# Modern Automotive Technology Chapter 59

## Drive Shafts and Transfer Cases

North Montco Technical Career Center

# Learning Objectives

- Identify and describe the parts of a modern drive shaft assembly.
- Explain the functions of a drive shaft.
- Describe the different types of universal joints.
- List the different types of drivelines.
- Identify the major parts of four-wheel-drive drivelines.
- Explain the basic operation of a transfer case.

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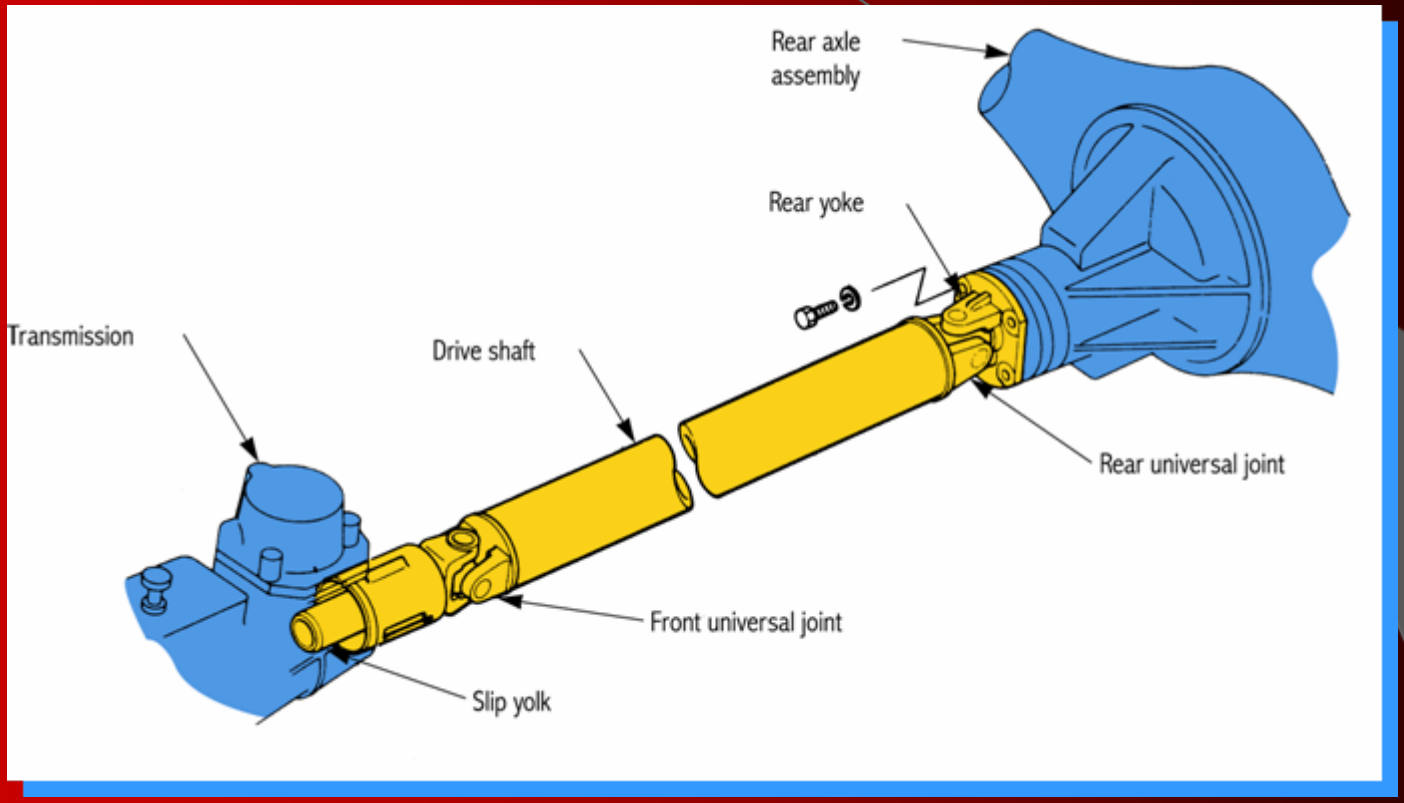
1. A Hotchkiss Driveline has an exposed drive shaft that operates a rear axle assembly mounted on springs.

