

Rear Drive Axle and Differential

Preliminary Inspection

1. Visually inspect the housing, seals, and pinion flange for obvious signs of mechanical damage.
2. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
3. If the cause is not visually evident, verify the symptom and REFER to Symptom Chart: [NVH](#) .

Symptom Chart(s)

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

Symptom Chart

Condition	Possible Sources	Actions
Axle howling or whine	<ul style="list-style-type: none"> • Axle lubricant low 	<ul style="list-style-type: none"> • CHECK the lubricant level. FILL the axle to specification. REFER to: Differential Fluid Level Check (205-02) .
	<ul style="list-style-type: none"> • Axle housing damage 	<ul style="list-style-type: none"> • INSPECT and INSTALL a new axle assembly as necessary. REFER to: Axle Assembly (205-02) .
	<ul style="list-style-type: none"> • Damaged, worn or incorrect ring and pinion gear contact 	<ul style="list-style-type: none"> • INSPECT and INSTALL a new ring and pinion set as necessary. Refer to, Contact Pattern of this procedure, or REFER to: Drive Pinion (205-02 Rear Drive Axle/Differential, Removal and Installation).
Driveline clunk - loud clunk when shifting from REVERSE to DRIVE	<ul style="list-style-type: none"> • Incorrect axle lubricant level 	<ul style="list-style-type: none"> • CHECK the lubricant level. FILL the axle to specification. REFER to: Differential Fluid Level Check (205-02) .
	<ul style="list-style-type: none"> • Excessive backlash in the axle 	<ul style="list-style-type: none"> • CHECK for excessive axle backlash. ADJUST backlash as necessary. REFER to: Ring Gear Backlash Adjustment (205-02 Rear Drive Axle/Differential, General Procedures).
Driveline clunk — occurs as the vehicle starts to move forward following a stop	<ul style="list-style-type: none"> • Pinion gears 	<ul style="list-style-type: none"> • CHECK and REPLACE as necessary REFER to: Drive Pinion Front Bearing (205-02 Rear Drive Axle/Differential, Removal and Installation).

Condition	Possible Sources	Actions
Grinding, popping or chattering – noise from the rear axle when the vehicle is turning	<ul style="list-style-type: none"> • Damaged or worn differential (differential side gears and pinion gears) 	<ul style="list-style-type: none"> • INSPECT the differential carrier and the components of the differential carrier. INSTALL a new differential carrier and/or differential carrier components as necessary. REFER to: Differential Carrier (205-02 Rear Drive Axle/Differential, Removal and Installation).
Grunting — normally associated with a shudder experienced during acceleration from a complete stop	<ul style="list-style-type: none"> • Loose rear axle mount bolts or suspension fasteners 	<ul style="list-style-type: none"> • CHECK for loose bolts. TIGHTEN to specifications. REFER to: Axle Assembly (205-02) .
Howl – can occur at various speeds and driving conditions. Affected by acceleration and deceleration	<ul style="list-style-type: none"> • Incorrect ring and pinion contact, incorrect bearing preload or gear damage 	<ul style="list-style-type: none"> • INSPECT and ADJUST as necessary. Refer to, Contact Pattern of this procedure, or REFER to: Differential Carrier (205-02 Rear Drive Axle/Differential, Removal and Installation). REFER to: Ring Gear Backlash Adjustment (205-02 Rear Drive Axle/Differential, General Procedures).
Chuckle – heard at coast/ deceleration. Also described as knock	<ul style="list-style-type: none"> • Incorrect ring and pinion contact or damaged teeth on the coast side of the ring and pinion 	<ul style="list-style-type: none"> • INSPECT and INSTALL a new ring and pinion set as necessary. Refer to, Contact Pattern of this procedure, or REFER to: Drive Pinion (205-02 Rear Drive Axle/Differential, Removal and Installation).
Knock – noise occurs at various speeds. Not affected by acceleration or deceleration	<ul style="list-style-type: none"> • Gear tooth damage to the driver side of the ring and pinion 	<ul style="list-style-type: none"> • INSPECT and INSTALL a new ring and pinion as necessary. REFER to: Drive Pinion (205-02 Rear Drive Axle/Differential, Removal and Installation). REFER to: Differential Carrier (205-02 Rear Drive Axle/Differential, Removal and Installation).
Scraping noise – a continuous low pitched noise starting at low speed	<ul style="list-style-type: none"> • Worn or damaged pinion bearings 	<ul style="list-style-type: none"> • INSPECT and INSTALL new pinion bearings as necessary. REFER to: Drive Pinion Front Bearing (205-02 Rear Drive Axle/Differential, Removal and Installation).
Driveline shudder – occurs during acceleration from a slow speed or stop	<ul style="list-style-type: none"> • Rear drive axle assembly mispositioned 	<ul style="list-style-type: none"> • CHECK the axle mounts and the rear suspension for damage or wear. Repair as necessary. REFER to: Axle Assembly (205-02) .
	<ul style="list-style-type: none"> • Loose rear axle bolts 	<ul style="list-style-type: none"> • CHECK the rear axle for loose bolts. TIGHTEN the bolts as necessary. REFER to: Axle Assembly (205-02) .
	<ul style="list-style-type: none"> • Driveline angles out of specification 	<ul style="list-style-type: none"> • CHECK for correct driveline angles. REFER to: Driveshaft Angle Measurement (205-01 Driveshaft, General Procedures).

Analysis of Leakage

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

A plugged Rear 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: Differential Fluid Level Check (205-02) .

