AUTOMOTIVE Youth Educational Systems YES The Passport to a Rewarding Automotive Career

ASE CERTIFIED

Modern Automotive Technology Chapter 61

Differential and Rear Drive Axle Fundamentals

North Montco Technical Career Center

Learning Objectives

- Identify the major parts of a rear drive axle assembly.
- List the functions of a rear axle assembly.
- Describe the operation of a differential.
- Explain differential design variations.
- Compare different types of axles.
- Describe the principles of a limited-slip differential.
- Relate rear axle ratios to vehicle performance.

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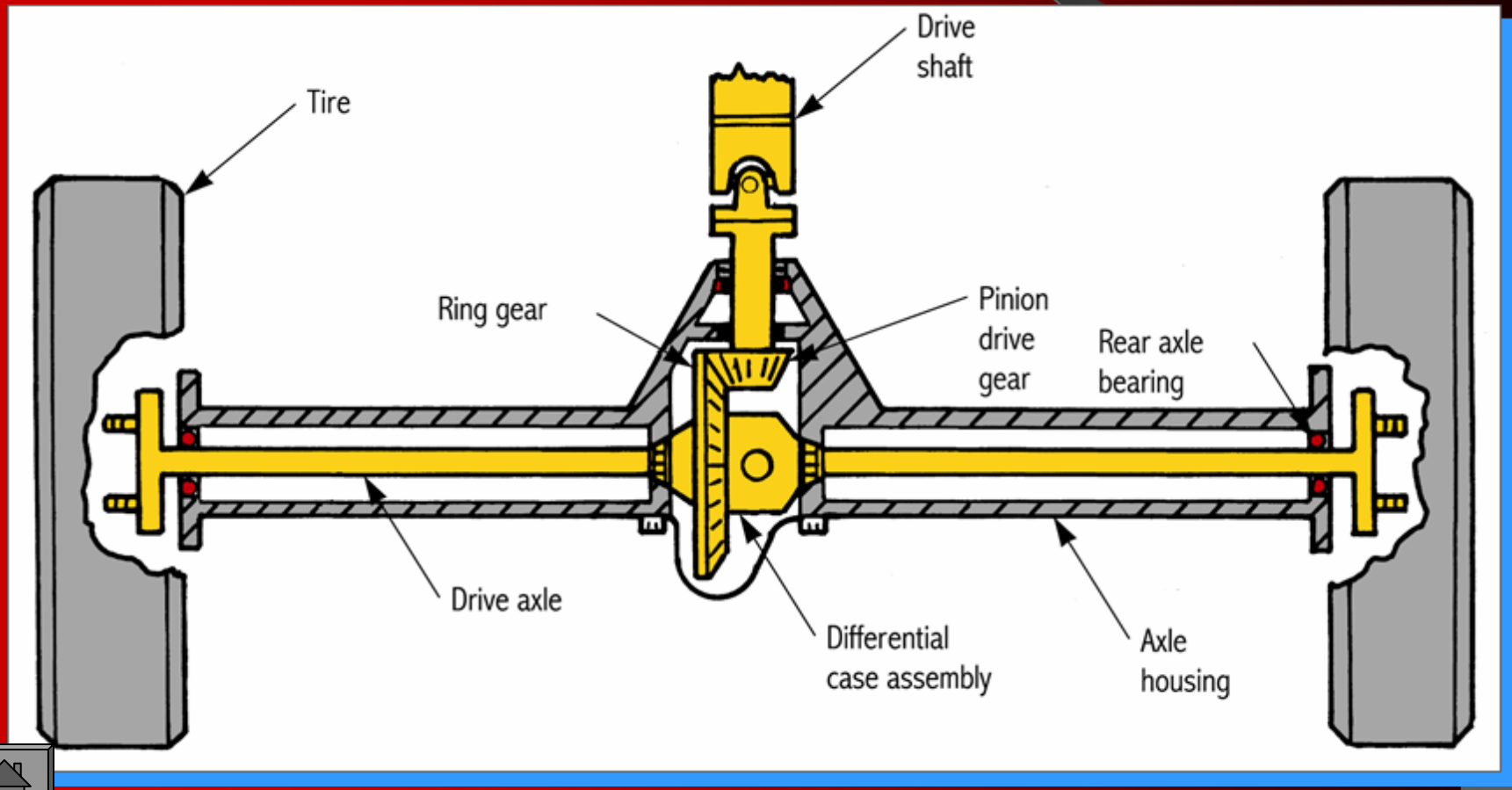
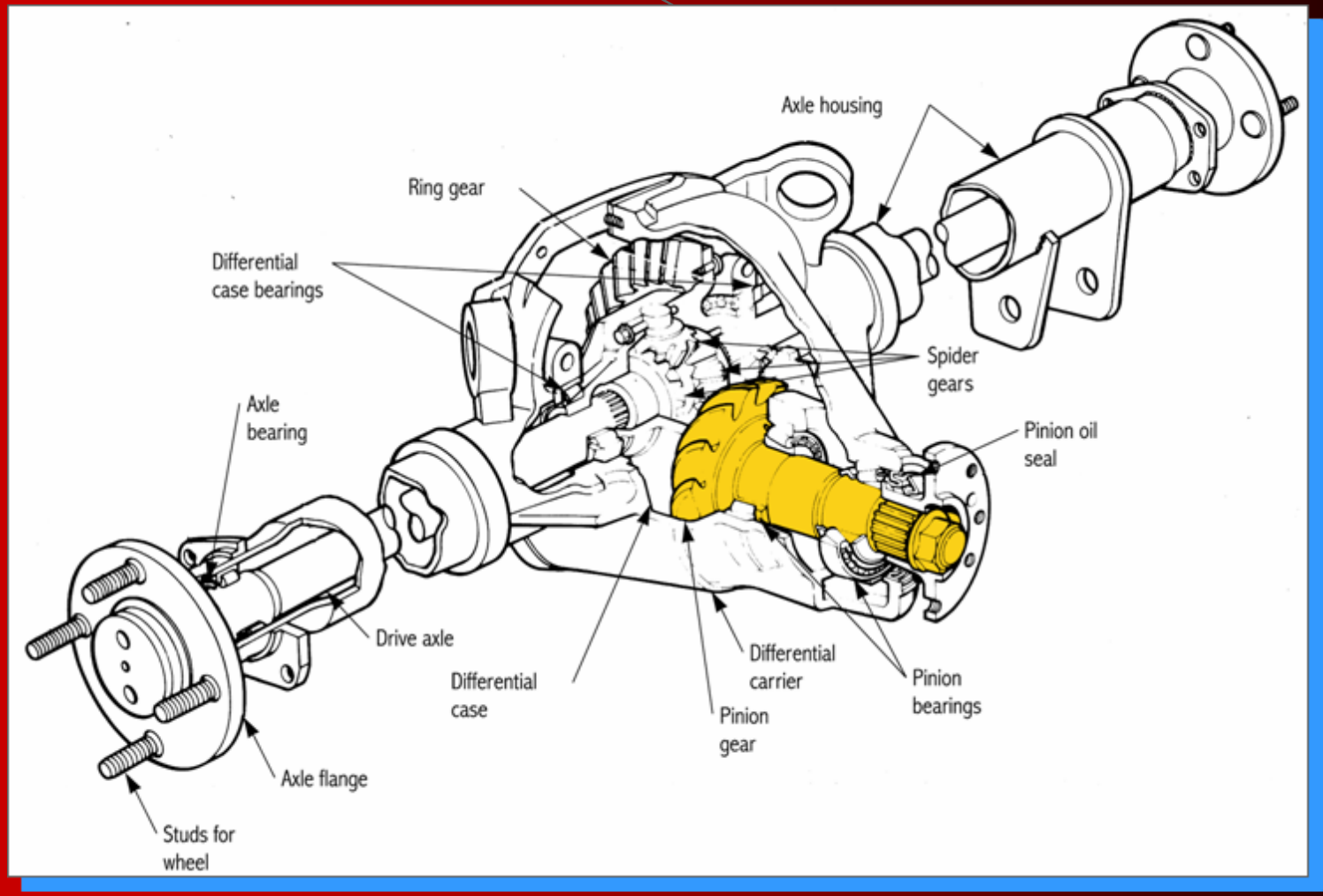
1. The AXLE HOUSING is the metal body housing that encloses and supports parts of rear axle housing