2. The Rear Yoke holds the rear universal joint and transfers torque to gears in the rear axle assembly.

# Hotch Kiss Driveline

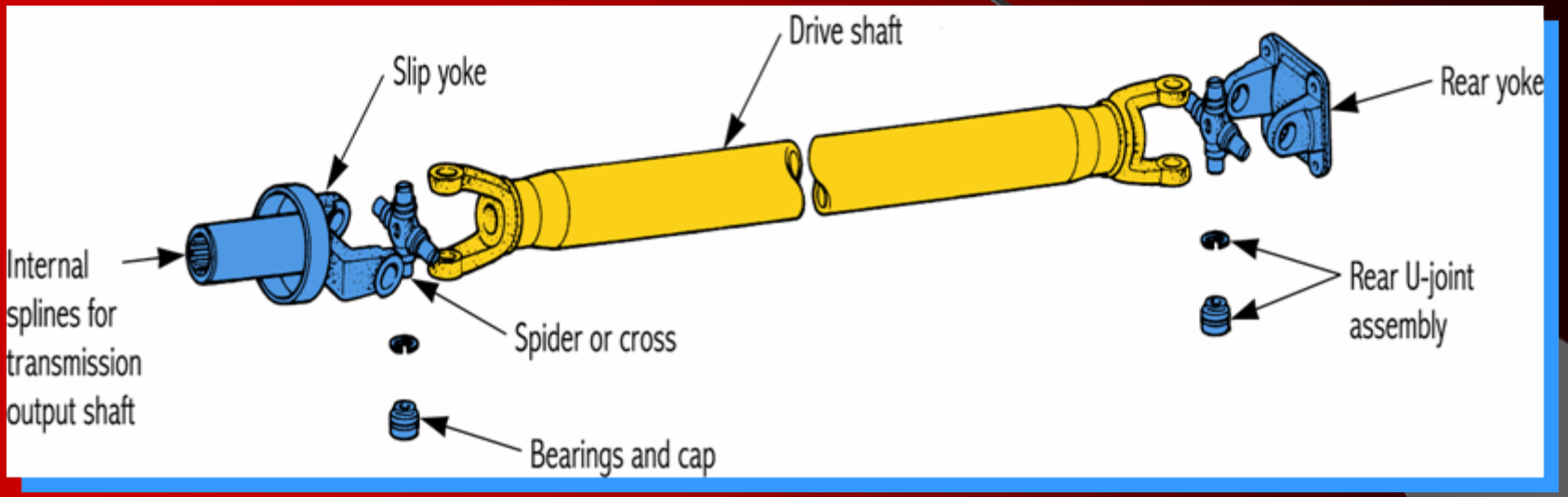
- An exposed drive shaft operates a rear axle assembly mounted on springs
- Most common type of driveline
- Universal joints are used at both ends of the drive shaft
- Cross-and-roller universal joints are most commonly used

