 1) Purpose
 - 2) Must be open when pressure tank bleeding
 - 3) Symptoms if defective
 - 4) Hold open tools
- F Pressure Differential Switch
 - 1) Operation
 - 2) Centering
 - 3) Testing the dash lamp
 - 4) Testing the warning light switch
- G Residual Valve
 - 1) Purpose
 - 2) Drum brakes only
- H Combination Valve
 - 1) Inspect and test
 - 2) By-pass
 - 3) Two-function type
 - 4) Threefunction type
 - 5) Servicing
- I Wheel Cylinders
 - 1) Nomenclature
 - 2) Inspection
 - 3) Reconditioning
 - 4) Purpose of expanders
- J Brake Fluids
 - 1) Boiling points
 - 2) Water contamination
 - 3) Silicone type
 - 4) Changing fluid
 - 5) Handling and storage
- K Hydraulic Tubing, Fittings, and Hoses (Copper Gaskets and Flare Nut Wrenches and Tools)
 - 1) Double flare
 - 2) ISO flare
- L Anti-Lock Components
 - 1) Accumulator
 - 2) Dump valve
 - 3) Isolation valve
 - 4) Controller
 - 5) Speed sensor/tone wheel
 - 6) Power supply
 - 7) Circuit protection
 - 8) Reset switch
 - 9) Warning lights
- M Pressure Test System by Applying Force to Pedal
 - 1) Hold for 15 seconds
 - 2) Inspect for leaks

III. System Service

A Bendix Type Brake

- 1) Common
- 2) Servoaction
- 3)

4)

5)

VI. Anti-Lock Braking Systems

- A Theory of Operation/Nomenclature of Parts
- B Precautions
- C Operational Checks/Scan Tool Data
- D Testing (Including Pulling Trouble Codes)
- E Clearing Codes
- F Using DVOM for Checks

VII. New Brake Systems Technologies

REQUIRED TEXTBOOKS AND MATERIALS:

To be announced by instructor

NATEF:

This course fulfills 80 of the 105 hours required by NATEF for A5. See COE 111.