2. REAR AXLE BEARINGS are either ball or roller type bearings that fit between axles and inside of axle housing

Basic Rear Drive Axle Assembly



Axle Housing



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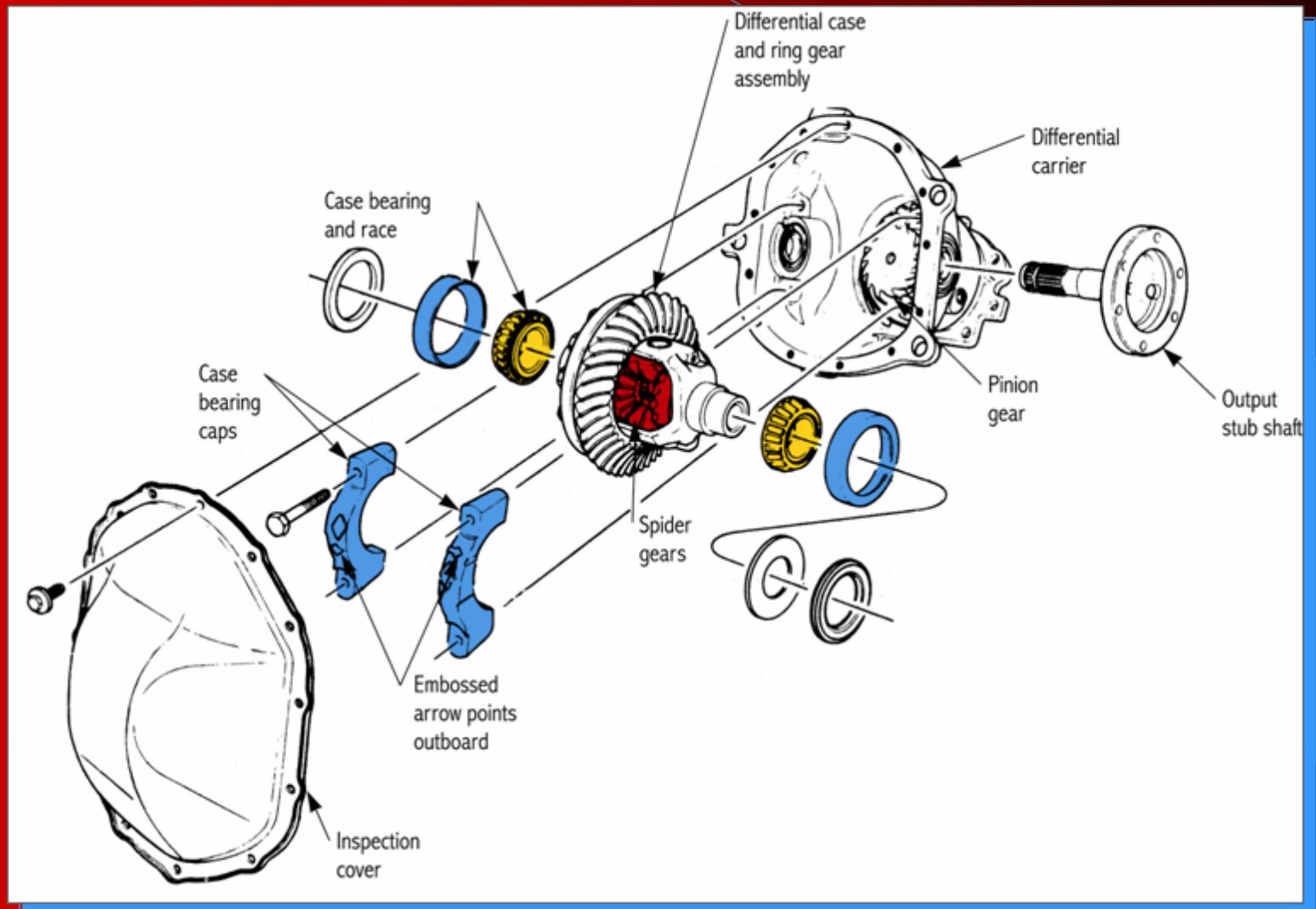
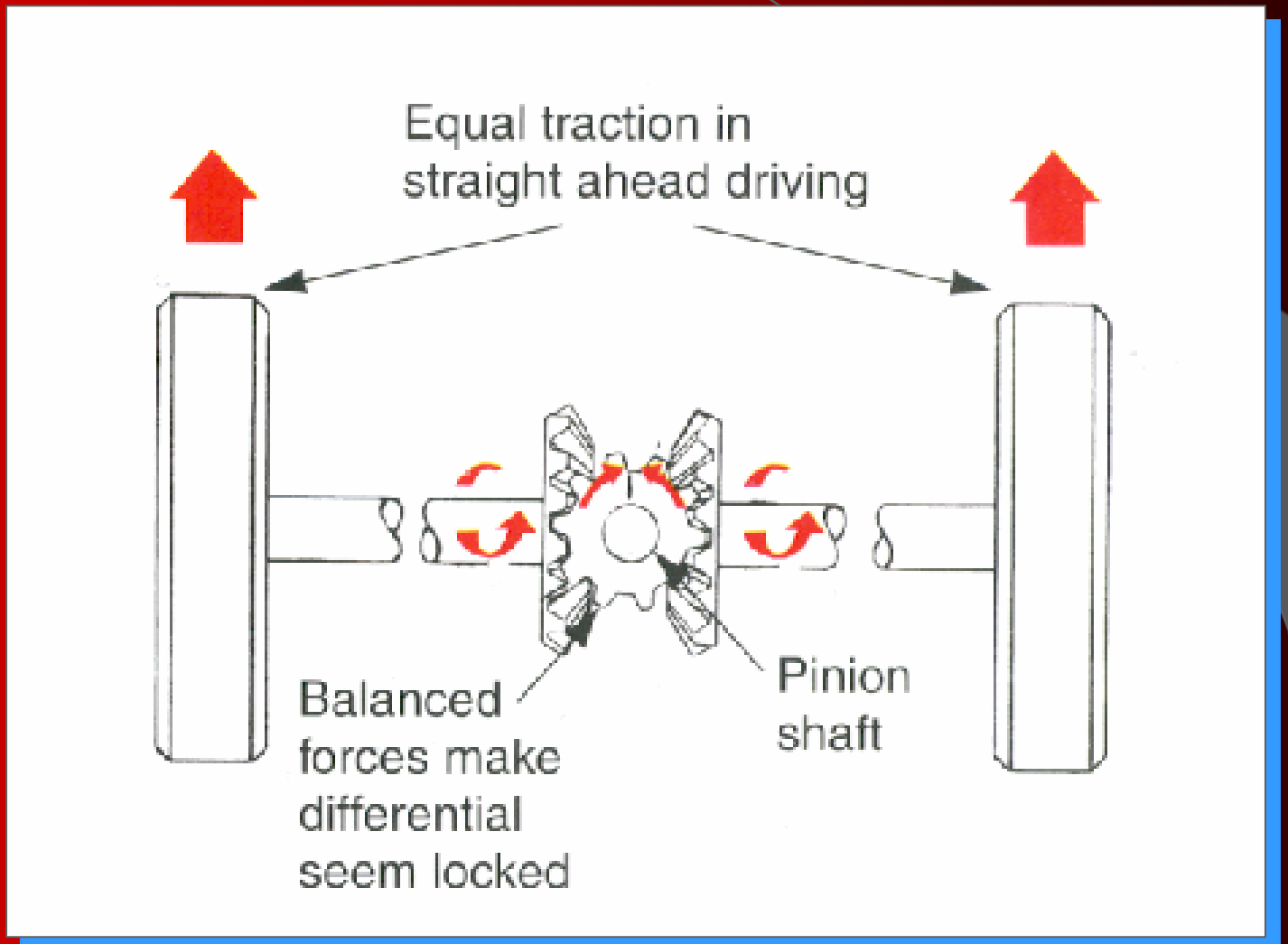
3. The REAR DRIVE AXLES connect the differential side gears to the drive wheels and normally support the weight of the vehicle

