

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: Auto 325 Department: Auto Technology  
Course Title: Automatic Transmission/Transaxle Semester: Fall Year: 2009

Objectives/Competencies

<u>Course Objective</u>	<u>Competencies</u>
1. The student must become familiar with the with the features of early automatic transmissions and list the major changes developed as a result of today's environmental and energy concerns.	The student must be able to: A. Explain how the 1973 oil embargo affected the number of gear shift speeds in the automatic transmission. B. Describe what changes were made in the torque converter as a result of the 1973 oil embargo. C. Explain how smaller, more fuel-efficient engines affected transmission operation. D. Describe how low emission engines affected transmission operation.
2. The student should develop an understanding of the function and operation of the major components of an automatic transmission, focusing on components that contribute directly or indirectly to transmitting power flow from input to output.	The student must be able to: A. Define a torque converter as a fluid coupling. B. Describe how an input shaft transfers power from the torque converter to internal drive members. C. Explain how transmission oil pump pressure is used to operate hydraulic components. D. Provide a general description of valve body operation oil flow. E. Explain how pistons and servos operate bands and clutches.

<b>Course Objective</b>	<b>Competencies</b>
<p>3. The student should develop an understanding of torque converter power-flow operation including: converter, lock-up, vortex flow, coupling phase and stator, one-way clutch function demonstrating on a cutaway model torque converter.</p>	<p>F. Identify that planetary gear sets provide different gear ratios and reverse gear.</p> <p>G. Recognize that bands and clutches apply clamping pressure on different parts of the planetary gear set to operate them.</p> <p>H. Explain how the output shaft transfers engine torque from the gear set to the drive shaft.</p> <p>The student must be able to:</p> <p>A. Name the four major components located in the sealed torque converter.</p> <p>B. Recognize which component generates fluid flow.</p> <p>C. Explain purpose of stator and one-way clutch.</p> <p>D. Show direction of fluid flow from the impeller to turbine through stator and back to impeller.</p> <p>E. Demonstrate impeller to turbine clearance check.</p> <p>F. Demonstrate stator one-way clutch strength check.</p> <p>G. Determine drivability symptoms caused by failed torque converter components.</p> <p>H. Demonstrate correct torque converter installation procedures.</p>
<p>4. The student should develop an understanding of how planetary gear sets provide a full range of gear ratios for an automatic transmission by demonstrating power flow through all gear ranges.</p>	<p>The student must be able to:</p> <p>A. Demonstrate by holding or releasing components of a planetary gear set, reduced output speed (gear reduction).</p>

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**Course Objectives**

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**Competencies**

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5. The student should develop an understanding of automatic transmission clutches and bands used to drive and or hold planetary gear set members, and demonstrate a variety of power flow ratios using a band and application chart

- B. Demonstrate by holding or releasing components of a planetary gear set, increased output speed (overdrive).
- C. Demonstrate by holding or releasing components of a planetary gear set, reverse (reverse gear).
- D. Demonstrate by holding or releasing components of a planetary gear set, a solid unit (1-to-1 ratio).
- E. Demonstrate by holding or releasing components of a planetary gear set, free wheel (park or neutral).
- F. Recognize a Ravigneaux compound planetary gear set.
- G. Recognize a Simpson compound planetary gear set.

The student must be able to:

- A. Read and understand a band and clutch application chart.
- B. Apply band and application chart data to a specific transmission gear range.
- C. Identify components of a typical automatic transmission clutch.
- D. Describe how a clutch apply and release cycle is accomplished.
- E. Disassemble and reassemble a typical driving or holding clutch.
- F. Locate abnormalities within a clutch that would prevent proper operation.

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**Course Objectives**

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**Competencies**

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6. The student should become familiar with the purpose of an over-running clutch used in an automatic transmission. Identify type used and determine if it is functioning properly after disassembly of the transmission.

- G. Diagnose a failed clutch circuit using the band and application chart.
- H. Determine proper clutch clearance upon assembly.
- I. Explain band operation in a typical automatic transmission.
- J. Locate abnormalities of a band that would prevent proper operation.
- K. Explain how servos apply and release bands.
- L. Demonstrate proper band to drum clearance using the adjustment screw.
- M. Diagnose a failed band circuit using the band and application chart.
- N. Describe what affect an accumulator has (if used) on the apply side of a band or clutch circuit.

The student must be able to:

- A. Identify a sprag or roller-type, over-running clutch.
- B. Determine what function the over-running clutch performs in a given transmission.
- C. Diagnose a failed over-running clutch using a band and clutch application chart.
- D. Disassemble and reassemble both sprag and roller-type, over-running clutches.
- E. Install assembled clutch in correct direction to permit proper operation.
- F. Recognize failed or worn components within a clutch which cannot be reused.

<b>Course Objectives</b>	<b>Competencies</b>
7. The student should develop and understanding of the hydraulic system of an automatic transmission, placing emphasis on hydraulic principles while tracing fluid flow through a typical oil circuit.	<p>The student must be able to:</p> <ul style="list-style-type: none"><li>A. Identify the source of hydraulic pressure.</li><li>B. Identify and describe one of three types of positive displacement pumps used.</li><li>C. Describe the operation of a pressure regulator valve.</li><li>D. Explain the operation of the manual control valve.</li><li>E. Determine the operation of the throttle valve in relation to shift timing and shift feel.</li><li>F. Describe the function of the governor valve.</li><li>G. Explain how throttle and governor valves function together to control shift timing and shift feel.</li><li>H. Explain the principles of force multiplication using hydraulic pressures.</li><li>I. Recognize a variety of shift valves located in the valve body and identify each using a schematic diagram.</li><li>J. Determine the type of transmission fluid used in a given application.</li><li>K. The student must be aware of transmission fluid properties to determine proper level or fluid in a transmission.</li><li>L. The student must be aware of symptoms associated with over and under-filled conditions.</li></ul>

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**Course Objectives**

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**Competencies**

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10. The student should develop an understanding of correctly diagnosing the cause of specific automatic transmission problems by following the accepted systematic approach to problem diagnosis.

- G. Determine overall electronic transmission circuit operation with transmission in the vehicle, using the scan tool to perform self tests.
- H. Road test vehicle using the scan tool to monitor electronic circuit operation in all gear ranges.

The student must be able to:

- A. Check fluid level and condition.
- B. Adjust manual shift linkage to specifications.
- C. Adjust throttle linkage to specifications for in-vehicle and out-of-vehicle service.
- D. Check and adjust vacuum modulator system and vacuum lines to specifications.
- E. Check and adjust idle speed to specifications.
- F. Perform stall test, record and interpret results.
- G. Perform road test and interpret results.
- H. Change fluid and filter, drain torque converter and replace pan gasket.
- I. Remove valve body and perform air pressure checks.
- J. Clean, disassemble, inspect, determine the serviceability of, overhaul, assemble, install and adjust all transmission sub-assemblies and components.
- K. Follow all required safety procedures and general precautions required for the safe and successful removal, overhaul and installation of an automatic transmission.