

Modern Automotive Technology Chapter 62

Differential and Rear Drive Axle
Diagnosis and Repair

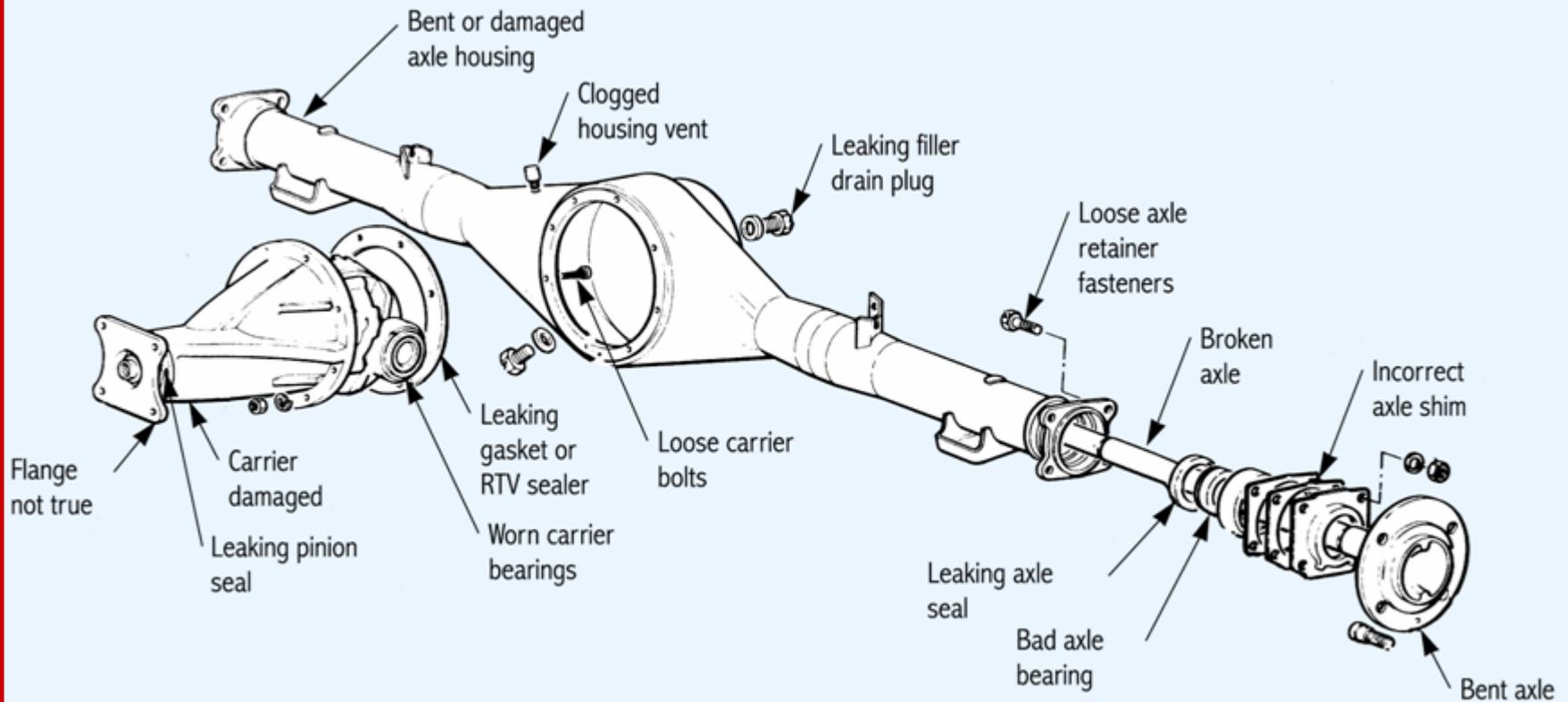


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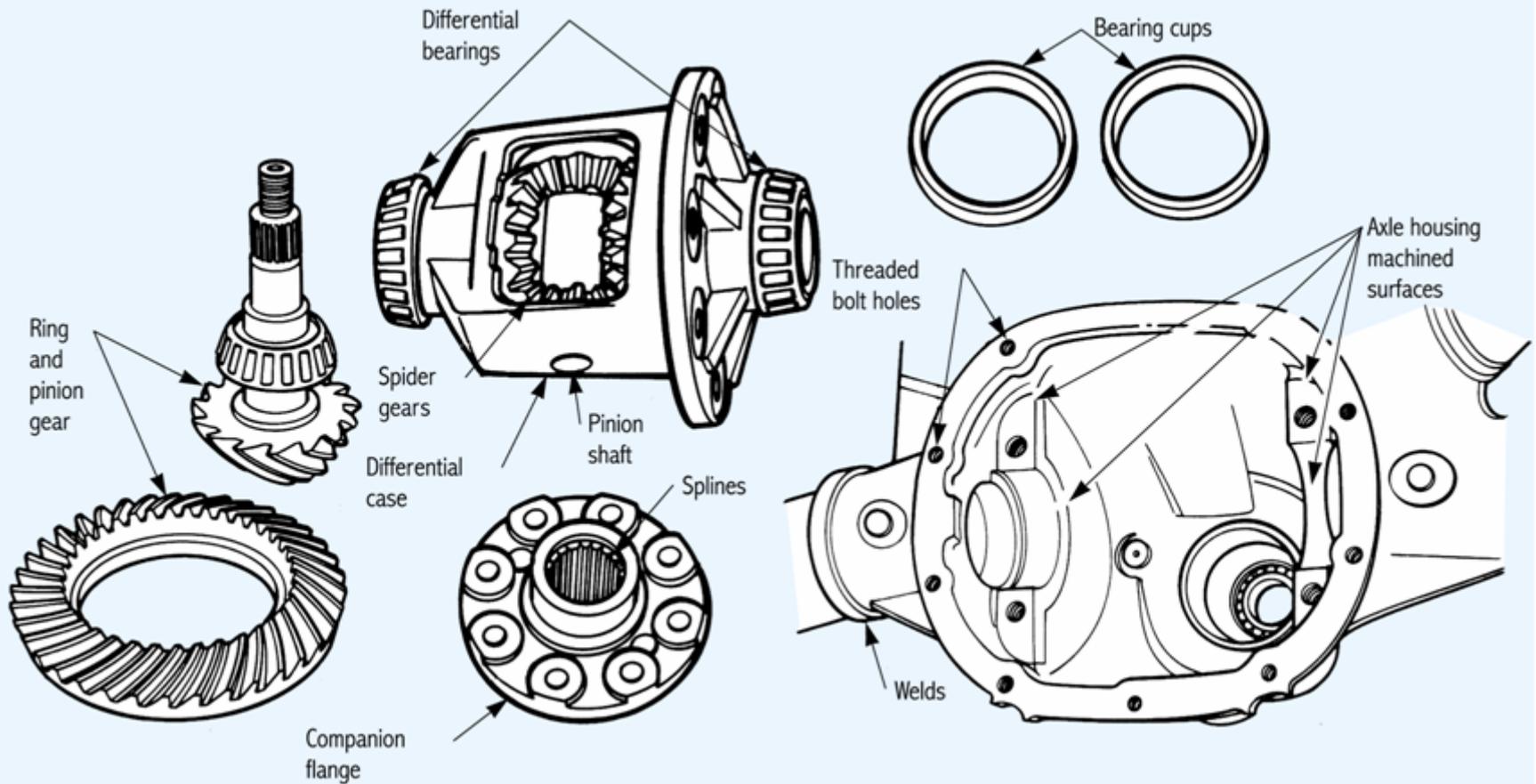
Objectives

- Diagnose common differential and rear drive axle problems.
- Explain the basic service and repair of a differential assembly.
- Remove and replace axles, axle bearings, and seals.
- Describe limited-slip differential testing and service.
- Adjust ring and pinion gears.
- Check and replace rear axle lubricant.
- Cite safety rules and practice safe work habits

Common Rear Axle Problems



Differential Inspection



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1. A REAR AXLE LUBRICANT LEAK will show up as a darkened, oily, dirty area below the pinion gear, carrier, or on the inside of the wheel and brake assembly.
2. A RING and PINION PROBLEM will usually show up as a howl or whining noise that changes when going from acceleration to deceleration.