4. The DIFFERENTIAL CASE ASSEMBLY holds the ring gear and other components that drive the rear axles

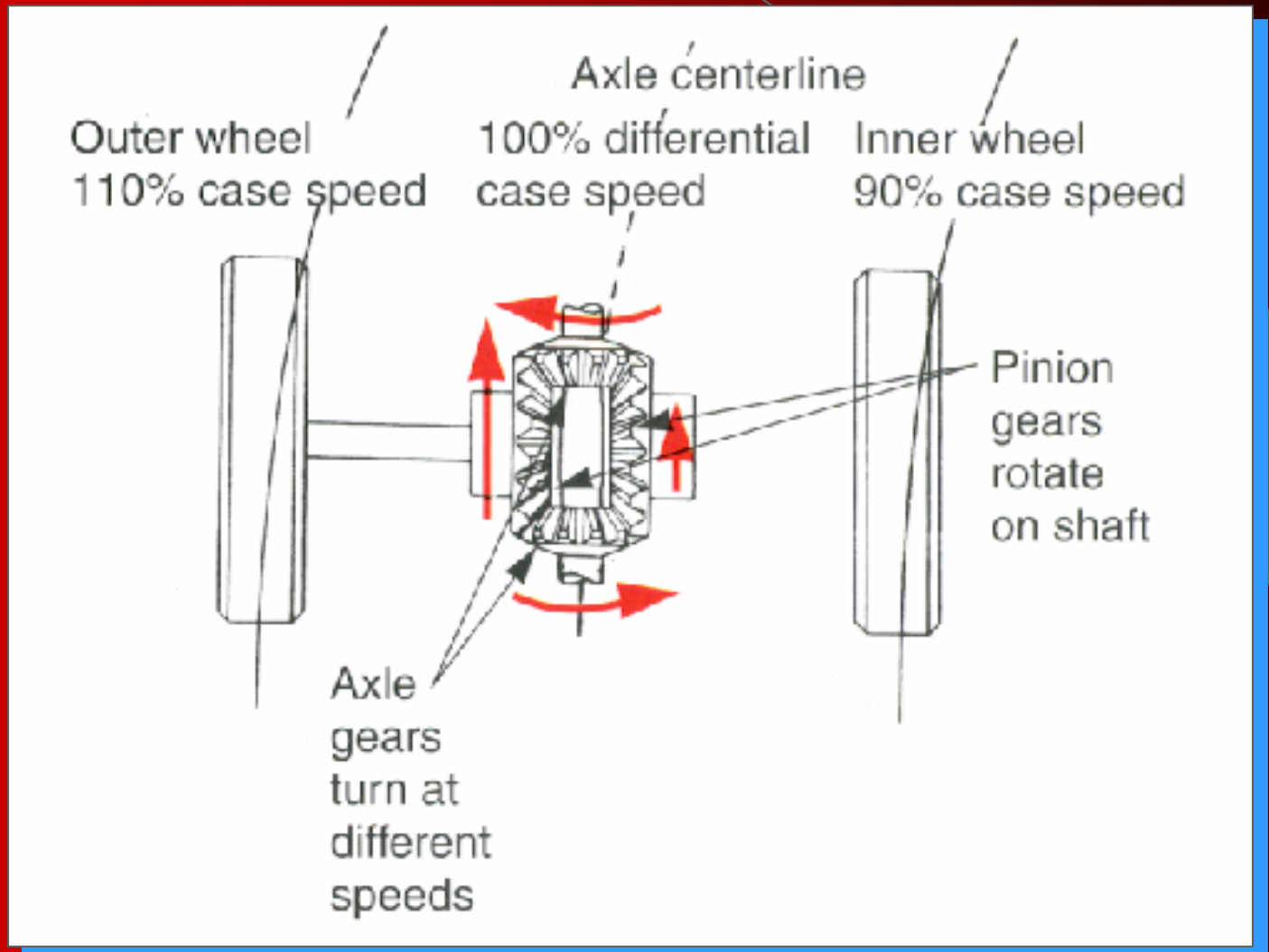
Differential Case



Driving Straight Ahead



Turning Corners



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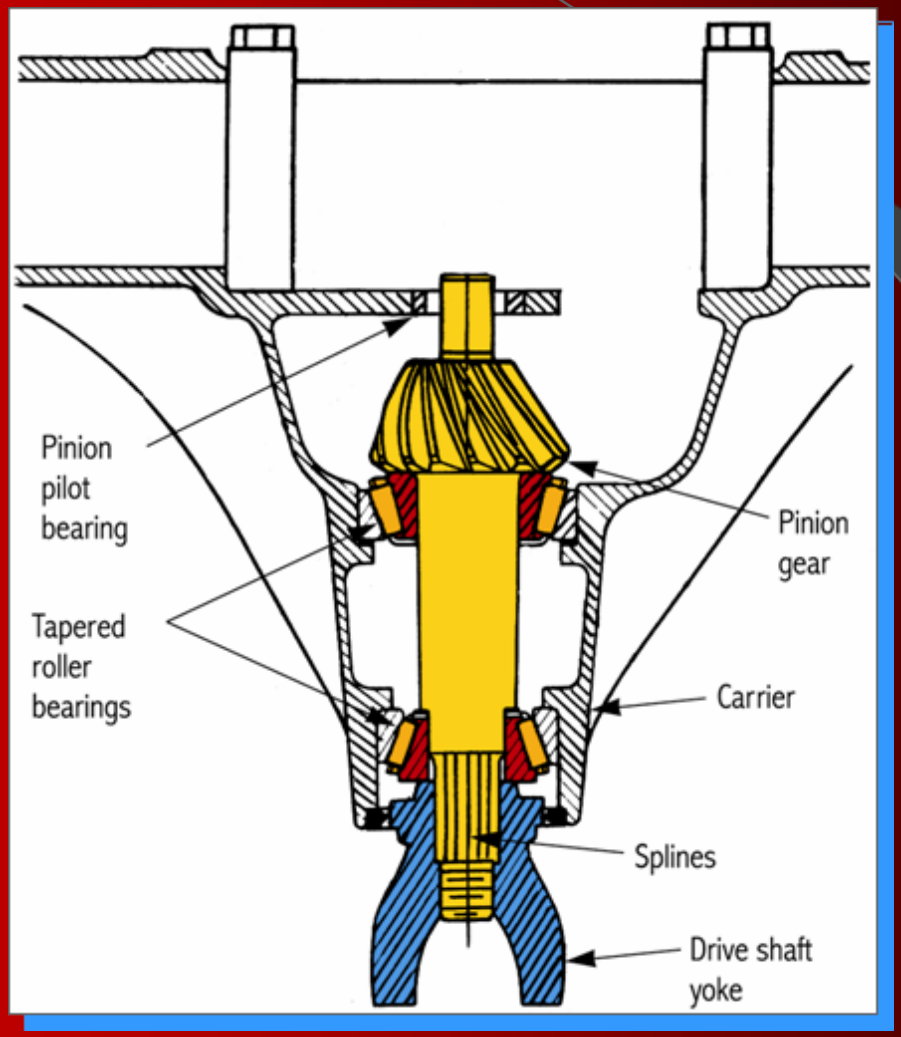