# Drive Shaft




Connects the transmission output shaft with the rear axle assembly

# Drive Shaft




Typical drive shaft assembly

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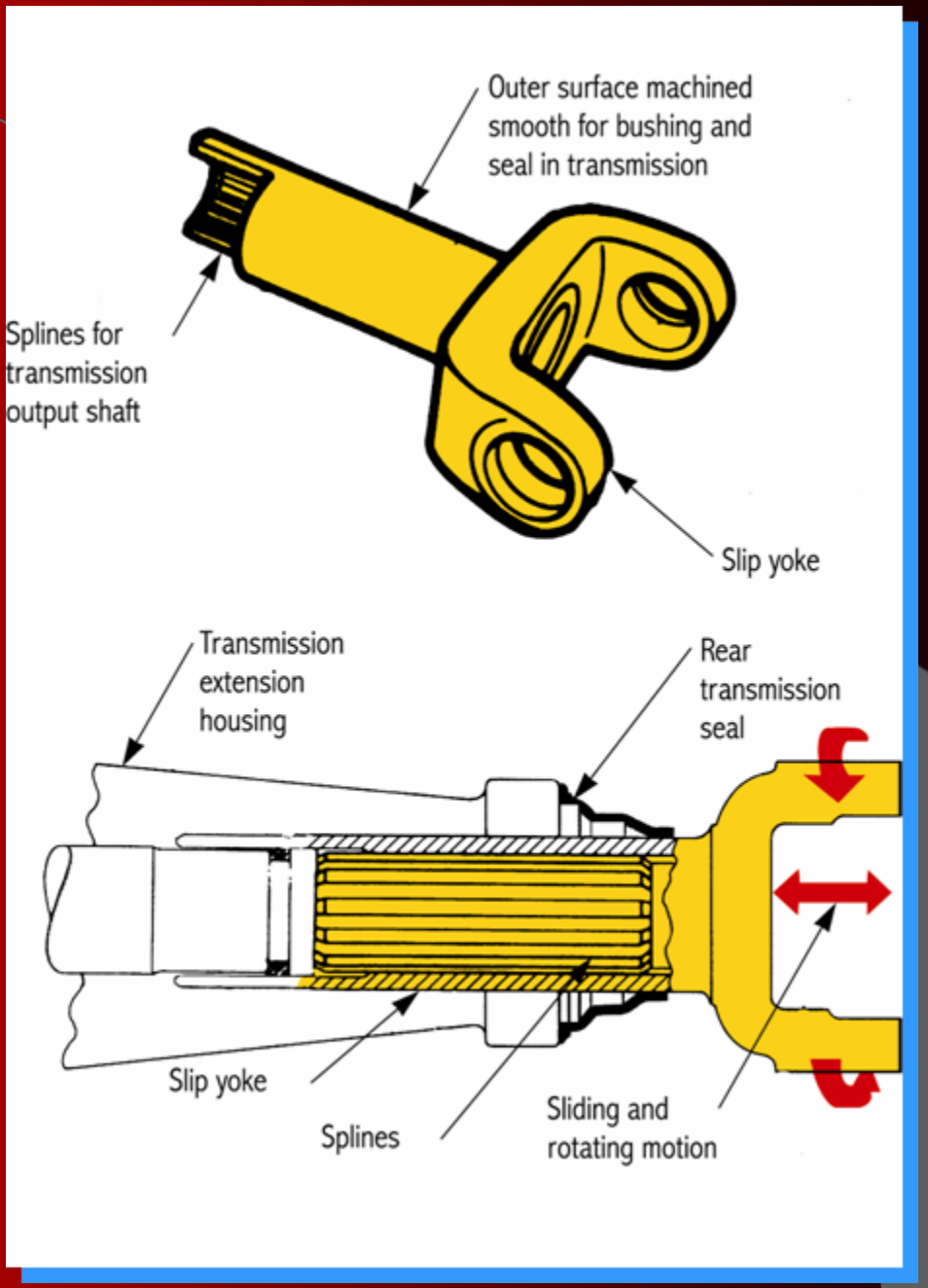
3. A hollow metal tube that transfers turning power from front universal joint to rear universal joint is known as the Drive Shaft

4. The transmission output shaft is connected to the front universal joint by the Slip Yoke

# Slip Yoke


Outer surface machined smooth for bushing and seal in transmission
Splines for transmission output shaft
Slip yoke
Transmission extension housing
Rear transmission seal
Slip yoke
Splines
Sliding and rotating motion