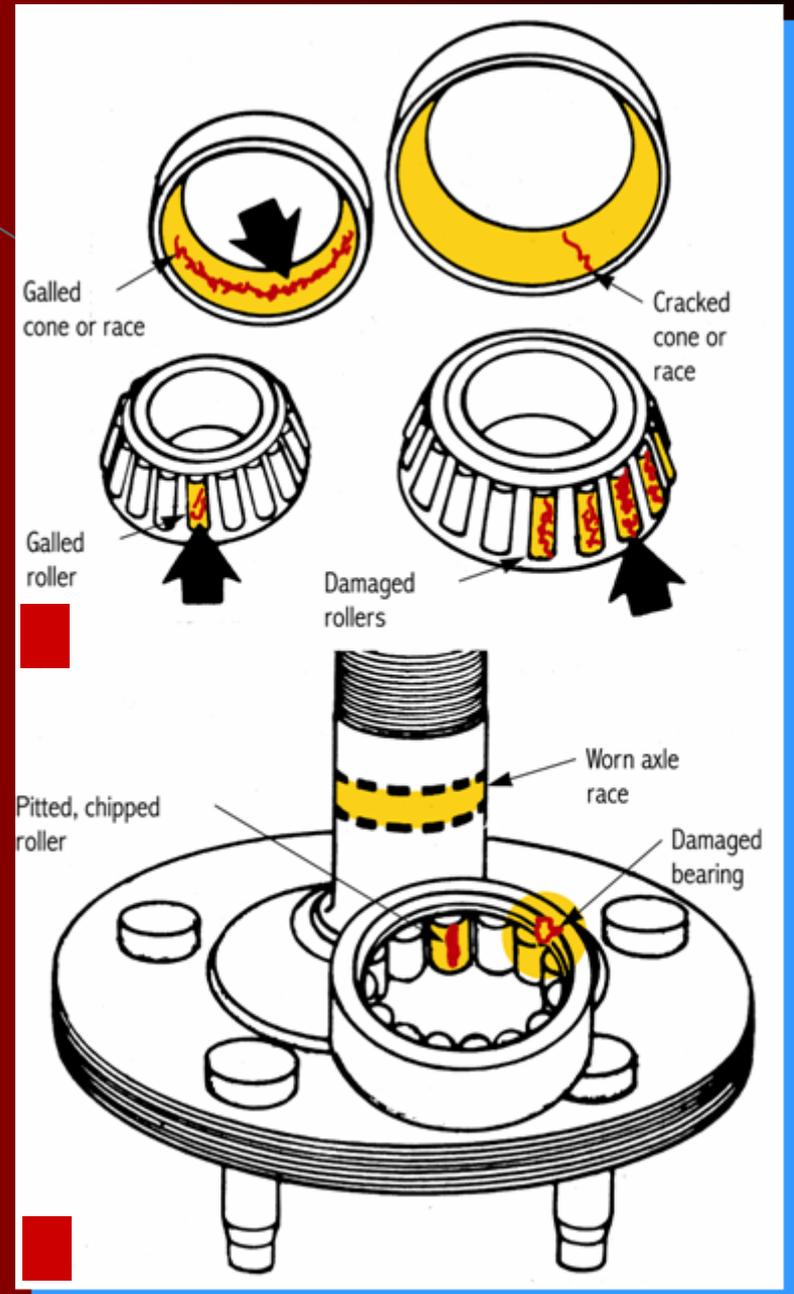
Rear Axle Leaks

- Lubricant leaks can occur at the pinion gear seal, carrier or inspection cover gaskets, or the two axle seals
- Make sure that a possible axle seal leak is not a brake fluid leak
 - touch and smell the wet area to determine the type of leak