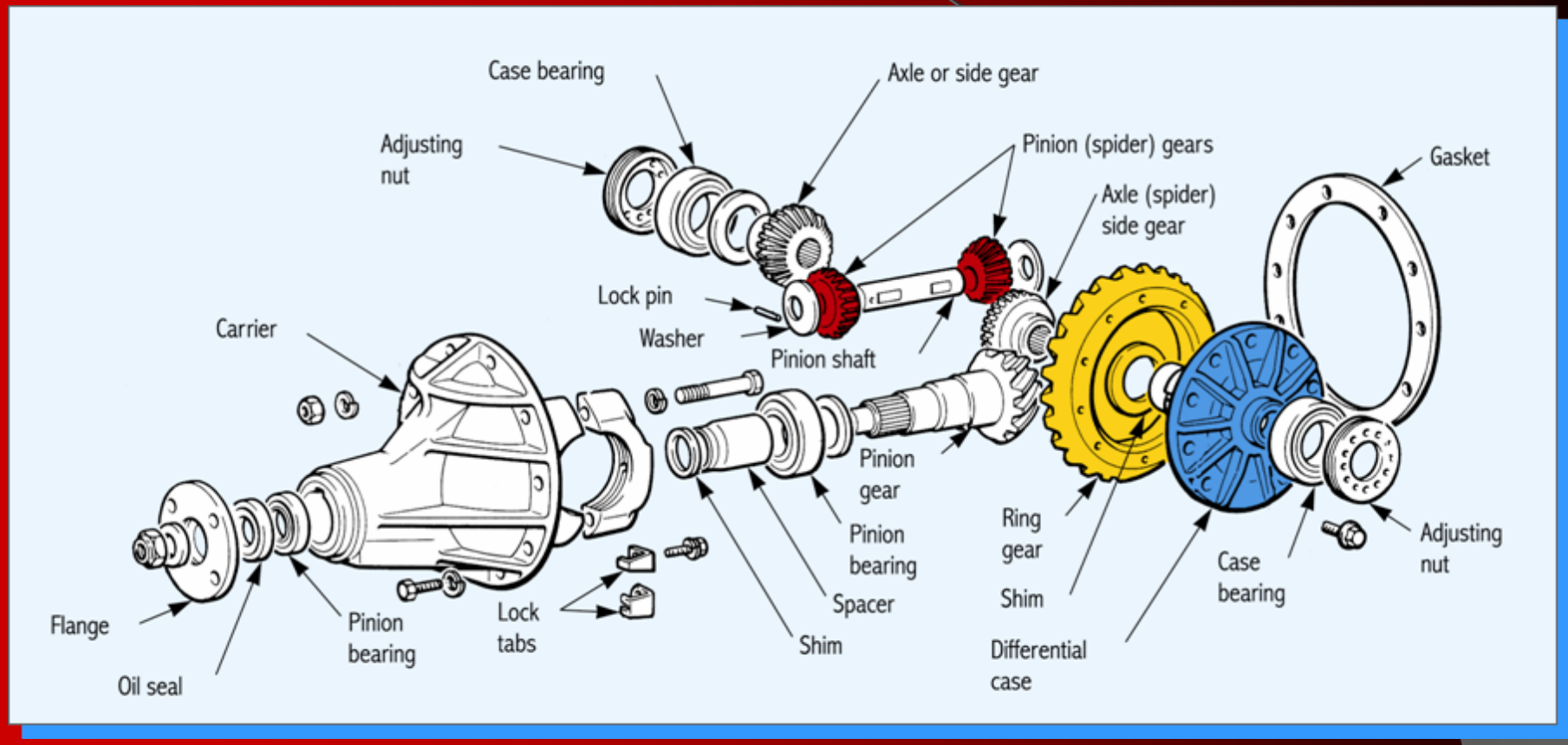
5. The RING GEAR transfers the turning power of pinion drive gear to the differential case assembly

6. The PINION DRIVE GEAR transfers power from drive shaft to ring gear

Pinion Gear


Pinion pilot bearing
Tapered roller bearings
Pinion gear
Carrier
Splines
Drive shaft yoke

