

# Automotive Technology 6<sup>th</sup> Edition

## Chapter 127 – Manual Transmissions/Transaxles

### Lesson Plan



#### **CHAPTER SUMMARY:**

1. The need for a transmission, gear types, gear ratios, and torque, speed, and power
  2. Transmission construction, torque flow through a manual transmission, and speed gears
  3. Synchronizer parts and operation, five-speed transmission torque flow, and manual transaxle construction
  4. Transmission/Transaxle removal and disassemble and hard-to-shift problem diagnosis
  5. Manual transmission installation and gear lubrication
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#### **OBJECTIVES:**

1. Discuss the need for a transmission.
  2. Explain the different types of gears and gear ratios.
  3. Describe the relationship between torque, speed, and power.
  4. Describe the construction of a transmission.
  5. Describe the torque flow through a manual transmission.
  6. Describe speed gears.
  7. Explain the construction and operation of a synchronizer.
  8. Describe the torque flow through a five-speed manual transmission.
  9. Describe the procedure to diagnose, remove, disassemble, and install manual transmission/transaxle.
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#### **RESOURCES:** (All resources may be found at <http://www.jameshalderman.com>)

1. Task Sheet ASE (A2-A-3) P-1, (A2-A-4) P-1, (A2-A-5) P-1: Diagnose Fluid Loss
  2. Task Sheet ASE (A3-A-2) P-1, (A3-A-4) P-1: Drain and Fill Manual Transmission/Transaxle
  3. Task Sheet ASE (A3-C-1) P-2: Manual Transmission/Transaxle Linkage
  4. Task Sheet ASE (A3-C-2) P-2: Electronically Controlled Manual Transmission
  5. Task Sheet ASE (A3-A-1) P-1, (A3-C-3) P-2: Diagnose Noise Concerns
  6. Task Sheet ASE (A3-C-4) P-2: Diagnosing Hard Shifting Concerns
  7. Task Sheet ASE (A3-C-5) P-3: Transaxle Final Drive
  8. Task Sheet ASE (A3-C-6) P-2: Disassemble and Reassemble Transmission/Transaxle
  9. Chapter PowerPoint
  10. Chapter Crossword Puzzle and Word Search
  11. Animations: See list at the end of the lesson plan.
  12. Videos: See list at the end of the lesson plan.
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DEMO

#### **ACTIVITIES:**

1. **Task Sheet ASE (A2-A-3) P-1, (A2-A-4) P-1, (A2-A-5) P-1:** Have student complete Diagnose Fluid Loss Task Sheet.
  2. **Task Sheet ASE (A3-A-2) P-1, (A3-A-4) P-1:** Have student complete Drain and Fill Manual Transmission/Transaxle Task Sheet.
  3. **Task Sheet ASE (A3-C-1) P-2:** Have student complete Manual Transmission/Transaxle Linkage Task Sheet.
  4. **Task Sheet ASE (A3-C-2) P-2:** Have student complete Electronically Controlled Manual Transmission Task Sheet.
  5. **Task Sheet ASE (A3-A-1) P-1, (A3-C-3) P-2:** Have student complete Diagnose Noise Concerns Task Sheet.
  6. **Task Sheet ASE (A3-C-4) P-2:** Have student complete Diagnosing Hard Shifting Concerns Task Sheet.
  7. **Task Sheet ASE (A3-C-5) P-3:** Have student complete Transaxle Final Drive Task Sheet.
  8. **Task Sheet ASE (A3-C-6) P-2:** Have student complete Disassemble and Reassemble Transmission/Transaxle Task Sheet.
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#### **ASSIGNMENTS:**

1. Chapter crossword and word search puzzles.
  2. Complete end of chapter 10 question quiz.
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#### **CLASS DISCUSSION:**

1. Review and group discussion chapter Frequently Asked Questions and Tech Tips sections.
  2. Review and group discussion of the five (5) chapter Review Questions.
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#### **NOTES AND EVALUATION:**

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**Animations:** (at <http://www.jameshalderman.com>)

5 Speed Transmission, 1st Gear	Transmission Power Flow
Check Blocker Ring Clearance	Transmission Reverse
CVT Forward and Reverse	6 Speed Transaxle Operation
CVT Operation	FWD Drivetrain
CVT Ratio Control	Power Transfer Unit
External Gears, 2:1	Transaxle, 1st Gear
External Gears With Idler	Transaxle, 2nd Gear
Internal & External Gear	Transaxle, 3rd Gear
Synchronizer Operation	Transaxle, 4th Gear
Transmission 2nd Gear	Transaxle, 5th Gear
Transmission 3rd Gear	Transaxle, Final Drive
Transmission 4th Gear	Transaxle, Power Flow
Transmission 5th Gear	Transaxle, Reverse
Transmission Interlocks & Detents	

**Videos:** (at <http://www.jameshalderman.com>)

How synchronizers work (time 13:11)	AX-15 rebuild part 3 (time 19:46)
Clutch and trans operation (time 3:30)	AX-15 rebuild part 4 (time 13:32)
Manual trans operation (time 0:43)	AX-15 rebuild part 5 (time 25:27)
Manual trans power flow (time 0:13)	AX-15 rebuild part 6 (time 22:14)
Trans operation (time 7:59)	AX-15 rebuild part 7 (time 9:28)
Trans operation (time 2:19)	Shifter bushing repair (time 3:23)
Manual trans animation (time 0:43)	Gearshift knob removal (time 1:23)
Manual overdrive transmission (time 2:40)	Transmission noise (time 3:04)
Electronic manual transmission (time 0:49)	Transaxle noise (time 1:15)
Overdrive transmission old British car (time 1:34)	Drivetrain diagnosis (time 1:11)
AX-15 teardown part 1 (time 13:57)	Honda manual transmission fluid change (time 10:20)
AX-15 assembly part 2 (time 10:43)	