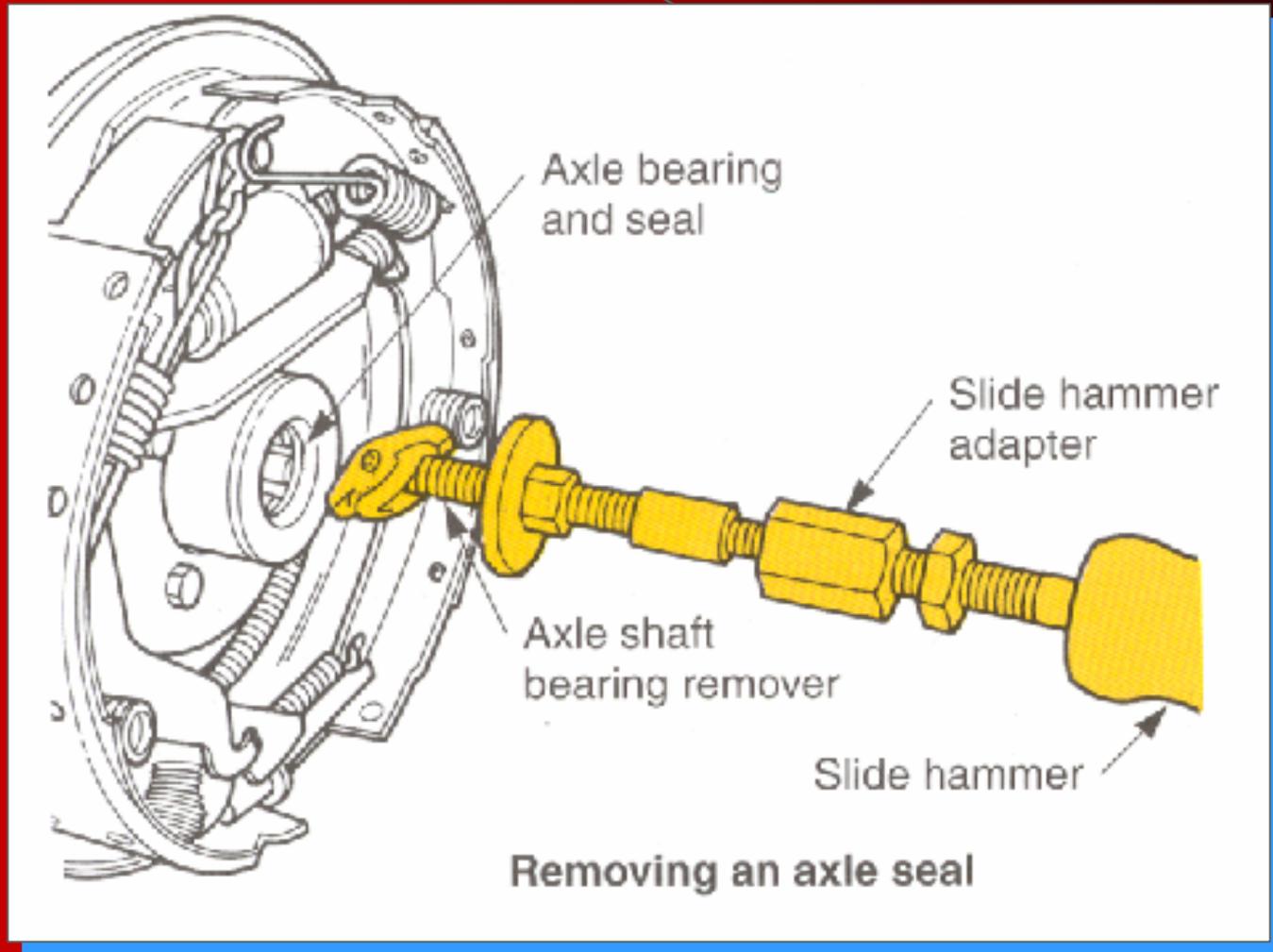
Axle and Carrier Bearing Problems

Pinion gear or case bearing failure

Axle bearing failure

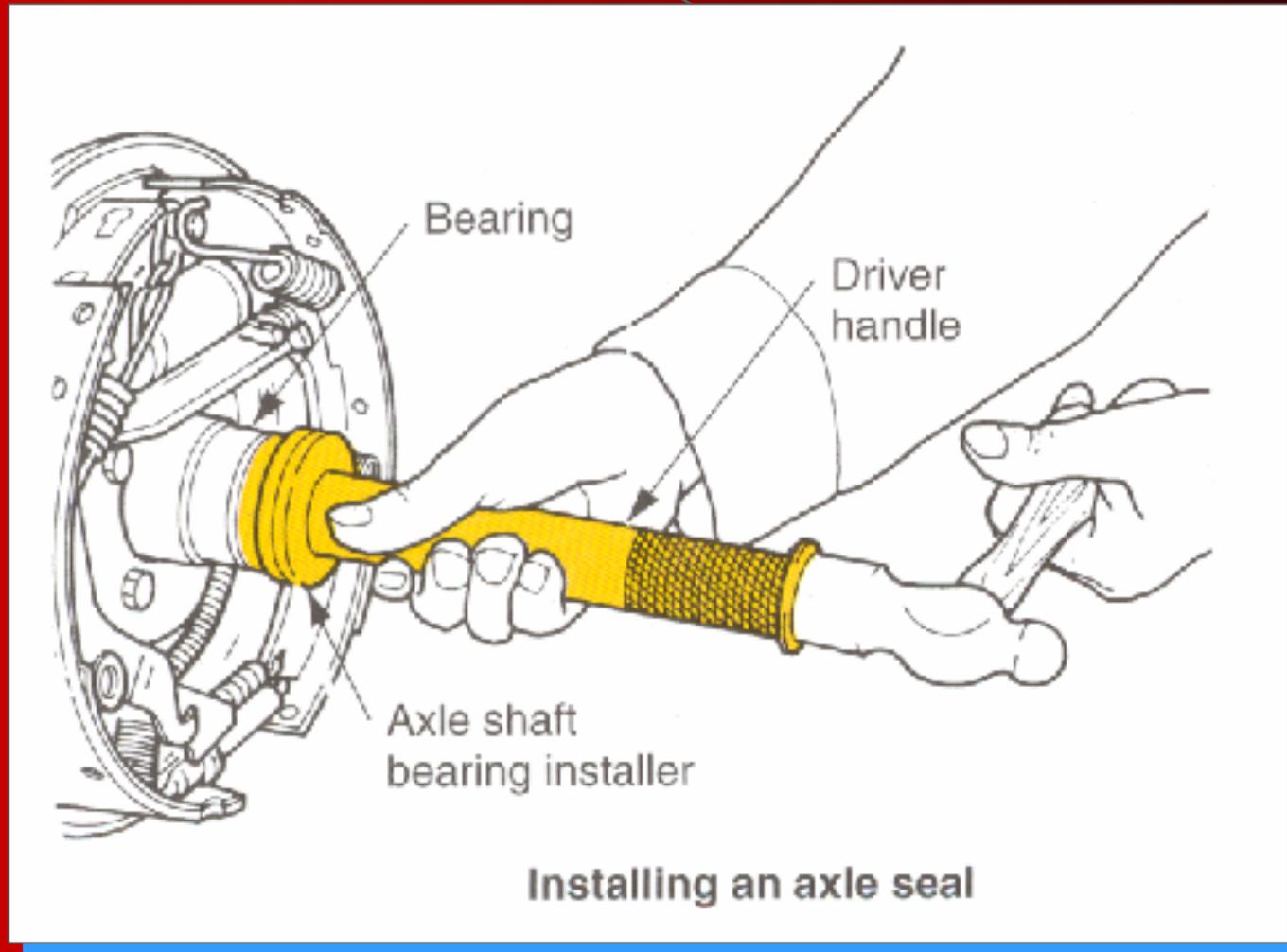


Rear Axle Seal Service



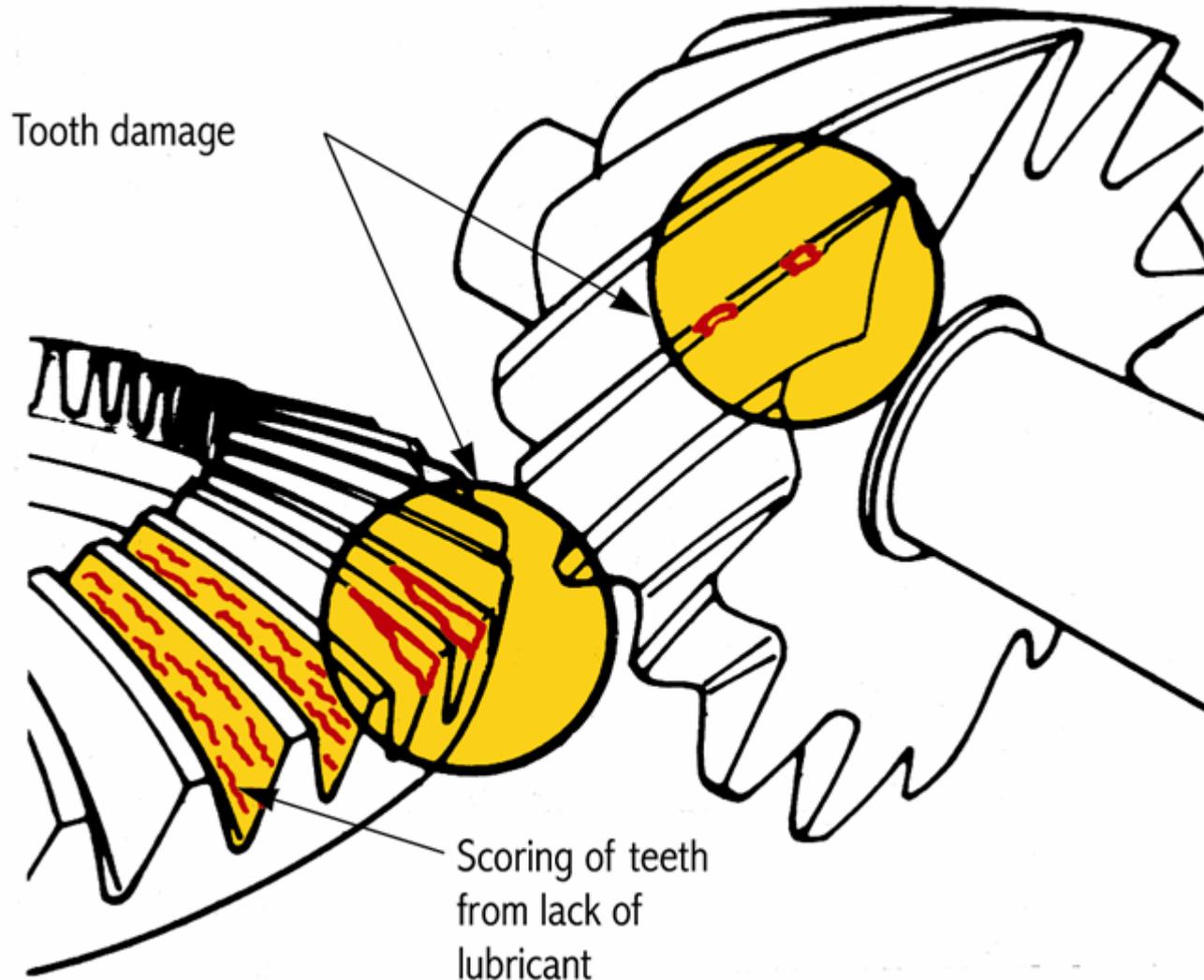
Using a slide hammer puller for removal

Rear Axle Seal Service



Using a seal driver for installation

Ring and Pinion Problems

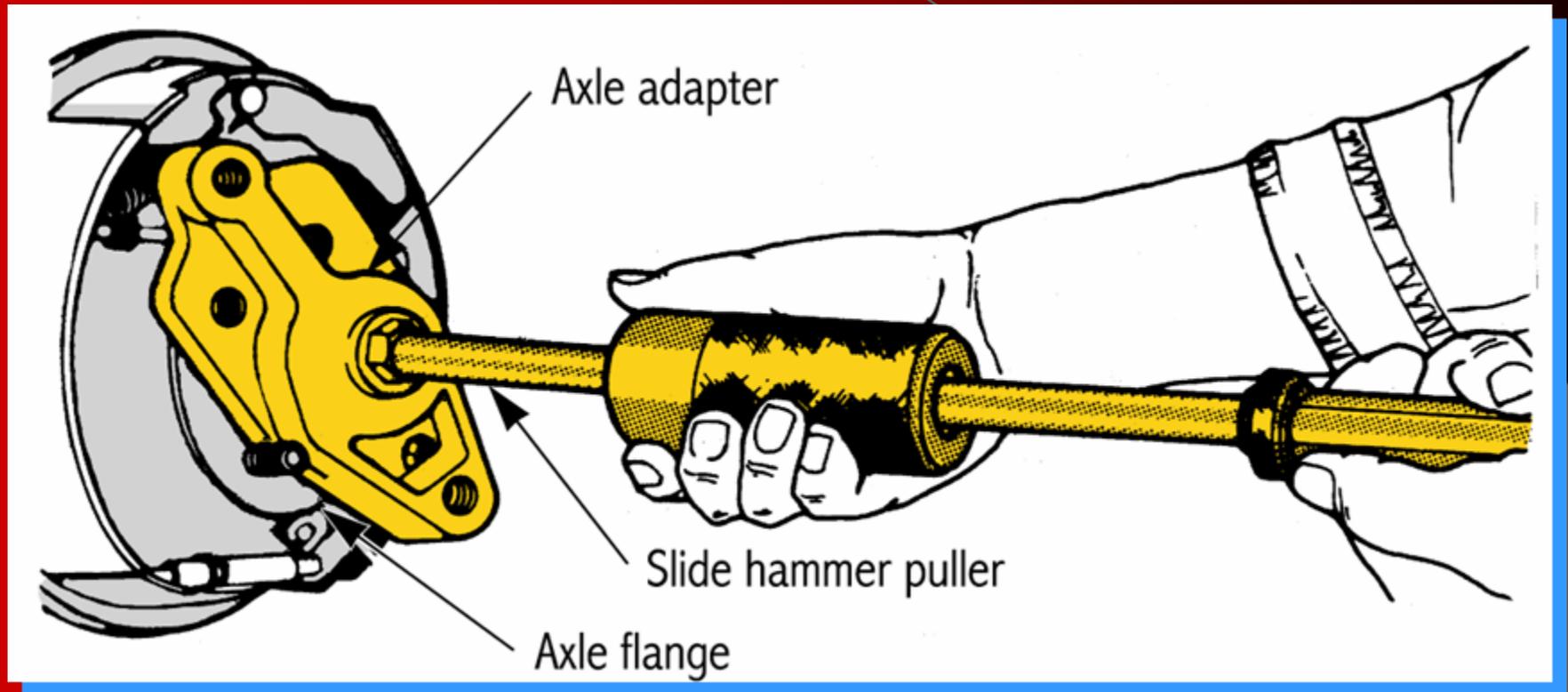


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Differential and Rear Drive Axle Diagnosis and Repair

