Front Wheel Drive Notes

Drive Axle Components

• Outer CV-joint
  – Allows wheels to steer while axle is rotating
• Inner CV-joint
  – Allows for suspension changes while axle is rotating
• Axle shaft
  – Transmits power from inner to outer CV-joint

Types of Drive Axles

Equal length shafts
  – Used to reduce torque steer
• Vibration dampers
  – Sometimes used to dampen vibrations in the driveline
• Unequal length half-shafts
  – Usually constructed differently to prevent torque steer

CV-Joints

• Outboard joint types
  – Rzeppa fixed tripod
• Inboard joint types
  – Double-offset
  – Plunging tripod
  – Cross-groove plunge joint

CV-Joint Functions

• Fixed joint
  – Does not move in and out to change shaft length
  – Is used as the outboard joint
• Plunging joint
  – Changes in length to allow movement of the suspension
  – Is used as the inboard joint

Inboard Joints

• Ball-type joint
  – Is similar to a Rzeppa joint but has elongated grooves in the inner race
  – Is commonly known as a double-offset joint
• Tripod-type joint
  – Has longer grooves than a fixed-type joint to allow for plunging
Rzeppa CV joint
Outboard Joints

• Ball-type CV-joint
  – Was named after its designer, A.H. Rzeppa
  – Uses three to six steel balls held together by a steel cage
  – The balls ride in a socket to allow rotation and turning
  – Is used in most front-wheel-drive vehicles

FWD Wheel Bearing Styles

• Double-row, angular-contact bearings
  – Are used on most General Motors, DaimlerChrysler, and European cars
  – Have two rows of ball bearings located next to each other

• Opposed tapered-roller bearings
  – Are used on Fords and most Asian cars

Steps in FWD Axle Diagnosis

1. Talk to the customer
   – Get as much information as possible
2. Road test the vehicle
   – Listen and feel for symptoms
3. Perform a visual inspection
   – Look and feel for causes of concern

Questions to Ask the Customer

• What is the problem?
• Is the symptom felt or heard?
• What type of noise is it?
• When does the noise or symptom occur?
• When did the symptom start?

Performing a Road Test

• Drive the car under various conditions such as accelerating, coasting, turning, and weaving side to side
• Listen for clicking or clunking, especially while turning
• Feel for shudder, shimmy, vibration, or any other abnormalities

Visual Inspection

• Check out all other problem areas before assuming that the problem is being caused by the axle assembly
• Check the CV-boots for tears and grease leaks
• Check the shafts for damage or being bent
• Move the shaft, wheels, and other components to check for looseness
Possible Reasons for CV-Boot Failure

- Cuts or tears from foreign objects
- Accident damage
- Improper towing hook-up or service techniques
- Ice forming around boot
- Deterioration
- Clamp failure

Axle Removal Techniques

- Always follow manufacturer’s service procedures
- Never let the axle or other components hang free
- Be careful not to damage ABS sensor components
- Use the correct pullers to separate the inboard joint from the differential

Axle Removal Techniques (Cont’d)

- Make sure all components are clean before assembly
- Only use new axle hub nuts
- Always torque axle hub nut to specifications

Off-Car Axle Inspection

- Be careful not to overtighten the shaft in the vise
- Look for cracks, chips, pits, or rust on all components
- Check the joint for sticking while plunging it in and out
- Check for discoloring usually caused by heat

Boot Replacement Tips

- Mark the location of the boot on the axle before removal
- Inspect the grease for contamination
- Make sure the new boot clamps are secure
- Use a dull screwdriver to remove trapped air from the boot

CV-Joint Replacement Tips

- Clean the joint thoroughly so a complete inspection can be made
- Refer to the service manual to find out how the joint is retained to the shaft
- Pack the new joint using all of the lubricant supplied

FWD Wheel Bearing Inspection

- Excessive play inspection
  - Usually checked by pulling outward at the top of the tire and pushing inward at the bottom with the vehicle supported under the control arm

- Noise inspection
  - Bearing noise will often increase when the vehicle is turned
Bearing Replacement Tips

- Loosen lug and hub nuts with the wheel on the ground
- Index the position of the strut to the steering knuckle before disassembly
- Always tighten all bolts to the factory torque specifications
- Never reuse axle hub nuts

Summary
- A drive axle assembly consists of an axle shaft, an inner joint, and an outer joint

CV-joints are categorized by placement (outer and inner), type (ball or tripod), and function (fixed or plunging)

Summary (Cont’d)
- A complete inspection includes talking to the customer, a thorough road test, and a visual inspection

- Wheel bearing failure is usually indicated by noise or excessive play

Summary (Cont’d)
- Manufacturers’ replacement procedures should always be followed

- Some fasteners must always be replaced when servicing drive axles and wheel bearings

Diagnostics And Service
A bad outer cv joint will normally cause a clicking or popping noise when turning. (most noticeable on inside of turn)

A clunking noise during acceleration and deceleration (torque changes) indicates an Inner CV joint problem

Shudder can be caused be a stuck joint, or worn, damaged, or missing torsional damper

Check the boots. A failed boot is the most common cause of a failed cv joint