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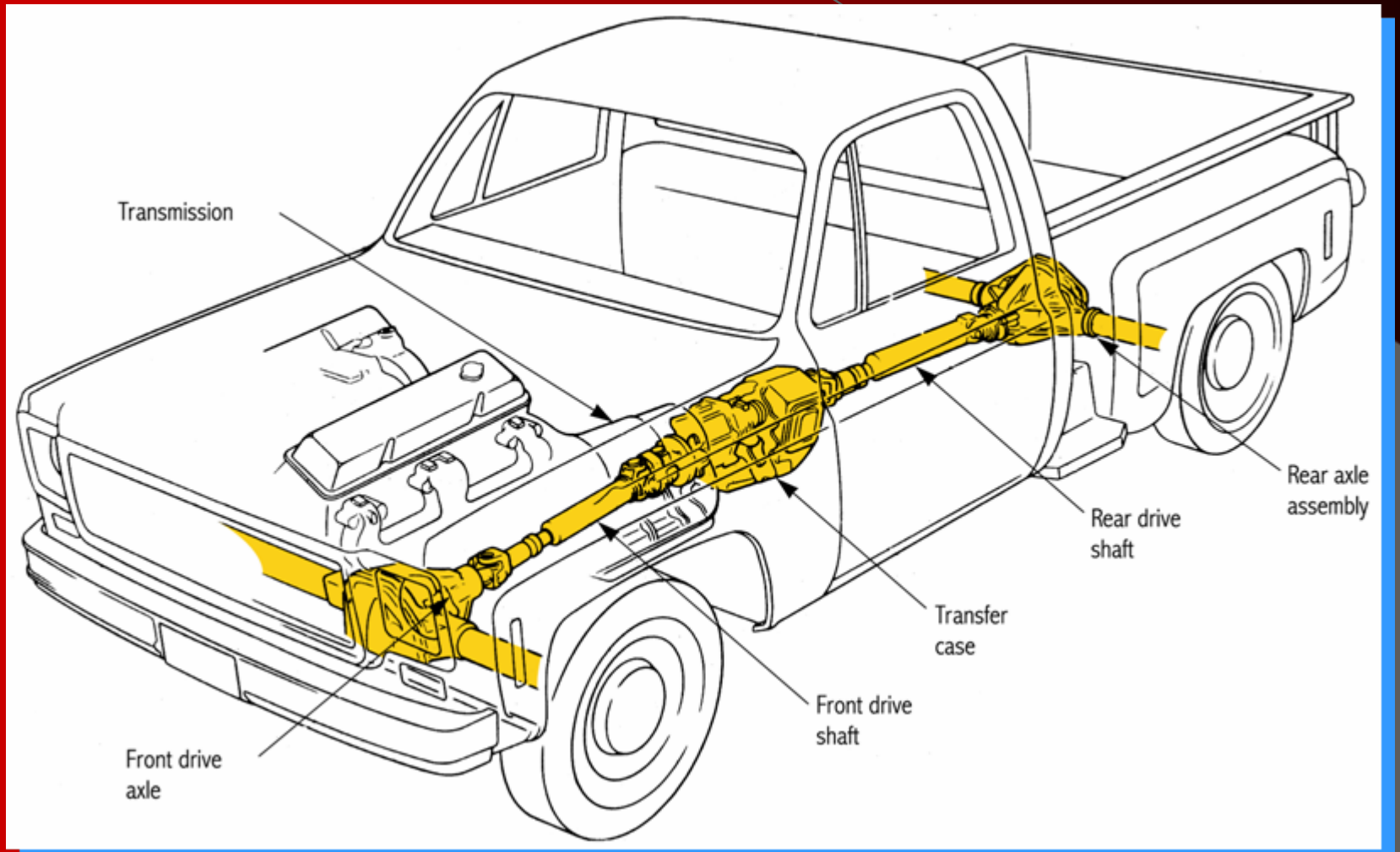
