South Central College

AST 1423 Manual Transmission/Transaxle and 4x4

Course Outcome Summary

Course Information

Description	This course covers the operation and the proper repair procedures for the types of manual transmissions/transaxles and transfer cases used in late model vehicles. Four wheel drive locking hubs, axle disconnects, AWD, full-time, and part-time four-wheel drive systems will also be covered. (Prerequisite: Admission into the Automotive Service program and AST1112 or instructor approval)
Total Credits	3
Total Hours	64

Types of Instruction

Instruction Type	Credits/Hours
Lecture	2/32
Lab	1/32

Pre/Corequisites

Admission into the Automotive Service program

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Exhibit Professionalism

Learning Objectives

Demonstrate shop safety practices
Perform Safety Procedures

2. Identify manual trans/transaxles

Learning Objectives

Identify manual trans/transaxle components
Diagnose noise concerns using transmission/transaxle powerflow principles
Calculate manual trans/transaxle gear ratio
Diagnose hard shifting and jumping out of gear, determine necessary action

Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers
Inspect, replace, and align powertrain mounts
Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action

3. Define manual trans/transaxle minor service

Learning Objectives
Diagnose manual trans / transaxle fluid condition, fluid level and leaks
Identify manual trans/transaxle fluid, drain and refill trans / transaxle and final drive unit

4. Remove and reinstall transmission / transaxle

Learning Objectives
Dissassemble manual transaxle, clean and inspect
Inspect manual transaxle gears / shafts
Inspect manual transaxle synchros / hubs / blocking rings / sleeves / inserts and springs
Inspect manual transaxle bearings
Inspect manual transaxle thrust washers
Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action
Install countershaft gear assembly
Inspect / reinstall reverse idler gear, shaft, bearings, thrust washers, and retainer; check end play
Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly, install final drive
Install mainshaft assembly
Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs
Inspect, test, and replace transmission/transaxle sensors and switches

5. Disassemble manual transmission, clean and inspect

Learning Objectives
Inspect manual transmission gears / shafts
Inspect manual transmission synchros / hubs / blocking rings / sleeves / inserts / springs
Inspect manual transmission bearings and thrust washers
Install transmission countershaft gear assembly
Measure end play or preload (shim or spacer selection procedure) on transmission / transaxle shafts; perform necessary action
Install transmission mainshaft assembly
Install clutch shaft assembly
Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs
Inspect lubrication devices (oil pump or slingers)
Inspect / repair or replace extension housing / case mating surfaces / bores / bushings and vents
Inspect / replace trans / transaxle gaskets / seals and sealants / inspect sealing surfaces
Inspect, test, and replace transmission / transaxle sensors and switches

6. Define four wheel drive driveline components

Learning Objectives
Analyze planetary gear transfer case power flow
Analyze gear drive transfer case power flow
Explain types of transfer case / axle differential systems and concerns related to variations in tire circumference and / or final drive ratios
Remove and install transfer case
Disassemble, service, and reassemble transfer case components
Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.
Diagnose noise, vibration, and unusual steering concerns; determine necessary action

7. Identify part-time 4x4 axle/wheel disconnects

Learning Objectives
Service manual locking hub wheel disconnects

Service automatic locking hub wheel disconnects
Diagnose IWE (Integrated Wheel End) and pulse vacuum hublock wheel disconnects
Diagnose front axle shaft disconnects
Inspect, service, and replace front axle wheel bearings and races, u-joints, CV joints, and spindle bearings

8. Describe part-time, full-time, AWD, and automatic four wheel drive systems

Learning Objectives
Explain automatic, AWD, and full-time differential systems
Explain part-time 4x4 system driveline wind-up and crow hopping

9. Diagnose 4x4 shift controls

Learning Objectives
Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum)
Inspect transfer case shift control, bushings, mounts, levers, and brackets
Diagnose, test, adjust, and/or replace electrical/electronic components of four-wheel drive / all-wheel drive systems

SCC Accessibility Statement

South Central College strives to make all learning experiences as accessible as possible. If you have a disability and need accommodations for access to this class, contact the Academic Support Center to request and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507) 332-7222.

Additional information and forms can be found at: www.southcentral.edu/disability

This material can be made available in alternative formats by contacting the Academic Support Center at 507-389-7222.