Differential Assembly



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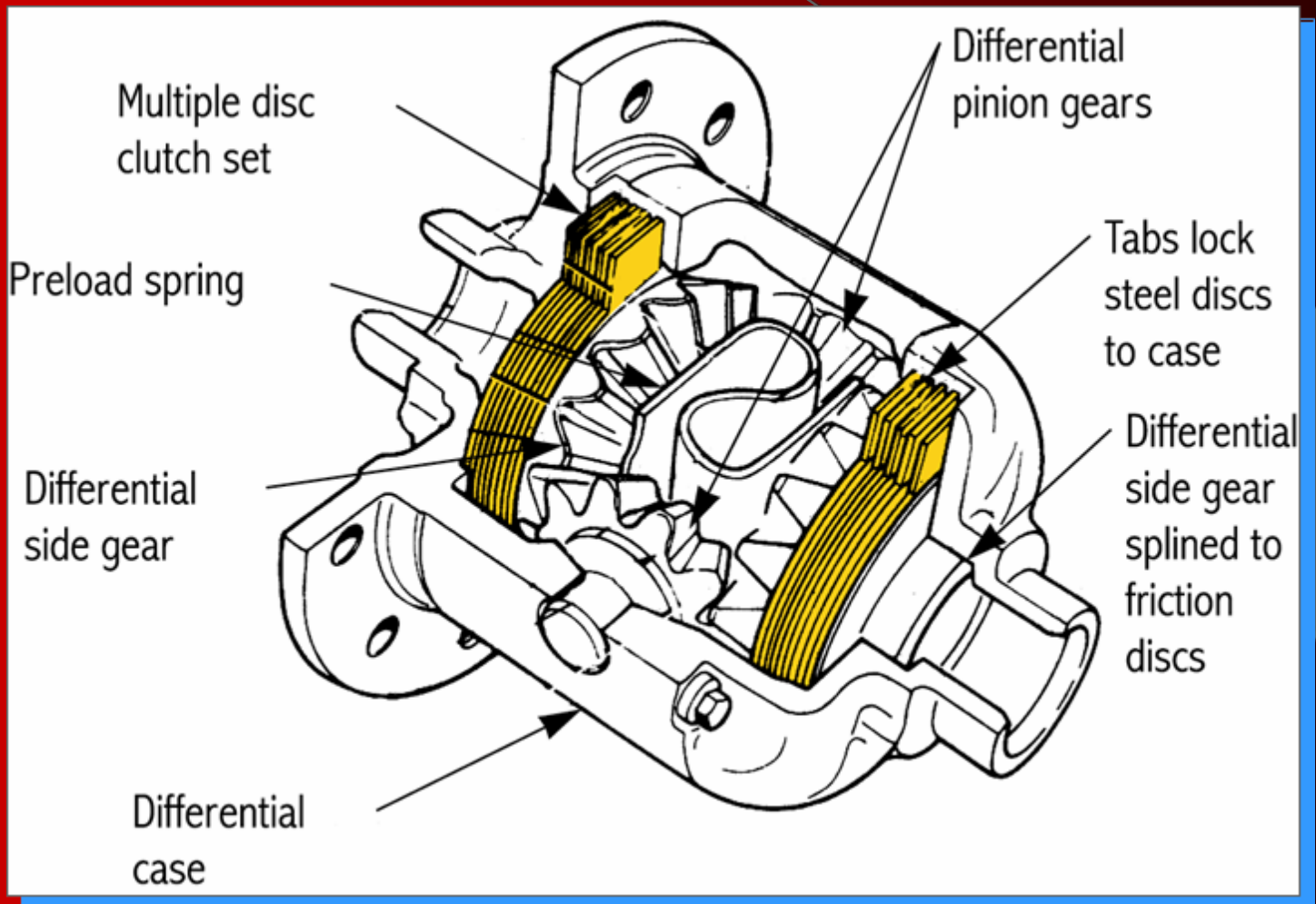
7. A LIMITED SLIP DIFFERENTIAL provides driving force to both rear wheels at all times