3. A RETAINING PLATE TYPE AXLE is a method of holding an axle in its housing that commonly is used with a removable carrier
4. INSUFFICIENT AXLE END-PLAY can result in axle bearing, retainer, or differential side gear failure

Axle Removal (with a Retainer Plate)

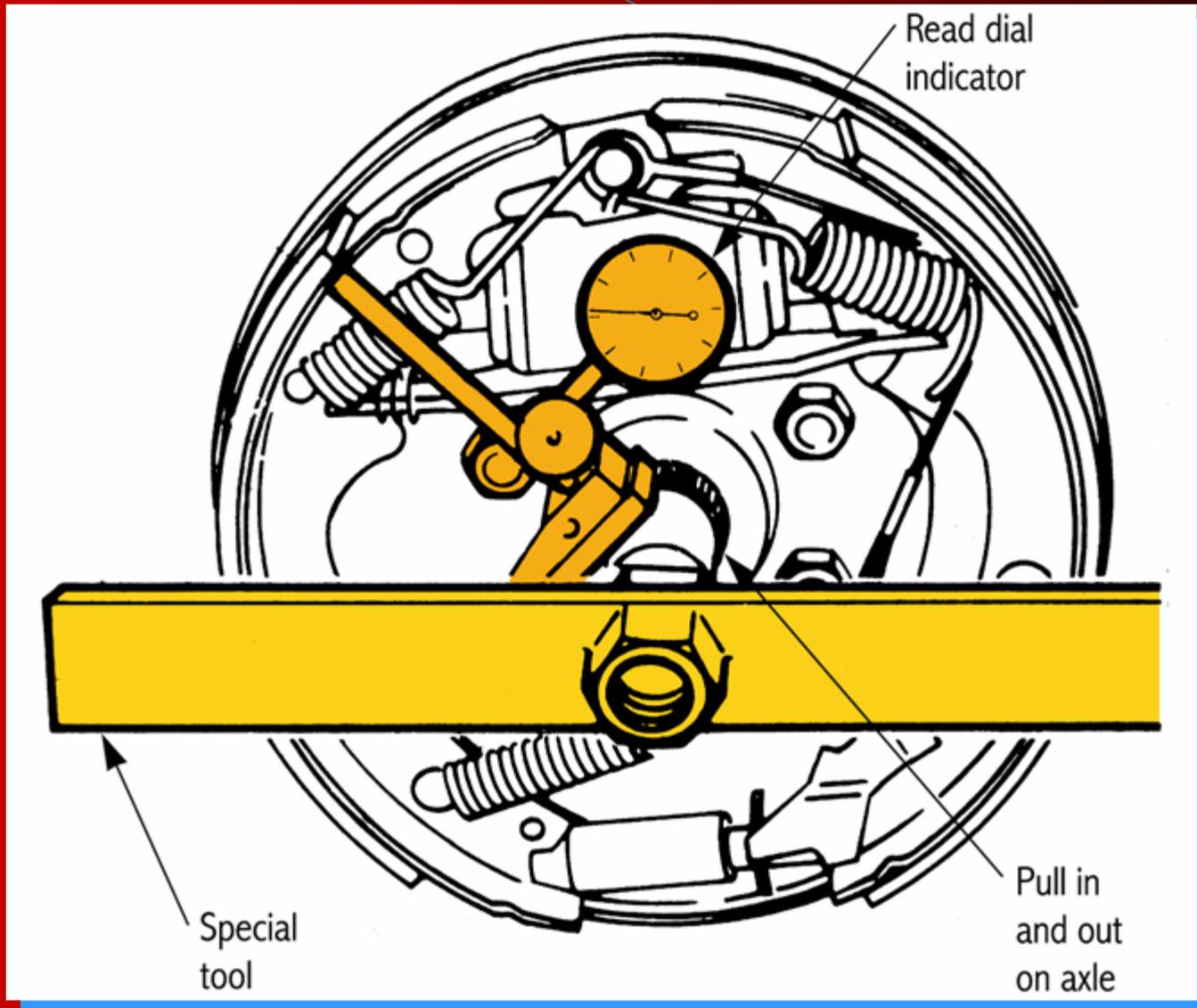


Using a slide hammer puller

Measuring Axle Endplay

- Excessive axle end play can cause a clunking sound as the vehicle corners
- To measure, mount a dial indicator so that the stem is parallel with the axle centerline
- Pull the axle in and out while watching the indicator
- Compare the reading to specs

