



AST 120 Automotive Brake Systems

Course Information

Division	ASET
Contact Hours	90
Theory	30
Lab Hours	60
Total Credits	4

Corequisites – AST 101

Course Description

This course focuses on the design and operation of automotive brake systems. Topics include diagnosis and repair, to manufacturer specifications, of traditional and Anti-Lock Brake Systems (ABS) as well as Traction Control Systems (TCS). Lab demonstrations and on-car repair provide a working knowledge of hydraulic systems, disc/drum machining, rebuilding, and power assist, as well as scan tool usage to repair ABS/TCS systems

This course is a required core course for students pursuing a (n) Certificate or *AAS in Automotive Technologies*

Program Outcomes Addressed by this Course:

Upon successful completion of this course, students should be able to meet the program outcomes listed below:

- A. Demonstrate the correct method of utilizing automotive service tools and equipment
- B. Identify all related system diagnostic/repair information within automotive service information
- C. Employ safe and professional work habits while conducting typical automotive service procedures.
- D. Explain how the various systems of an automobile work
- E. Demonstrate correct service procedures in the various automotive systems
- F. Test and diagnose the proper operation of the various automotive systems

Course Outcomes

In order to evidence success in this course, the students will be able to:

1. Understand and demonstrate general brake system operation, and diagnosis

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Identify and interpret brake system concerns; determine necessary action.
- b) Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
- c) Describe procedure for performing a road test to check brake system operation; including an anti-lock brake system (ABS).
- d) Install wheel and torque lug nuts.

2. Understand and demonstrate brake hydraulic system operation, diagnosis, and repair

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).
- b) Measure brake pedal height, travel, and free play (as applicable); determine necessary action.



AST 120 Automotive Brake Systems

- c) Check master cylinder for internal/external leaks and proper operation; determine necessary action.
- d) Remove, bench bleed, and reinstall master cylinder.
- e) Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.
- f) Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, and wear; check for loose fittings and supports; determine necessary action.
- g) Replace brake lines, hoses, fittings, and supports.
- h) Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).
- i) Select, handle, store, and fill brake fluids to proper level.
- j) Inspect, test, and/or replace components of brake warning light system.
- k) Identify components of brake warning light system.
- l) Bleed and/or flush brake system.
- m) Test brake fluid for contamination.

3. Understand and Demonstrate drum brake operation, diagnosis, and repair

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.
- b) Remove, clean, inspect, and measure brake drum diameter; determine necessary action.
- c) Refinish brake drum and measure final drum diameter; compare with specifications.
- d) Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
- e) Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.
- f) Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.

4. Understand and demonstrate disc brake operation, diagnosis and repair

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine necessary action.
- b) Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.
- c) Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.
- d) Remove, inspect, and replace pads and retaining hardware; determine necessary action.
- e) Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.
- f) Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
- g) Remove and reinstall rotor.
- h) Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.



AST 120 Automotive Brake Systems

- i) Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.
- j) Retract and re-adjust caliper piston on an integrated parking brake system.
- k) Check brake pad wear indicator; determine necessary action.
- l) Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.

5. Understand and demonstrate power-assist unit operation, diagnosis and repair

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Check brake pedal travel with, and without, engine running to verify proper power booster operation.
- b) Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
- c) Inspect vacuum-type power booster unit for leaks; inspect the check-valve for proper operation; determine necessary action.
- d) Inspect and test hydraulically-assisted power brake system for leaks and proper operation; determine necessary action.
- e) Measure and adjust master cylinder pushrod length.

6. Understand and demonstrate miscellaneous brake component (Wheel Bearings, Parking Brakes, Electrical, Etc.) operation, diagnosis and repair

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.
- b) Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
- c) Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.
- d) Check parking brake operation and parking brake indicator light system operation; determine necessary action.
- e) Check operation of brake stop light system.
- f) Replace wheel bearing and race.
- g) Remove and reinstall sealed wheel bearing assembly.
- h) Inspect and replace wheel studs.

7. Understand and demonstrate electronic brake, traction and stability control systems diagnosis and repair

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Identify and inspect electronic brake control system components; determine necessary action.
- b) Identify traction control/vehicle stability control system components.
- c) Describe the operation of a regenerative braking system.
- d) Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system; determine necessary action.
- e) Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.
- f) Depressurize high-pressure components of an electronic brake control system.



MONROE COUNTY
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Course Outcome Summary

Required Program Core Course

AST 120 Automotive Brake Systems

- g) Bleed the electronic brake control system hydraulic circuits.
- h) Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data).
- i) Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).

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