Front Drive Axle

Principles of Operation

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.
3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

Symptom Chart - Front Differential

Symptom Chart - Front Differential

Condition	Possible Sources	Actions
Axle overheating	• Axle lubricant low	• CHECK the lubricant level. FILL the axle to specification. REFER to: Specifications (205-03 Front Drive Axle/Differential, Specifications).
	• Incorrect or contaminated lubrication type	• INSPECT the axle for damage. REPAIR as necessary. CLEAN and REFILL the axle to specification as necessary. REFER to: Specifications (205-03 Front Drive Axle/Differential, Specifications).
	• Excessive gear wear	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
	• Incorrect ring gear backlash	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Broken gear teeth on the ring gear or pinion	• Overloading the vehicle	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Differential side gears/pinion gears are	• Insufficient lubrication	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03

scored		Front Drive Axle/Differential, Removal and Installation).
	• Incorrect or contaminated lubricant type	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Front axle will not disengage	• Mode switch	• REFER to: Four-Wheel Drive Systems (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
	• Wiring/relays	• REFER to: Four-Wheel Drive Systems (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
	• 4x4 control module	• REFER to: Four-Wheel Drive Systems (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
	• Shift motor	• REFER to: Four-Wheel Drive Systems (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
Front axle will not engage	• Mode switch	• REFER to: Four-Wheel Drive Systems (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
	• Wiring/relays	• REFER to: Four-Wheel Drive Systems (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
	• 4x4 control module	• REFER to: Four-Wheel Drive Systems (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
	• Shift motor	• REFER to: Four-Wheel Drive Systems (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
Gray or milky axle lubricant in low mileage vehicles	• Marking compound in axle fluid	• Inspect axle housing and vent for damage or leaks. Refer to Axle Fluid Analysis in this section.
Lubricant leaking from the pinion seal, axle shaft oil seals or support arm to the	• Vent	• CLEAN the axle housing vent.
	• Damage in the seal	• INSTALL a new pinion seal if

housing	contact area or dust slinger on the pinion flange dust shield	damage is found.

Symptom Chart - NVH

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Symptom Chart - NVH

Condition	Possible Sources	Actions
Axle howling or whine	• Axle lubricant low	• CHECK the lubricant level. FILL the axle to specification. REFER to: Specifications (205-03 Front Drive Axle/Differential, Specifications).
	• Axle housing damage	• INSPECT the axle housing for damage. INSTALL a new axle as necessary. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
	• Damaged or worn wheel hub bearings	• CHECK for abnormal wheel hub bearing play or roughness.
	• Damaged or worn differential ring and pinion	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
	• Damaged or worn differential side or pinion bearings	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Driveline clunk - loud clunk when shifting from REVERSE to DRIVE	• Incorrect axle lubricant level	• CHECK the lubricant level. FILL the axle to specification. REFER to: Specifications (205-03 Front Drive Axle/Differential, Specifications).
	• Excessive backlash in the axle	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
	• Damaged or worn pinion bearings	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
	• Loose or missing fasteners	• CHECK all driveline fasteners for proper torque.

Driveline clunk — occurs as the vehicle starts to move forward following a stop	• Loose axle mount	• CHECK the axle for loose bolts. TIGHTEN to proper torque. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
	• Loose or missing fasteners	• CHECK all driveline fasteners for proper torque.
Driveline clunk — occurs during acceleration or from cruise to coast/deceleration	• Loose or missing fasteners	• CHECK all driveline fasteners for proper torque.
High pitched chattering — noise from the axle when the vehicle is turning	• Incorrect or contaminated lubricant	• CHECK the vehicle by driving in tight circles (5 clockwise, 5 counterclockwise). CLEAN and REFILL the axle to specification. REFER to: Specifications (205-03 Front Drive Axle/Differential, Specifications).
	• Damaged or worn differential (differential side gears and pinion gears)	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Grunting — normally associated with a shudder experienced during acceleration from a complete stop	• Loose axle mount bolts or suspension fasteners	• INSPECT the front suspension and axle. TIGHTEN the fasteners to specification. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Howl — can occur at various speeds and driving conditions. Affected by acceleration and deceleration	• Incorrect ring and pinion contact, incorrect bearing preload or gear damage	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Chuckle — heard at coast/deceleration. Also described as a knock	• Incorrect ring and pinion contact or damaged teeth on the coast side of the ring and pinion	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Knock — noise occurs at various speeds. Not affected by acceleration or deceleration	• Gear tooth damage to the drive side of the ring and pinion	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Scraping noise — a continuous low pitched noise starting at low speeds	• Worn or damaged pinion bearings	• INSTALL new axle assembly. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
Driveline shudder – occurs during acceleration from a slow speed or stop	• Drive axle assembly mispositioned	• CHECK the axle mounts and the front suspension for damage or wear. REPAIR as necessary. REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
	• Loose axle bolts	• CHECK the axle for loose bolts. TIGHTEN the bolts to specification.

		REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).
	• Loose or missing fasteners	• CHECK all driveline fasteners for proper torque.

Axle Fluid Analysis

The appearance of milky or gray axle fluid in early mileage axles is a result of white marking compound used at the assembly plant to verify gear mesh contact pattern. The marking compound within the fluid will darken some over time. The milky fluid appearance will diminish and cause no harm and does not require a fluid change.

Analysis of Leakage

Clean up the leaking area enough to identify the exact source.

A plugged front axle housing vent can cause excessive pinion seal lip wear due to internal pressure buildup.

Verify the differential lubricant level is at the correct level.
REFER to: Specifications (205-03 Front Drive Axle/Differential, Specifications).

Axle Vent

A plugged vent will cause excessive seal lip wear due to internal pressure buildup. If a leak occurs, check the vent. If the vent cannot be cleared, install a new vent.

Drive Pinion Seal

Leaks at the drive pinion seal originate from the following causes:

- Damaged seal
- Worn seal journal surface

A new drive pinion seal must be installed if any of these conditions exist.

- The drive pinion seal can be torn, cut or gouged if it is not installed correctly. The spring that holds the drive pinion seal against the pinion flange may be knocked out and allow fluid to pass the lip.
- Metal chips trapped at the sealing lip can cause oil leaks. These can cause a wear groove on the drive pinion flange and result in pinion seal wear.
- When a seal leak occurs, install a new drive pinion seal and check the vent to make sure it is clean and free of foreign material.

If a mechanical failure is causing the leak, the axle must be replaced.
REFER to: Axle Assembly (205-03 Front Drive Axle/Differential, Removal and Installation).

Differential Seals

NOTICE: When installing shafts, do not allow splines to contact seals during installation or damage to the seals may occur.

Halfshaft pilot bearing housing seals are susceptible to the same types of damage as drive pinion seals if incorrectly installed. The seal bore must be clean and the lip handled carefully to avoid cutting or tearing it. The seal journal surface must be free of nicks, gouges and rough surface texture.