Learning Objectives

1.1 Prepare for ASE Manual Drive Train and Axles (A3) certification test content area “B” (Transmission Diagnosis and Repair).
1.2 Explain the parts of a standard transaxle.
1.3 Discuss transaxle operation.

Purpose and Function

• The development of the transaxle has, in part, made the modern, fuel-saving front-wheel-drive (FWD) vehicle possible.
• Early FWD vehicles included the American Cord of the 1930s.
• What is torque steer caused by?
FIGURE 7–1 (a) The Cord was one of the first front-wheel-drive vehicles.

Transaxle Construction (1 of 6)

• Input shaft
  – Sometimes called clutch shaft.
• Main shaft
  – Sometimes called countershaft or intermediate shaft.
  – Includes drive pinion gear.

Transaxle Construction (2 of 6)

• Final drive ring gear
  – The differential divides the power flow between the two CV joints coupled to the drive shafts and on to the wheels.
• Reverse idler shaft
  – Each of the gear pairs on the input shaft and main shaft represents the power paths for a particular gear ratio.
Transaxle Operation (3 of 6)

- **Power flow**
  - The power passes from the driving gear to the driven gear on the main shaft and through the synchronizer and the power leaves through the drive pinion.

- **Fear ratios**
  - Reverse idler shifted into mesh; idler gear rotates counterclockwise; 1-2 synchronizer rotates clockwise; differential and drive wheels rotates counterclockwise.
Figure 7–5 (a) First gear power flow through a Mitsubishi KM M5AF3 five-speed transaxle. (b) Second gear.

Figure 7–6 The gear ratios of a transaxle are determined by dividing the tooth count of the driven gear by that of the driving gear.
Transaxle Operation (4 of 6)

- Final drive and differential
  - Power leaves through drive pinion.
- Longitudinal Transaxles
  - Power must turn 90 degrees to align with front drive.
  - Hypoid gears require adjustments for proper ring and pinion gear positioning.

Figure 7–7 The final drive pinion gear drives the ring gear, which is mounted on the differential case.

Figure 7–8 This Subaru transaxle is used with an engine that is mounted lengthwise in the vehicle.
Transaxle Operation (5 of 6)

• Transaxle Gears
  – Speed gears, synchronizer assemblies, and bearings are kept as narrow and compact as practical.

• Transaxle Bearings
  – The ball bearing supports one end and positions the shaft to the case.

Figure 7–9 (a) This transaxle uses tapered roller bearings at the input shaft.

(b) The selective shim is used under the bearing race and placed into the bearing pocket (bearing counter-bore) before the race is pressed into the transaxle case.
Transaxle Operation (6 of 6)

- Transaxle Case Design
  - Made from cast aluminum.
  - Separate side case or side cover.
- Splash Lubrication
  - Oil is directed to critical areas by troughs and oiling funnels.

Summary

- Transaxles combine a transmission with the final drive gear set and differential.
- Some transaxles are mounted in a longitudinal position and use a hypoid final drive gear set.
- Transaxles use helical cut gears except for reverse where straight cut spur gears are often used.