Butler County Community College
Business, Technology, and Workforce Development

Mike Fatkin
Fall 2004

COURSE OUTLINE
Automotive Brakes II

Course Description:
AT106. Automotive Brakes II. 3 credit hours. Prerequisite: AT 103 with a C or better. This course will enable the student to diagnose and repair brake system complaints related to anti-lock and/or brake boost problems/malfunction. Initially the student will explore power brakes operation, diagnosis and service procedures and conclude with the study of antilock braking systems components, operation and diagnostics. The student will compare Kelsey Hayes, Bosch, Teves and Delco systems.

Course Relevance:
The principles and techniques acquired in this course are common to the automotive industry and are the foundation for all braking systems. Comprehension of these principles allows the student to effectively diagnose and repair common automotive braking systems.

Required Materials:
Halderman, J. D. (1995). Automotive Brake Systems. New York: Prentice Hall.

Learning Outcomes:
1. Diagnose and repair antilock and boost related complaints.
2. Discern between problems caused by simple mechanical component failure/malfunction and those caused by electronic or boost related malfunction.

Learning PACT
Through the student involvement in this course, the student will develop and document his/her achievement of the following PACT skills:
Primary skills (developed and documented):
1. Problem Solving
   - Through the application of the principles and techniques acquired in this course will allow the student to diagnose and repair starting and charging complaints. Knowledge of electrical laws and principles allow the student to discern between component and circuit problems.
2. Critical Thinking Skills
   - Through the diagnosis of Electrical Circuit and Component problems requires the student to employ “outside—in “thinking process. A logical, sequential approach must be utilized in order to repair the “cause” and not the symptom.

3. Speaking
    - Through working in a team environment, the student will enhance his/her interpersonal communication skills and recognize the need for clear, concise communication between the customer and the technician to effectively analyze and repair the complaint.
4. Field related Technology
    - Through the completion of assigned tasks, the student will develop the ability to select and utilize those tools and instruments that are appropriate for the assigned tasks. The ability to research repair procedures and service bulletins related to the complaint are further enhanced.

Secondary skills (developed but not documented):

Listening
Reading
Time Management
Ethical work practices

Assessment Tasks:

These learning outcomes and primary Learning PACT skills will be demonstrated by:

1. In a field related environment, locate and Identify components peculiar to the Anti-lock braking system.
2. In a field related environment, research service bulletins and repair procedures required for the assigned task
3. Follow all manufacturers' recommendations for de-pressuring and bleeding antilock brake systems
4. Diagnose and repair brake "boost "customer complaints
5. Service, test and adjust anti-lock brake electronic components according to manufacturer's specifications
6. Follow all recommended safety procedures required in the performance of anti-lock brake systems repair

Course Content:

I. Themes - Key recurring concepts that run throughout this course:
    A. Ethical work practices
    B. Cost Effectiveness
    C. Time management
    D. Safe working practices
    E. Communication

II. Issues - Key issues that will be addressed in this course: areas of conflict that must be understood in order to achieve the intended outcome:
    A. Safety when working with high pressure fluids
    B. Communication in the diagnostic loop
    C. Technology as a research tool
    D. Responsibility
    E. Design variations

III. Concepts – Key concepts that must be understood to address the issues:
   A. Hydraulic Principles
   B. Mechanical Principles
   C. Electronic Principle
      a. Ohms Law
      b. Theory of Induction
      c. Concepts of current, voltage and resistance
   D. Friction and heat transfer
   E. Basic machining practices

IV. Skills / Competencies - Actions that are essential to achieve the course outcomes:
   A. Test pedal travel with and without engine running; check power assist operation
   B. Check vacuum supply to vacuum type power booster
   C. Inspect the vacuum type booster unit for vacuum leaks; inspect the check valve for proper operation; service as needed
   D. Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise problems caused by the antilock brake system; determine needed repairs
   E. Inspect, test and service anti-lock brake system hydraulic, electrical and mechanical components
   F. Observe antilock brake system light(s) at start-up; determine if further diagnosis is needed
   G. Diagnose A.B.S. electronic controls and components using self diagnosis and/or test equipment; determine needed repairs
   H. De-pressure H.P. components of the A.B.S. following manufacturers recommended procedures
   I. Fill A.B.S. master cylinder with manufacturers recommended fluid; inspect for leaks
   J. Bleed the antilock front and rear hydraulic circuits following manufacturers recommended procedures
   K. Perform a fluid pressure diagnosis on the High Pressure A.B.S.; determine needed repairs
   L. Remove and install A.B.S. electronic/electrical/hydraulic components following manufacturer's procedures and specifications
   M. Service, test and adjust A.B.S. speed sensors following manufacturers recommended procedures
   N. Diagnose A.B.S. braking problems caused by vehicle modifications (tire size, vehicle ride height, final drive ratio etc.)

Learning Units:

I. A.B.S. component Identification and Location
II. A.B.S. Principles
III. Testing procedures
   a. Hydraulic
   b. mechanical

c. electronic

IV. Safety
V. Information research

Learning Activities:
Independent and collaborative learning activities will be assigned within the classroom and lab environment to assist the student in achieving the desired outcomes. Class discussion, lecture, reading assignments and supportive lab activities will also contribute to the learning experience.

Grade Determination:
Grade determination will be based on the student's performance of assigned tasks within the classroom/lab environment. Attendance, group participation, and attitude toward fellow students and assigned tasks will be reflected in the final grade. Lab tasks (competencies) will be evaluated (rated) according to the competency profile.