8. The REAR AXLE RATIO is determined by comparing the number of teeth on the pinion drive gear and on the ring gear

Limited Slip Differentials

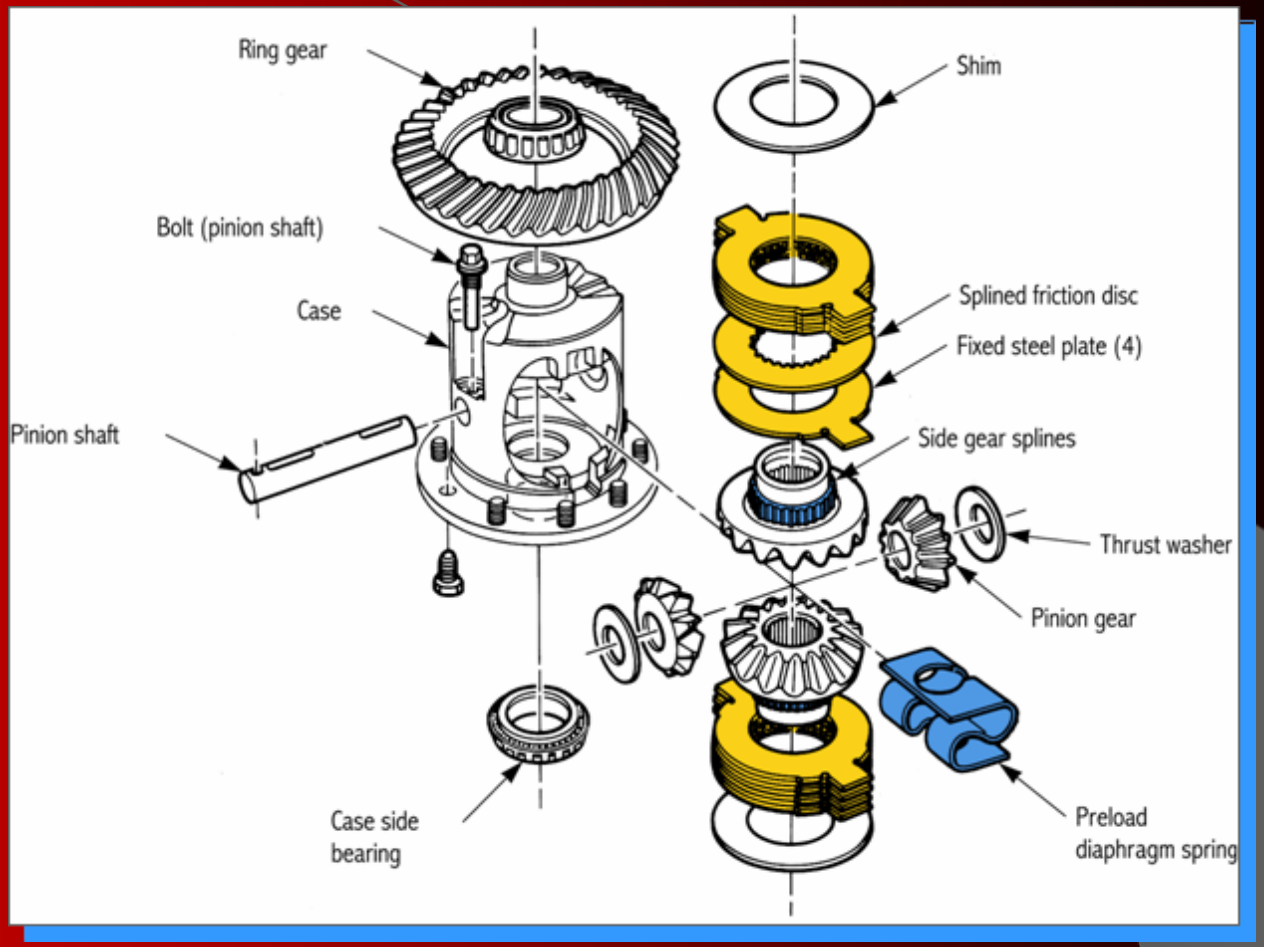
- When one wheel of a conventional rear axle assembly lacks traction, the other wheel will not propel the vehicle
- Torque will flow to the axle that turns easiest
- Limited-slip differentials provide driving force to both rear wheels at all times

