

**BILLINGS PUBLIC SCHOOLS**  
**ELECTRICAL**  
**Adopted – 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 foundations 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 so students understand automobile systems and learn how to plan and perform repairs according to the various manufacturers recommended procedures.

These 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 appropriate work place skills.**
- III. The student will apply basic skills in the understanding of electrical theory in classroom content and learning activities applied in lab setting.**
- IV. The student will apply basic skills in the starter overhaul and starter system diagnosis in the classroom content and learning activities applied in lab setting.**
- V. The student will apply basic skills in the alternator overhaul and charging system diagnosis in the classroom content and learning activities applied in lab setting.**
- VI. The student will apply basic skills in classroom instruction in tune-up content and student activities in lab setting.**
- VII. The student will apply basic skills in electrical accessories, advanced circuits and electronic instrumentation.**

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**Learner Objectives**

**I. The student will demonstrate an understanding of automotive literacy.**

**1. Student will demonstrate the use of technical manuals in class and lab settings.**

**(E)**

- a. **Disassemble and reassemble of automotive components.**
- b. **Use manufacturer procedures for inspection and diagnosing electrical components according to OEM (Original Equipment Manufacturing.)**
- c. **Identify all necessary defective components.**
- d. **Interpret technical data, wiring diagrams, and component figures while performing diagnostic checks.**
- e. **Comply with OSHA, State and Federal standards for safety.**
- f. **Identify recent advances in automotive training.**
- g. **Demonstrate proficiency in computerized service manuals.**

**II. The student will demonstrate an understanding of appropriate work skills.**

**2. Student will demonstrate an understanding of automotive safety. (E)**

- a. **Complete required OSHA certified safety tests.**
- b. **View safety videos and completing test procedures.**
- c. **Work in a clean lab setting.**
- d. **Apply understanding of hazardous material disposal.**

**3. Student will demonstrate procedures of work place skills while working with tools, equipment and materials. (E)**

- a. **Follow all safety rules and procedures.**
- b. **Maintain a safe and clean environment.**
- c. **Conduct shop activities and equipment operation in a safe manner.**

**4. Student will explore various aspects of work place readiness. (E)**

- a. **Understand that skills developed in academic and occupational programs relate to career goals.**
- b. **Understand the importance of reading, writing, speaking and the knowledge of mathematical skills in the work place.**

**5. Student will develop an understanding of post secondary options. (E)**

- a. **Research all opportunities that the automotive industry has to offer a prospective employee.**
- b. **Research all opportunities at post secondary educational opportunities.**
- c. **Explore career opportunities.**
- d. **Explore articulation agreements of high school to tech school to college.**

**III. The student will apply basic skills in the understanding of electrical theory in the content and learning activities.**

**6. Student will be able to explain the theories of electricity. (E)**

- a. **Explain the theories and laws of electricity.**

**7. Student will be able to describe the difference between insulators, conductors and semiconductors. (E)**

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- III. The student will apply basic skills in the understanding of electrical theory in the content and learning activities. (cont)**
- 8. Student will be able to define voltage, amperage and resistance and understand the relationship between them. (E)**
  - 9. Student will be able to define ohm's law correctly. (E)**
  - 10. Student will be able to explain the difference between a/c and d/c currents. (E)**
  - 11. Student will be able to define and interpret series, parallel, and complex circuits and the electrical laws that govern them. (E)**
- IV. The student will apply basic skills in the starter overhaul and starter diagnosis.**
- 12. Student will be able to remove and replace starting system components. (E)**
  - 13. Student will be able to perform tests on the starter with a DVOM. (E)**
    - a. Perform and accurately interpret the results of internal starter component tests.**
    - b. Perform diagnostic tests to determine the starters current draw and voltage drop.**
  - 14. Student will be able to identify and replace faulty components and test the starter after reassembly. (E)**
  - 15. Student will be able to properly inspect, diagnose, and replace battery system components. (E)**
    - a. Explain the purpose and theory of a battery.**
    - b. Describe the construction of conventional and maintenance-free, hybrid and dry cell batteries.**
    - c. Explain the different ratings utilized by manufacturers.**
    - c. Identify the major reasons of battery failure.**
    - d. Test batteries for proper operation.**
    - e. Remove and replacing battery system components.**
- V. The student will apply basic skills in the alternators overhaul and charging.**
- 16. Student will be able to perform charging system tests, disassemble, test individual components, and reassemble an alternator. (E)**
    - a. Diagnose charging system malfunctions and make the proper repairs.**
    - b. Remove and replace an alternator from the vehicle.**
    - c. Disassemble, inspect, and test alternator components.**
    - d. Reassemble and test alternators.**
  - 17. Student will be able to inspect and adjust or replace belts. (E)**
    - a. Inspect, adjust and replace alternator belts and pulleys.**

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**VI. The student will apply the following basic skills in the tune up; in content and learning activities:**

- 19. Student will be able to define engine tune up. (E)**
- 20. Student will explain the close relationship of engine tune-up, performance, and emissions controls. (E)**
- 21. Student will be proficient with current industry equipment needed to perform basic engine tune-ups and minor engine repairs. (E)**
- 22. Student will perform preliminary checks and determine component failures that need replacing during the tune-up. (E)**
- 23. Students will understand the order of diagnostic procedures.**
- 24. Student will recognize the value of compression, vacuum, and cylinder balance tests. (E)**

**VII. The student will apply basic skills in electrical accessories, advanced circuits and electronic instrumentation.**

- 25. Student will gain an understanding of wiring diagrams and circuits. (E)**
- 26. Student will understand the operation of basic sending units and sensors. (E)**
- 27. Student will trouble shoot, and repair various electrical accessories. (E)**
- 28. Student will develop communication skills in electrical terminology by completing lab worksheets and answer verbal questions upon completion. (E)**
- 29. Students will gain a basic understanding of SRS (Safety Restraint Systems) along with safety procedures while working with airbags.**