BILLINGS PUBLIC SCHOOLS
POWERTRAINS
Adoption Dates April 12, 2004

MISSION STATEMENT

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

BELIEF STATEMENT

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 learner will demonstrate an understanding of automotive literacy.
II. The learner will demonstrate an understanding of appropriate work place skills.
III. The learner will apply basic skills in standard transmissions in the content and learning activities.
IV. The learner will apply basic skills in clutch removal and installation in the content and activities.
V. The learner will apply basic skills in differentials in the content and activities.
VI. The learner will apply basic skills in manual transaxles in the content and activities.

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Learners Objectives

I. The learner will demonstrate an understanding of automotive literacy.

1. **Student will demonstrate the use of technical manuals in class and lab settings. (E)**
    a. **Disassembly and assembly.**
    b. **Guide for inspection.**
    c. **Indentify all necessary defective components.**
    d. **Complying with OSHA, and State and Federal standards.**
    e. **Identify recent advances in automotive training.**
    f. **Use of computer training.**

II. The learner will demonstrate an understanding of appropriate work skills.

2. **Student will demonstrate an understanding of automotive safety. (E)**
    a. **Complete required safety tests.**
    b. **View of video and test book.**
    c. **Work in a clean and well maintained environment.**
3. **Student will demonstrate procedures of work place skills while working with tools, apparatuses, 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, and speaking and the knowledge of mathematical skills in the work place.**
    c. **Listen to verbal instruction and apply written directions.**
5. **Student will develop an understanding of the options available after high school. (E)**
    a. **Look at all the fields the auto industry covers.**
    b. **Look at post secondary education opportunities.**
    c. **Explore career opportunities.**
    d. **Explore articulations of agreements of high school to tech school to college.**

III. The learner will apply basic skills in standard transmission in the content and learning activities.

6. **Student will be able to disassemble, check parts for damage. (E)**
    a. **Disassemble and clean transmission.**
    b. **Inspect transmission gasket, seals, and inspecting sealing surfaces.**
    c. **Inspect shift cover, forks, grommets, levers, shafts, sleeves, detents mechanisms interlock and springs.**
    d. **Inspect input shafts and bearings.**
    e. **Inspect transmission main shafts, gears, thrust washers, bearings, retainers.**

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III. The learner will apply basic skills in standard transmission in the content and learning activities. (cont)

6. **Student will be able to disassemble, check parts for damage. (E)**
    f. **Inspect synchronizer hub, sleeve, inserts, springs and blocking rings.**

7. **Student will be able to figure gear ratio and power flow through a standard transmission by knowing the following: (E)**
    a. **Type a manual transmission**
    b. **Synchronizers**
    c. **Transmission design**
    d. **Basic operation of manual transmission**
8. **Student will be able to reassemble the standard transmission in a working order. (E)**
    a. **Replace transmission shift cover, forks, grommets, levers, shafts, sleeves detent mechanisms, interlock and springs.**
    b. **Replace gaskets, seals and sealing surfaces.**
    c. **Replace input shaft and bearings.**
    d. **Replace transmission main shift, gears thrust washers, bearings and retainers.**
    e. **Replace synchronizer hub, sleeve, inserts, springs, and blocking inserts.**
    f. **Reassemble transmission.**
9. Student will be able to do a worksheet and have instructor check when completed. (R)

IV. The learner will apply basic skills in clutch removal and installation in the content and learning activities.

10. **Student will be able to remove clutch, pressure plate and release bearing. (E)**
    a. **Use guide lines for servicing clutch systems.**
    b. **Remove the clutch assembly**
    c. **Service the clutch release bearing.**
11. **Student will be able to check all parts, measure flywheel and pressure plate. (E)**
    a. **Inspect the pressure plate.**
    b. **Use proper measuring techniques for diagnosing the flywheel.**
    c. **Properly diagnose clutch problems to determine if service is necessary.**
12. **Student will be able to install clutch disc and pressure plate using alignment Tools. (E)**
    a. **Use guide lines for servicing clutch systems.**
    b. **Remove and reinstall mechanical clutch controls.**
    c. **Proper inspection of input shaft, pilot bearing and bushing.**
13. Student will be able to do a worksheet and have the instructor check when completed. (R)

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V. The learner will apply basic skills in differentials in the content and learning activities.

14. Student will be able to disassemble, clean and check for worn parts. (E)
- **a. Identify the major components of the differential and explaining their purpose.**
- **b. Inspect, measure, adjust and replace differential pinion gears and shaft, side gears, thrust washers and case.**
- **c. Inspect drive pinion gear collapsible spacers, sleeves and bearings.**

15. Student will be able to check backlash and tooth patterns. (E)
- **a. Perform ring-and-pinion tooth contact pattern, checking and determine needed adjustments.**
- **b. Measure and adjust ring-and-pinion backlash; with treaded cap or shim type.**

16. Student will be able to check pinion depth then install. (E)
- **a. Measure and adjust drive, pinion depth.**
- **b. Measure and adjust drive pinion bearing pre-load.**
- **c. Measure pinion shaft endplay, pre-load and perform shim space selection procedure.**

17. Student will be able to assemble differential case and ring gear. (E)
- **a. Measure differential case run out sand determining repairs needed.**
- **b. Inspect and repair ring gear.**
- **c. Diagnose differential and rear axle noise, vibration, and fluid leakage problems and determine needed repairs.**

18. Student will develop an understanding of differentials. (E)
- **a. Describe the purpose of a differential.**
- **b. Identify the major components of a differential and explain their purpose.**
- **c. Describe the various gears in a differential assembly and stating their purpose.**
- **d. Describe the various methods used to mount and support the drive pinion shaft and gear.**
- **e. Describe the construction and operation of a rear axle assembly.**

19. Student will be able to do a worksheet and have the instructor check when completed. (R)

VI. The learner will apply basic skills in manual transaxles in the content and learning activities.

20. Student will be able to discuss transaxles. (E)
- **a. Compare and contrast the design and operation of a transaxle and a transmission.**

21. Student will be able to disassemble.

22. Student will be able to figure power flow.

23. Student will be able to troubleshoot and diagnosis by: (E)
- **a. Diagnosing transaxle noise, hard shifting, jumping out of gear and fluid leakage problems determining needed repairs.**

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VI. The learner will apply basic skills in manual transaxles in the content and learning activities. (cont)

24. Student will be able to reassemble and do all adjustments. (E)

25. Student will be able to do a worksheet and have the instructor check when completed. (R)
26. Student will apply basic work skills on industry standards. (R)
    a. Skilled – Can work independently.
    b. Moderately skilled – Has performed independently during training program.
    c. Limited Practice – Has practiced during training program.
    d. Exposure only – General information provided with no practice time.