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 flange must be installed if any of these conditions exist.

- Any damage to the seal bore (dings, dents, gouges or other imperfections) distorts the seal casing and allows leakage past the outer edge of the drive pinion seal.
- 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.

Differential Seals

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

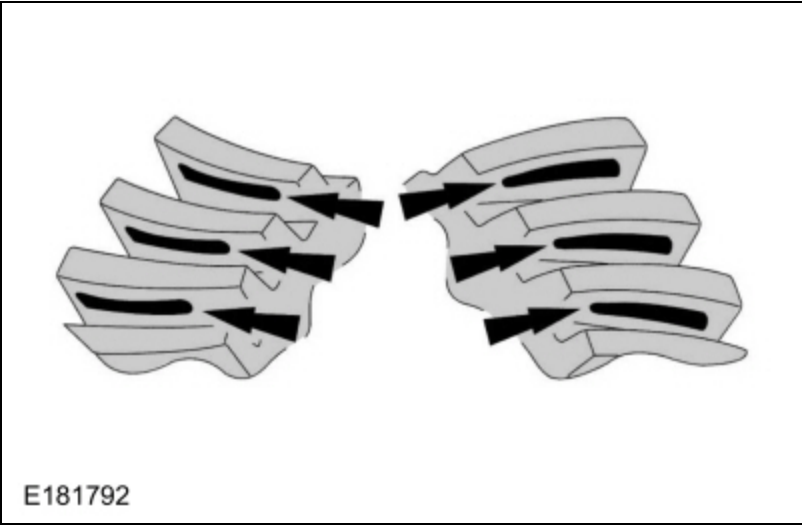
Halfshaft pilot bearing housing seals are susceptible to the same types of damage as drive pinion seals if incorrectly installed. The seal bore must be clean and the lip handled carefully to avoid cutting or tearing it. The seal journal surface must be free of nicks, gouges and rough surface texture.

Contact Pattern

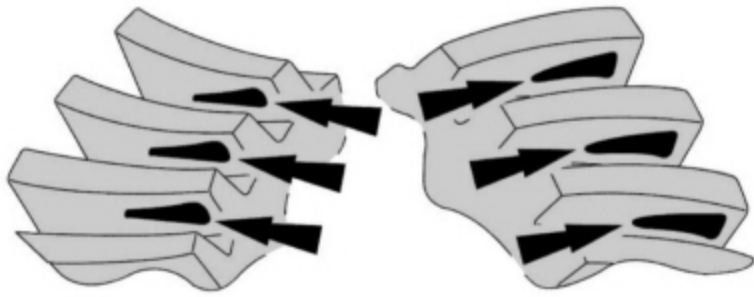
In general, desirable ring gear tooth patterns must have the following characteristics:

- Drive pattern on the drive side ring gear well centered on the tooth.
- Coast pattern on the coast side ring gear well centered on the tooth.
- Clearance between the pattern and the top of the tooth.
- No hard lines where the pressure is high.

Acceptable ring gear tooth patterns for all axles.

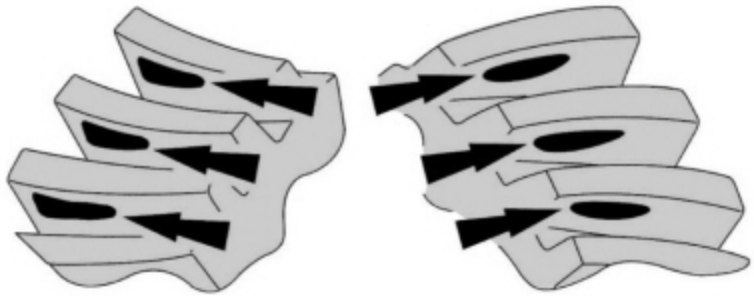


Correct backlash with a thicker pinion position shim required.



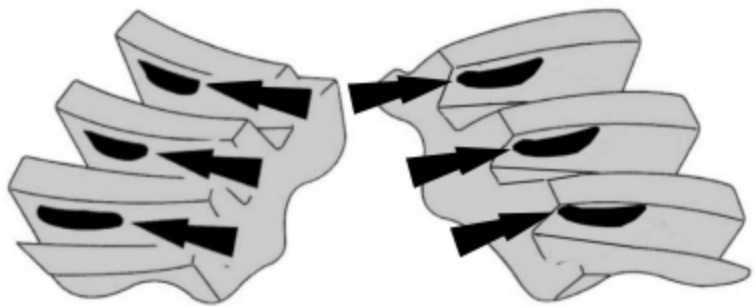
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Correct backlash with a thinner pinion position shim required.



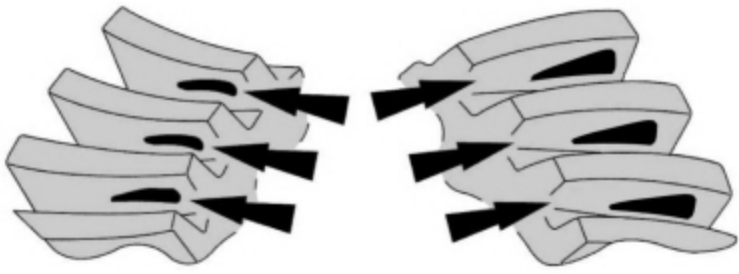
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Correct pinion position shim that requires a increase in backlash.



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Correct pinion position shim that requires a decrease in backlash.



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