Measuring Axle Endplay

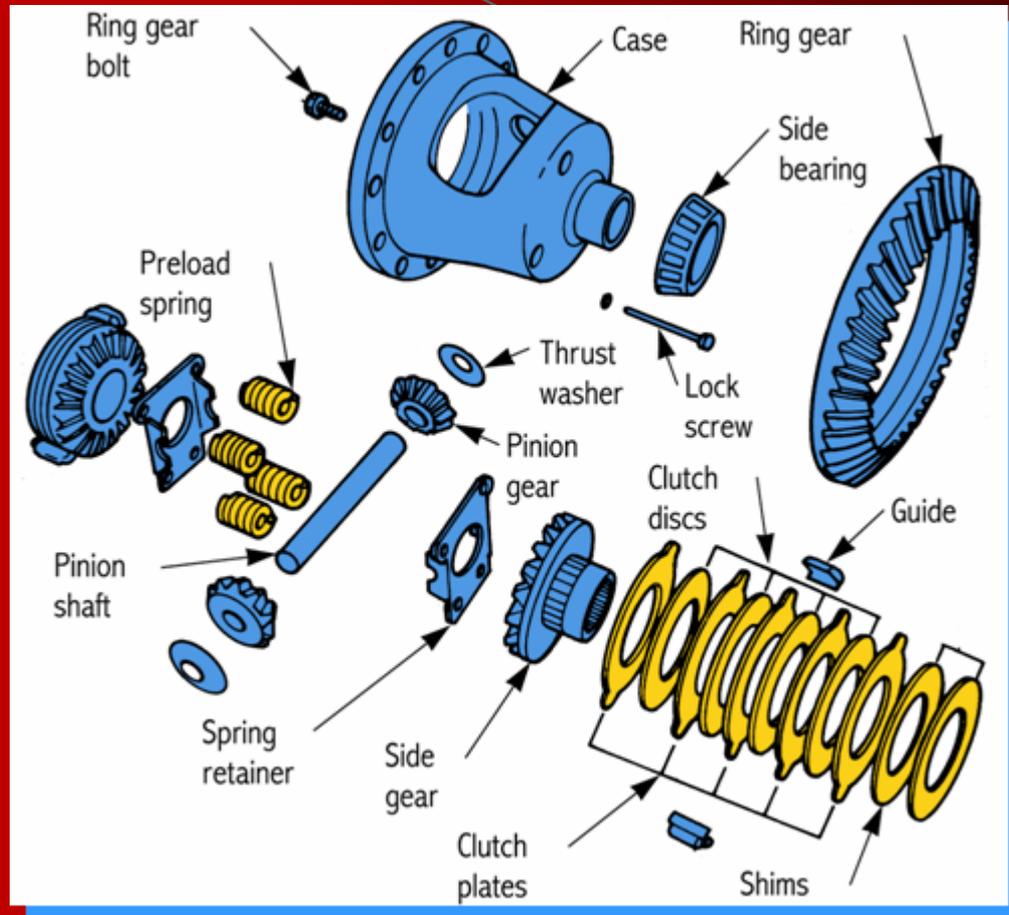


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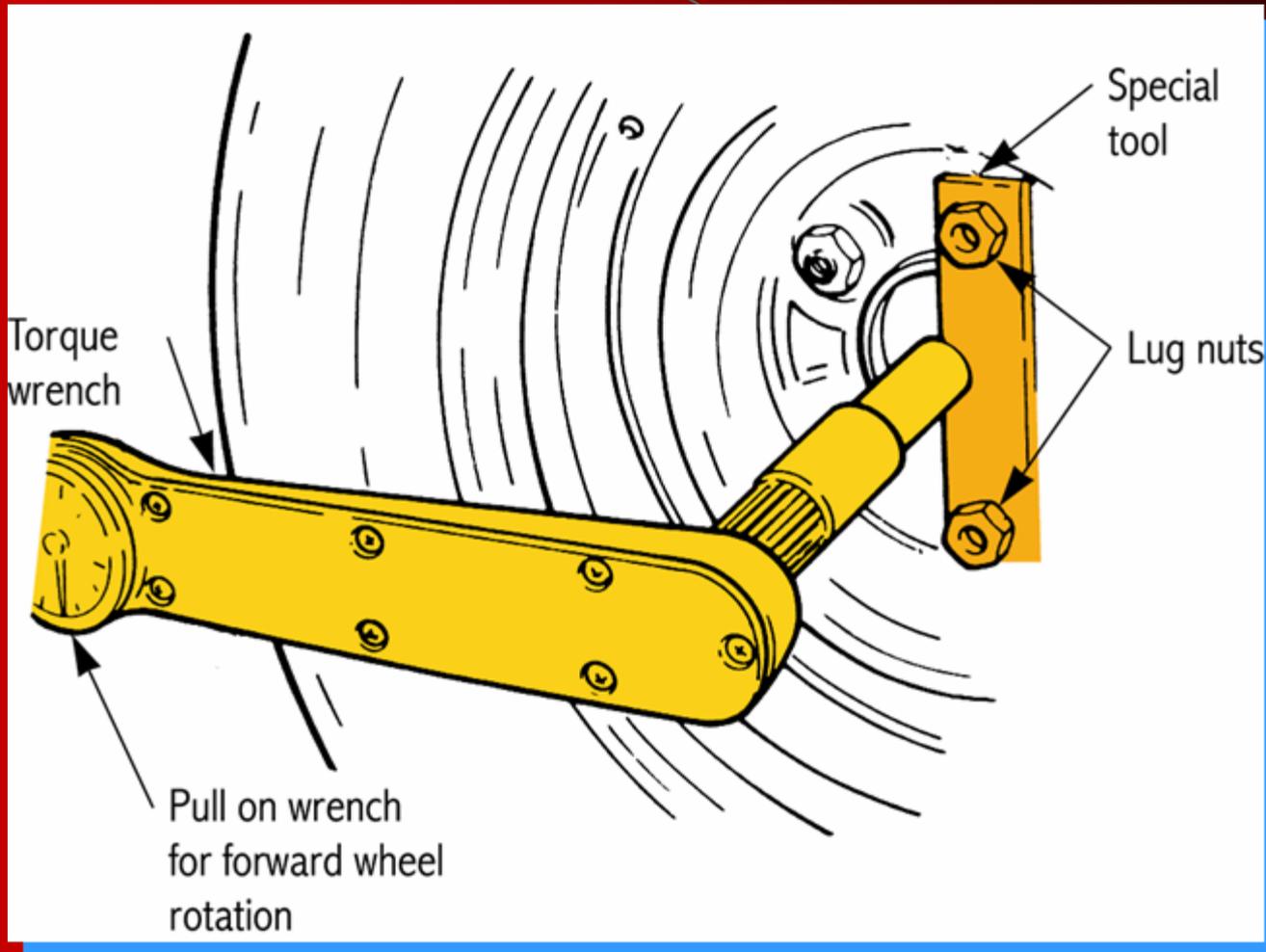
5. **BREAK-AWAY TORQUE** is the amount of torque needed to make one axle or differential side gear rotate the limited-slip differential clutches
6. **RING and PINION BACKLASH** refers to the amount of space between the meshing teeth of the gears

Brake-Away Torque



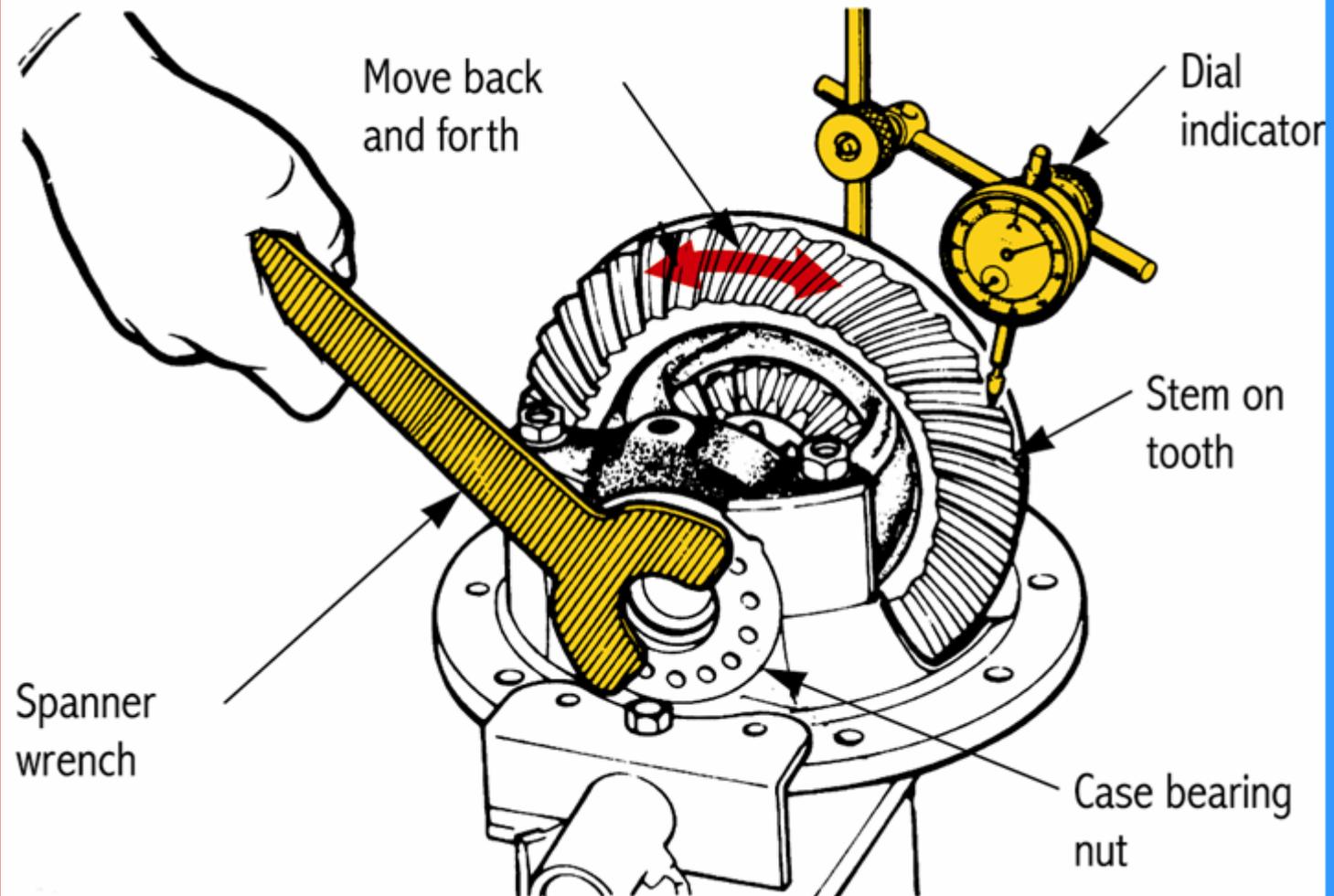
Amount of torque needed to make one axle or differential side gear rotate the limited-slip differential clutches