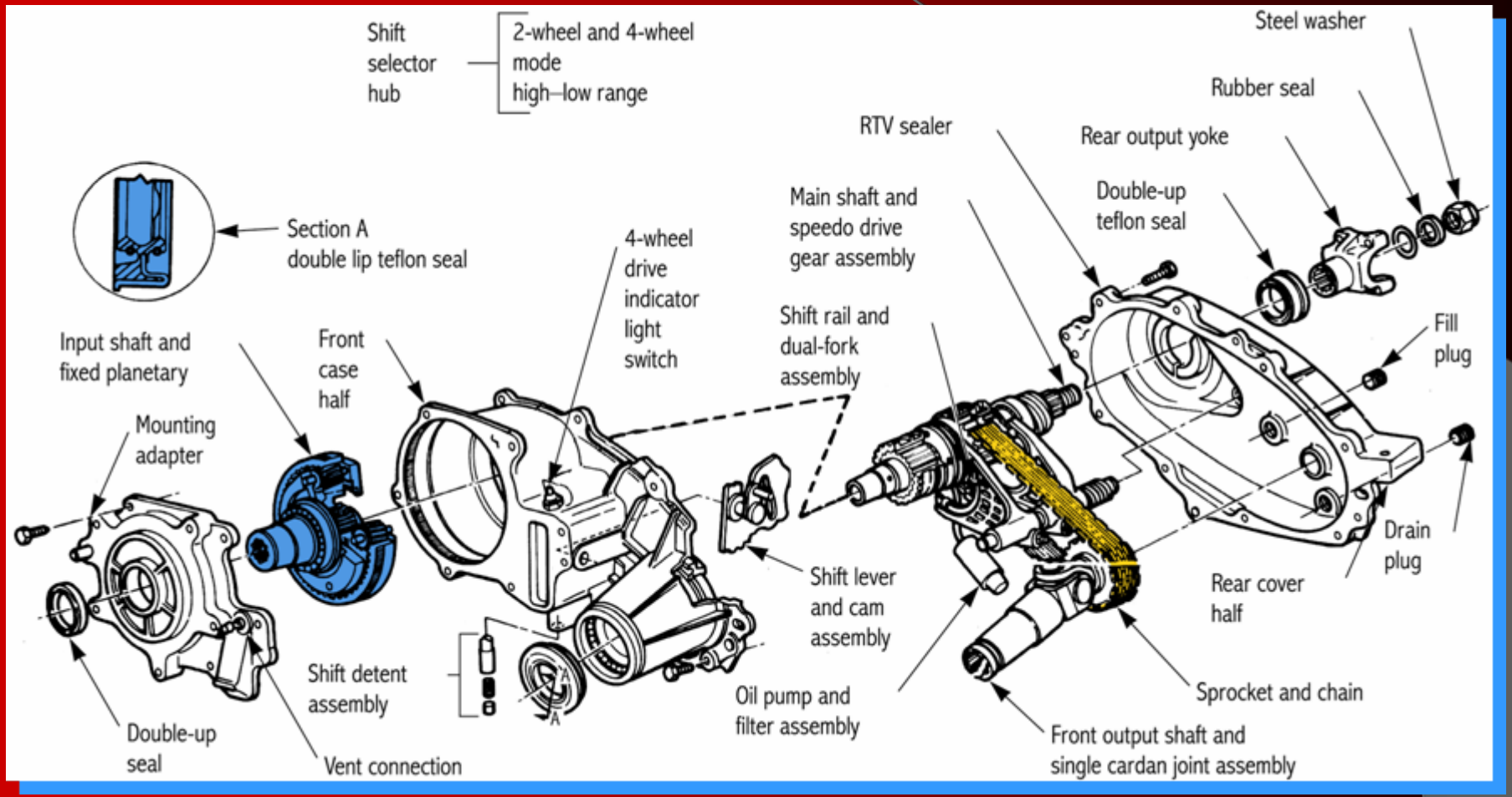
5. The Transfer Case sends power to both the front and rear axle assemblies.

