Learning Objectives

1.1 Explain the diagnosis of defective wheel bearings.
1.2 Discuss rear drive axle classifications.
1.3 State the reasons for bearing failure.

Antifriction Bearings (1 of 2)

- What is the purpose and function?
- Ball bearings use hardened steel balls between the inner and outer race to reduce friction.
- Roller bearings use rollers between the inner and outer race to reduce friction.
- The most commonly used automotive wheel bearing is the tapered roller bearing.
Antifriction Bearings (2 of 2)

- Many rear-wheel-drive vehicles use an inner and an outer wheel bearing on the front wheels.
- Bearings use standard dimensions for inside diameter, width, and outside diameter.
- Most front-wheel-drive vehicles use a sealed nonadjustable front wheel bearing.

Bearing Greases

- What is grease and why is it important?
- NLGI classification
  - How is grease classified?
Seals

• What is the purpose and function of seals?
• Types of seals
  – Static
  – Dynamic

Figure 11–11 A garter spring helps hold the sharp lip edge of the seal tight against the shaft.

Bearing Diagnosis (1 of 2)

• Wheel bearings control the positioning and reduce the rolling resistance of vehicle wheels.
• Whenever a bearing fails, the wheel may not be kept in position and noise is usually heard.
• Symptoms of defective wheel bearings include the following:
  – 1. A hum, rumbling, or growling noise that increases with vehicle speed.
**Bearing Diagnosis (2 of 2)**

- 2. Roughness felt in the steering wheel that changes with the vehicle speed or cornering.
- 3. Looseness or excessive play in the steering wheel especially while driving over rough road surfaces.
- 4. A loud grinding noise in severe cases, indicating a defective front wheel bearing.
- 5. Pulling during braking.

**Wheel Bearing Service**

- What are the steps in a non-drive-wheel bearing inspection?

**Figure 11–12 Removing the grease cap with grease cap pliers.**
Sealed Bearing Replacement

• Diagnosing a defective front bearing on a front-wheel-drive vehicle is sometimes confusing.
  – Noisy
• Special aftermarket tools are available to remove many of the bearings without removing the knuckle from the vehicle.

Figure 11–24 A special puller makes the job of removing the hub bearing from the knuckle easy without damaging any component.

Rear Drive Axle Classifications

• Full-floating
  – Bearings are mounted and retained in the hub of the brake drum or rotor.
• Three-quarter-floating
  – Bearings mounted and retained in the brake drum or rotor hub.
• Semi-floating
  – Bearings press onto the axle shaft or are installed in the outer end of the axle housing.
Rear Axle Bearing and Seal Replacement

- There are two basic types of axle retaining methods:
  - Retainer plate-type
    - Uses four fasteners that retain the axle in the axle housing.
  - C-lock
    - Straight roller bearing supporting a semi-floating axle shaft inside the axle housing.
Figure 11–29 A slide-hammer-type axle puller can be used to remove an axle.

Bearing Failure Analysis

• Whenever a bearing is replaced, the old bearing must be inspected and the cause of the failure eliminated.
• Metal Fatigue: Long vehicle usage
• Electrical Arcing
• Shock Loading

Figure 11–35 This bearing has a bent cage and must be replaced.
Summary

• A defective bearing can be caused by metal fatigue that leads to spalling, shock loads that cause brinelling, or damage from electrical arcing.
  – It is usually noisy while driving straight, and the noise increases with vehicle speed (wheel speed).

• All bearings must be serviced, replaced, and/or adjusted using the vehicle manufacturer’s recommended procedures as stated in the service manual.