Diagnosing Break-Away Torque



Compare the “break-away torque” to specs

Ring and Pinion Backlash



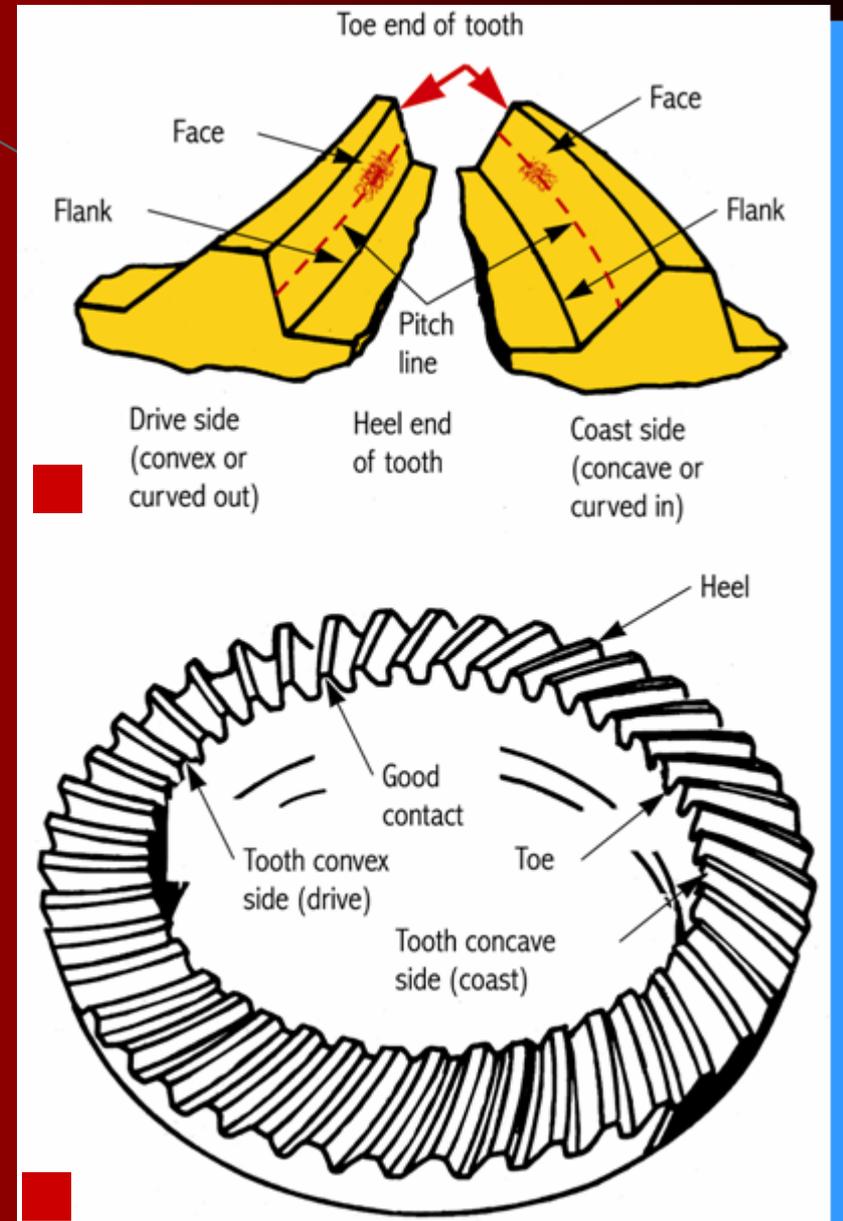
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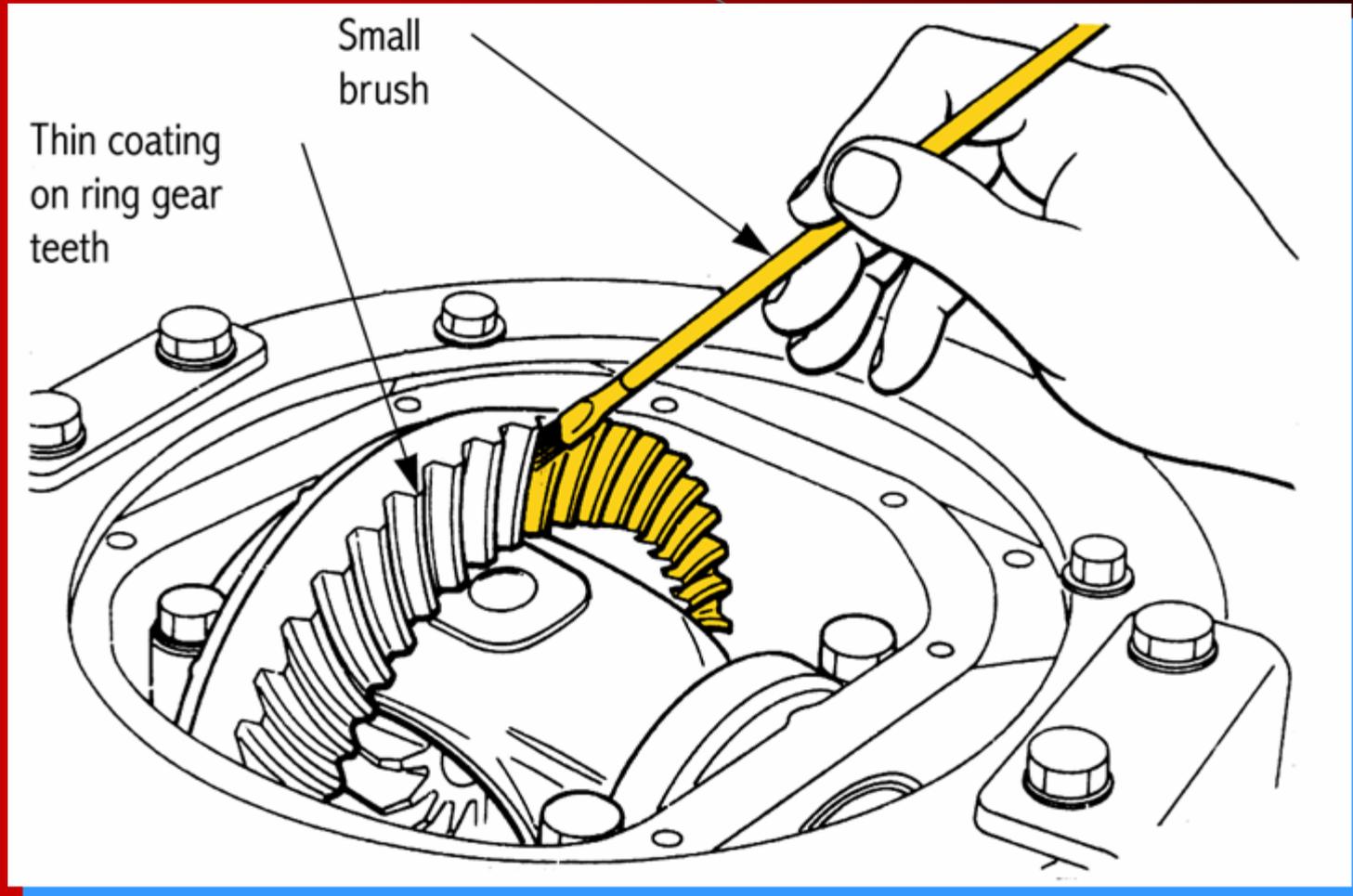
7. A **STETHOSCOPE** can often be used to isolate the source of a differential or rear axle bearing problem
8. A **CLUNKING SOUND** can be produced by the gears if the backlash between the ring and pinion is too great