Clutch Pack Differential



Clutch Pack Differential

Diaphragm spring preloads the clutch discs



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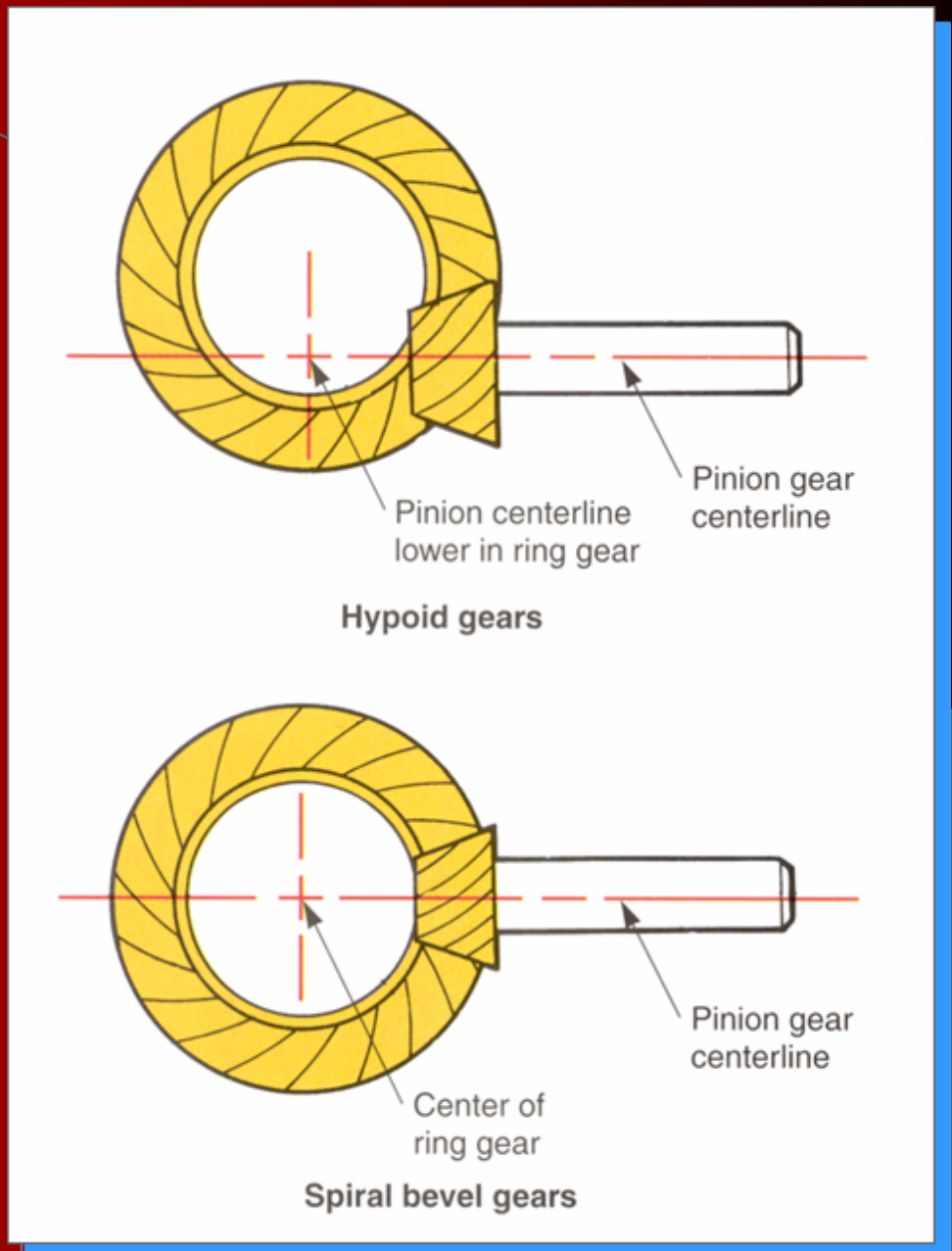
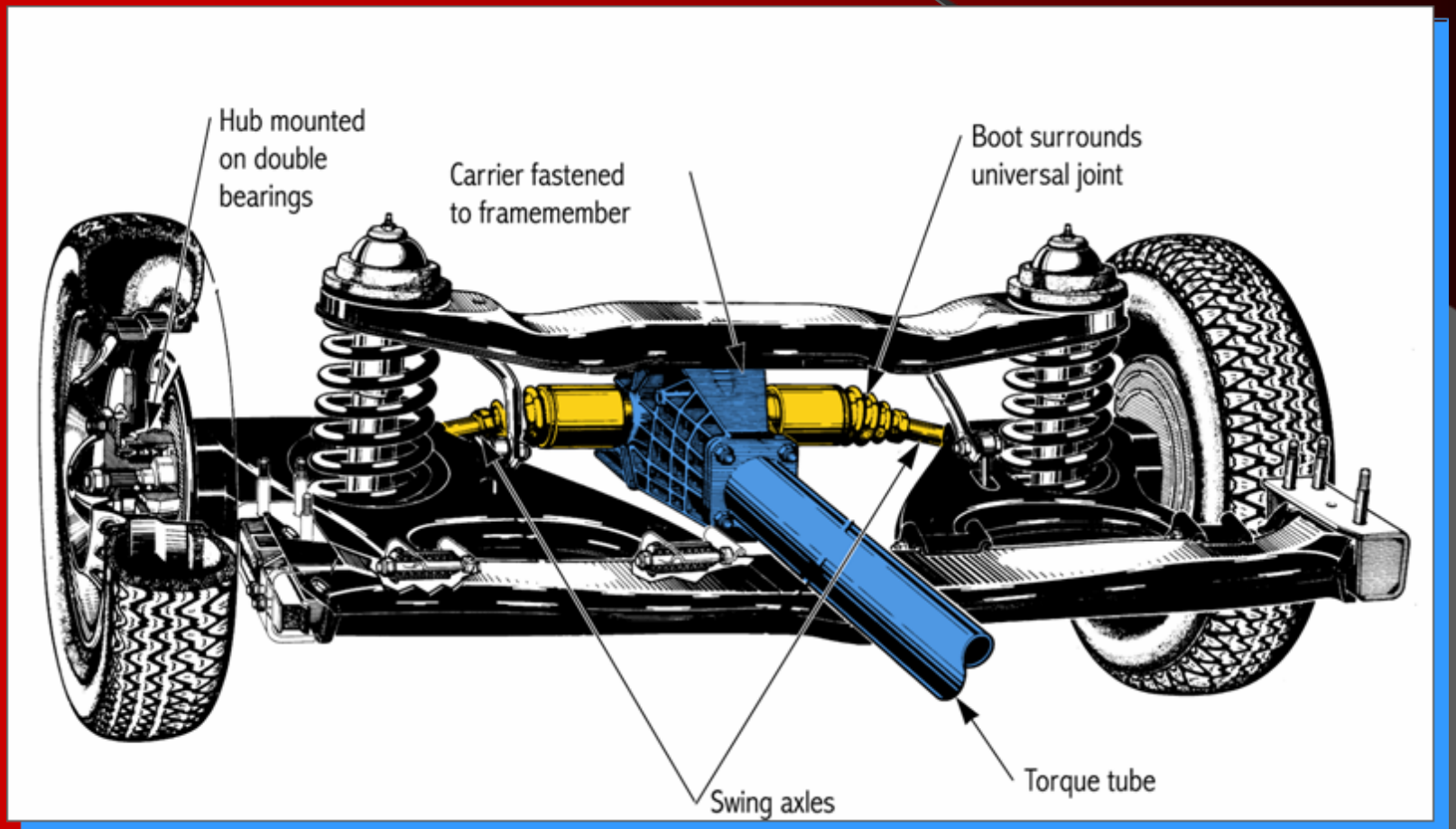
9. The driving pinion centerline of a HYPOID GEAR SET is offset — or lowered — from the centerline of the ring gear

10. SWING AXLES are used when the differential is mounted solidly on the car's frame

Hypoid and Spiral Bevel Gears



Swing Axles


Hub mounted on double bearings
Carrier fastened to framemember
Boot surrounds universal joint
Swing axles
Torque tube

Learning Objectives

- Troubleshoot common drive shaft problems.
- Check universal joint wear.
- Measure drive shaft runout.
- Remove and replace a drive shaft assembly.
- Replace universal joints.
- Perform basic service operations on a
- transfer case.
- Cite and practice good safety procedures.