

**BILLINGS PUBLIC SCHOOLS
BRAKE SYSTEMS
Adoption Date April 12, 2004**

MISSION STATEMENT

The Career Center is dedicated to providing Billings area students with an education that explores and enhances vocational and academic skills to promote critical thinking, self-discipline, and responsible citizenship.

BELIEF STATEMENTS

1. We believe in an environment that fosters mutual respect and dignity.
2. We believe that students and faculty should maintain pride in their work to improve their performance.
3. We believe that academic skills lay the foundation for critical thinking, problem solving, mathematical and communication skills.
4. We believe in the integration of academic and career areas.
5. We believe in the importance of current technology, and its impact on the future.
6. We believe that students who are encouraged to set goals will gain confidence in their potential and ability to contribute to society.
7. We believe mutual support between school and community is an integral part of a students learning experience.

PHILOSOPHY

The automotive technician is a person who works in an exciting, rapidly changing and growing industry. The automotive technology curriculum is designed to educate individuals to become competent auto technicians. The primary focus of the educating program is the diagnosis, service and repair of automobile systems and components. Students will perform service on modern automotive equipment using special test equipment and tools. Students in the program will learn how to plan and perform repairs according to the various manufacturers recommended procedures. Career and Vocational/Technical Education programs focus on career preparation, resource management, communication, technical skill development, applied academics, technological literacy; and personal skills and leadership.

LEARNING DOMAINS

- I. The student will demonstrate an understanding of automotive literacy.**
- II. The student will demonstrate an understanding of automotive work place skills.**
- III. The student will apply basic skills in communications appropriate to automotive content and learning activities.**
- IV. The student will apply basic skills in science appropriate to automotive content and learning activities.**
- V. The student will apply automotive technological applications and workplace skills in the automotive career strands of learning.**

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Learners Objectives

- I. The student will demonstrate an understanding of automotive literacy.**
 - 1. Student will demonstrate an understanding of safety procedures utilized in the automotive shop. (E)**
 - a. List the types of accidents that can happen in the auto shop.**
 - b. Explain how to prevent accidents in the auto shop.**
 - c. Describe general safety rules for working in the auto shop.**
 - d. Describe all pertinent safety rules for the brakes lab area.**
 - 2. Student will demonstrate an understanding of the automotive terminology as it pertains to brake systems. (E)**
 - a. Locate and describe the parts of a disc brake system.**
 - b. Locate and describe the parts of a drum brake system.**
 - c. Locate and describe the parts of a cast iron mater cylinder.**
 - d. Locate and describe the parts of an aluminum master cylinder.**
 - e. Locate and describe the parts of a power booster brake system.**
 - f. Locate and describe the parts of an anti-lock brake system.**
- II. The student will demonstrate an understanding of automotive work place skills. (E)**
 - 3. Student will demonstrate an understanding of automotive work place skills.**
 - a. Demonstrate attendance requirements consistent with the work world.**
 - b. Demonstrate punctuality related to assignments, attendance, and lab projects.**
 - c. Follow and understand directions in all lab requirements.**
 - d. Work independently with minimum supervision.**
- III. The student will apply basic skills in communications appropriate to automotive content and learning activities. (E)**
 - 4. The student will apply basic skills in communications appropriate to automotive content and learning activities.**
 - a. Research shop manual and technical manual to reference the design and layouts of parts and equipment needed for various vehicles.**
 - b. Read text and technical resources and discuss applications to specific auto makes and models.**
 - c. Write and complete shop lab projects or work orders.**
- IV. The student will apply basic skills in science appropriate to automotive content and learning activities. (E)**
 - 5. Student will be able to demonstrate the operational theory for a brake system.**
 - a. Describe the operational theory of a manual brake system.**
 - b. Describe the operational theory for a power boost brake system.**
 - c. Describe the operational theory of the hydraulic assist brake system.**
 - d. Describe the operational theory for an anti-lock brake system.**

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IV. The student will apply basic skills in science appropriate to automotive content and learning activities. (E) (cont.)

6. Student will identify various brake lines and hydraulic brake line bending and double flaring. (E)

- a. Demonstrate the procedure to bend a 45 degree and a 90 degree steel brake line.**
- b. Demonstrate the procedure to double flare an American steel brake line.**
- c. Demonstrate the procedure to double flare a metric steel brake line.**

V. The student will apply automotive technological applications and workplace skills in the automotive career strands of learning.

7. Student will be able to demonstrate the use of measuring devices to measure brake components to determine if they can be reused or need to be replaced. (E)

- a. Demonstrate the measuring of wheel cylinders and components.**
- b. Demonstrate the measuring of cast iron master cylinders and components.**
- c. Demonstrate the measuring of aluminum master cylinders and components.**
- d. Demonstrate the measuring of disc brake calipers.**
- e. Demonstrate the measuring of disc brake rotors.**
- f. Demonstrate the measuring of brake drums.**

8. Student will demonstrate the complete rebuilding and bleeding of brake system components for drum, disc parking and anti-lock brake systems by: (E)

- a. Demonstrate the rebuilding of wheel cylinders.**
- b. Demonstrate the rebuilding of disc brake calipers.**
- c. Demonstrate the rebuilding of cast iron master cylinders.**
- d. Demonstrate the rebuilding of aluminum master cylinders.**
- e. Demonstrate the bleeding of hydraulic brake components.**
- f. Inspect the parking brake systems to insure that they are operating properly.**

9. Student will demonstrate the adjusting, machining and reconditioning of brake system components for drum, disc and anti-lock brake systems by: (E)

- a. Demonstrate the adjustments performed to remove any slack in brake shoes for drum brake systems.**
- b. Machine brake drums to a smooth surface for superior stopping.**
- c. Machine brake rotors to a smooth surface for superior stopping.**
- d. Recondition drum brake systems to factory specifications to insure superior stopping.**
- e. Recondition disc brake systems to factory specifications to insure superior stopping.**
- f. Recondition the parking brake system to factory specifications to insure superior stopping.**

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- V. The student will apply automotive technological applications and workplace skills in the automotive career strands of learning. (cont.)**
- 10. Student will demonstrate final inspections, correct reassembly, and adjustments before the vehicle is determined safe to operate on city streets and roads. (E)**
- a. Perform final inspections to all drum brake systems to determine if the brakes have been properly reconditioned.**
 - b. Perform final inspections to disc brake systems to determine if the brakes have been properly reconditioned.**
 - c. Perform final adjustment to parking brake systems to determine if the brakes have been properly reconditioned.**