Gear Tooth Terminology

Note the names of the areas on the ring gear teeth

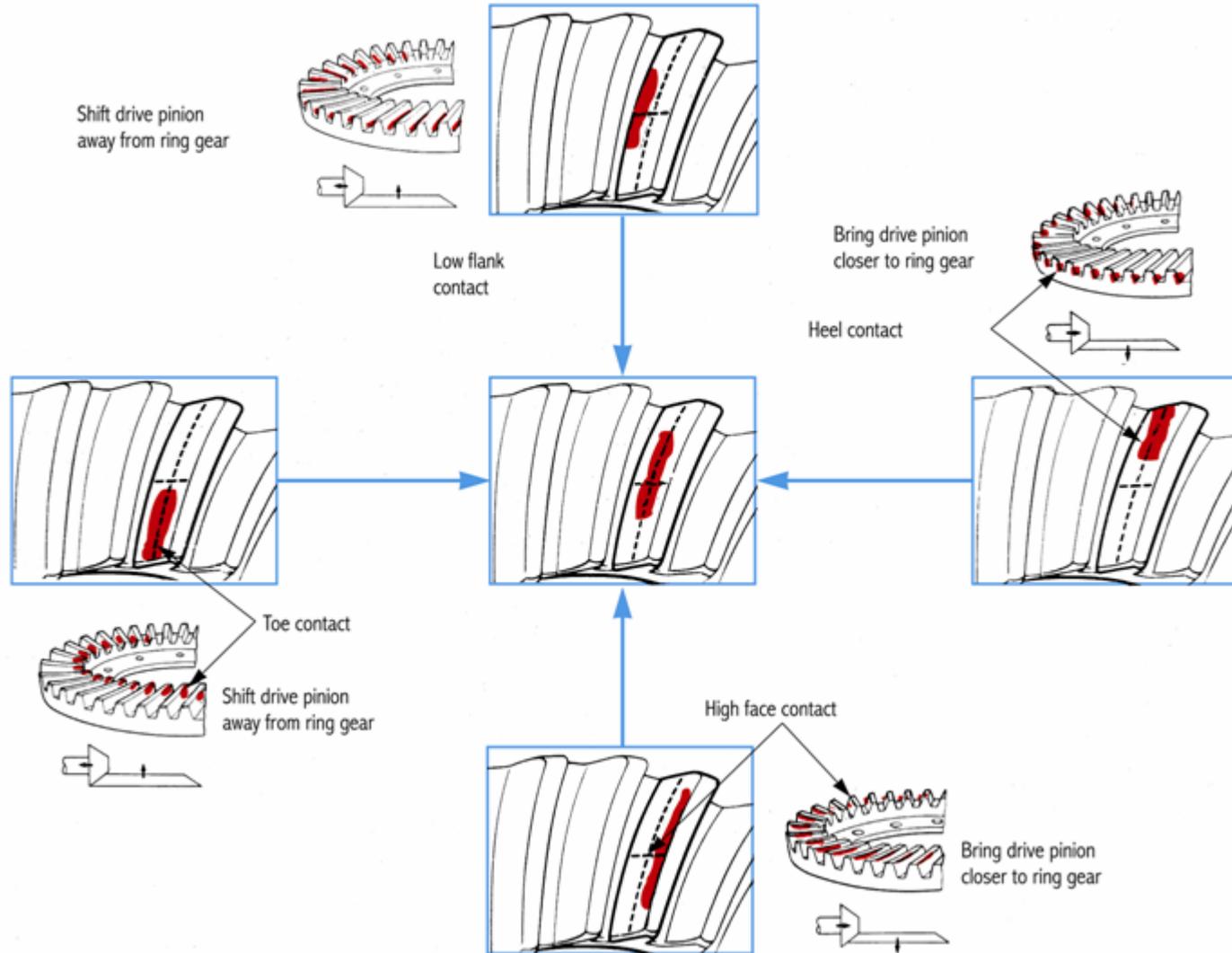


Contact Pattern



Checking gear contact pattern

Contact Patterns



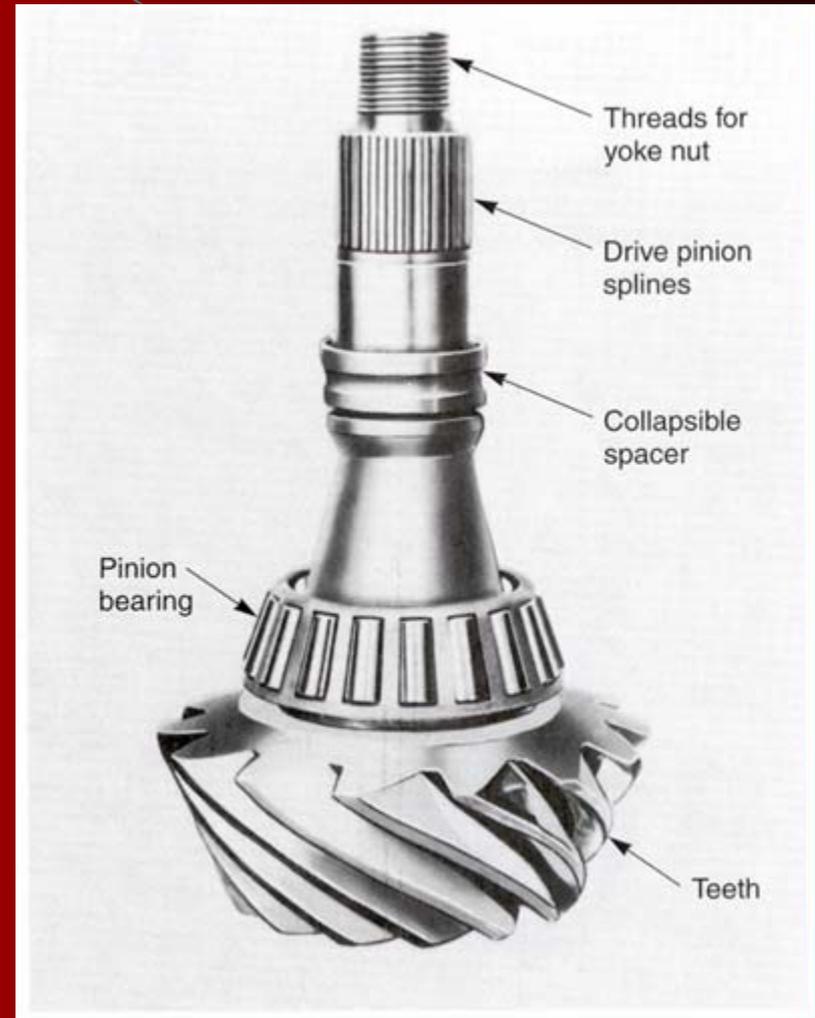
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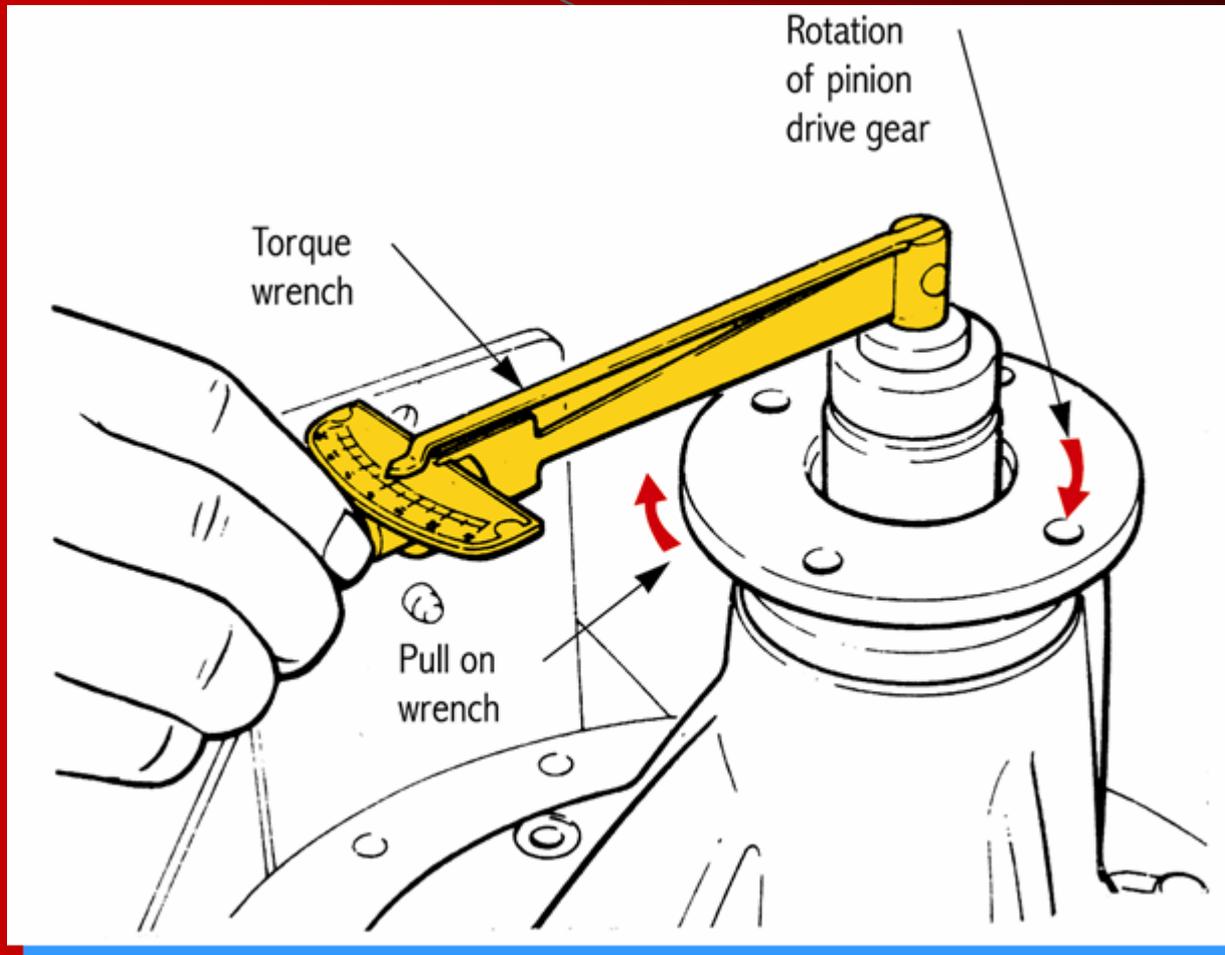
9. The PINION GEAR PRELOAD is frequently adjusted by torquing the pinion nut to compress a collapsible spacer
10. DIFFERENTIAL CASE TROUBLES frequently show up when rounding a corner as an abnormal sound (knocking or grinding) from the rear of the vehicle

Pinion Gear Spacer

If the pinion gear has
a collapsible spacer,
always replace it

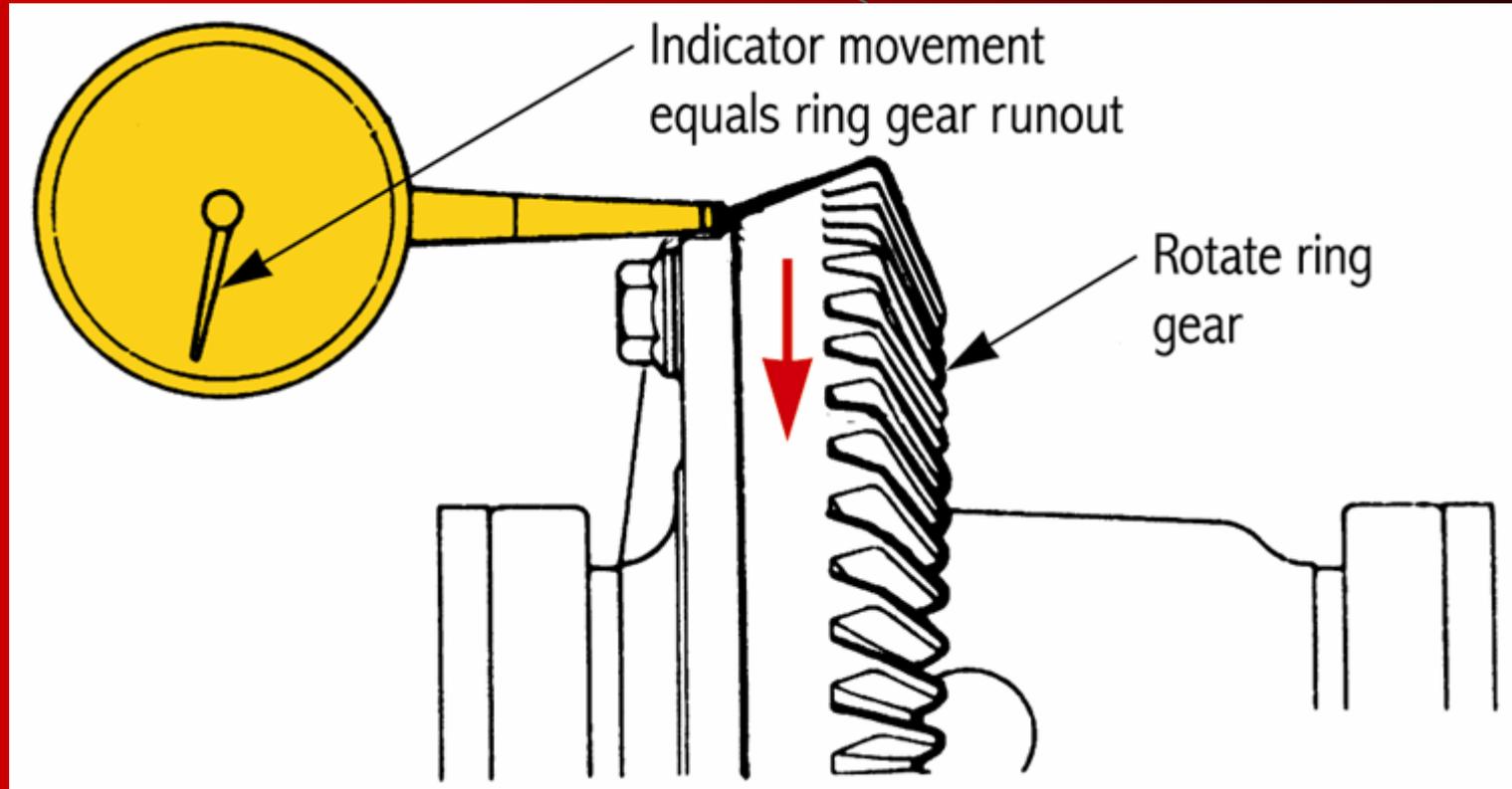


Pinion Bearing Preload



Measure preload with a torque wrench.
Compare the measurement to specs

Ring Gear Runout



If runout is excessive, check ring gear mounting and case runout

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