6. The rear of the Torque Tube is formed as a rigid part of the rear axle housing.

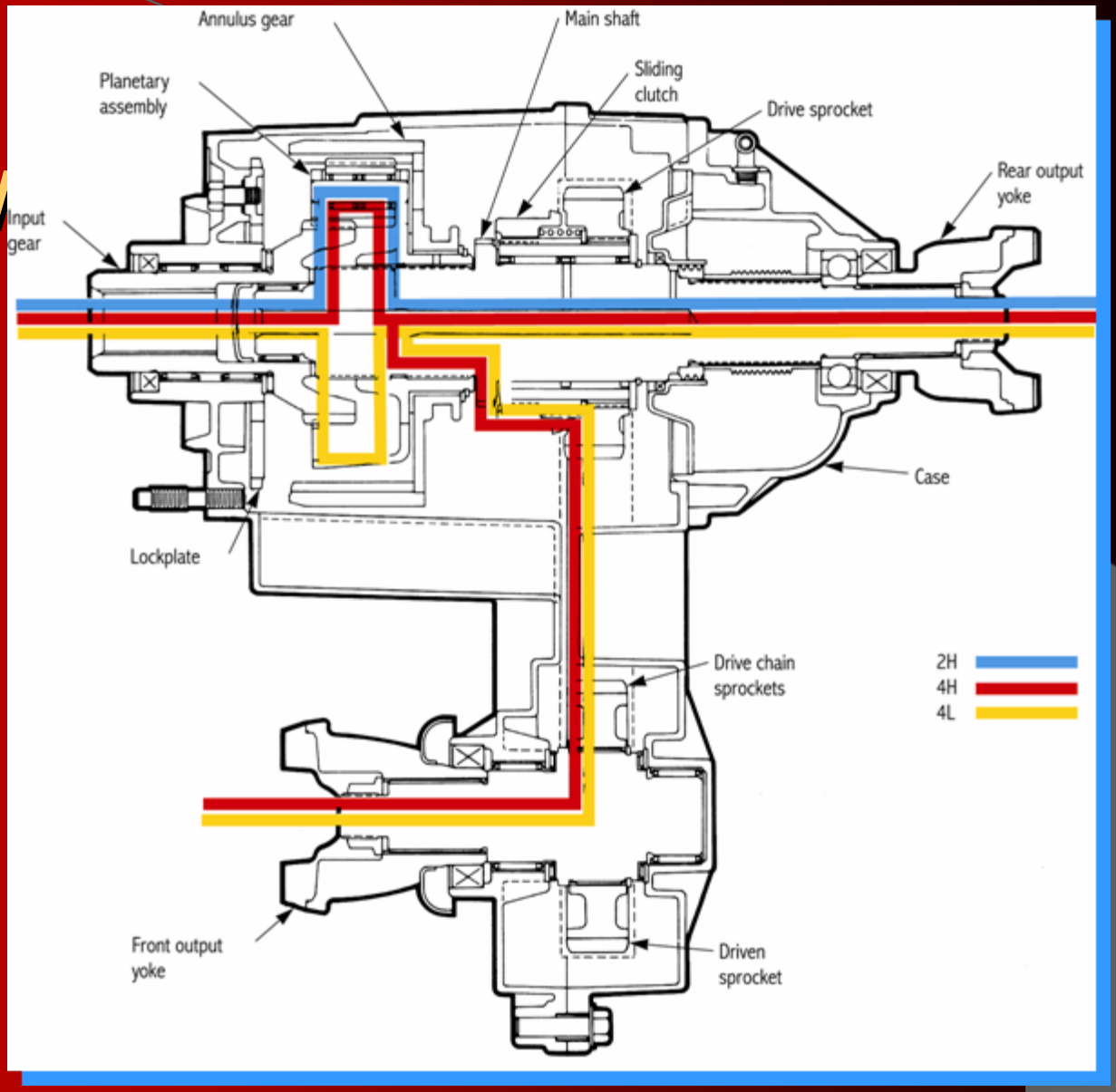
# Transfer Case



# Transfer Case Construction



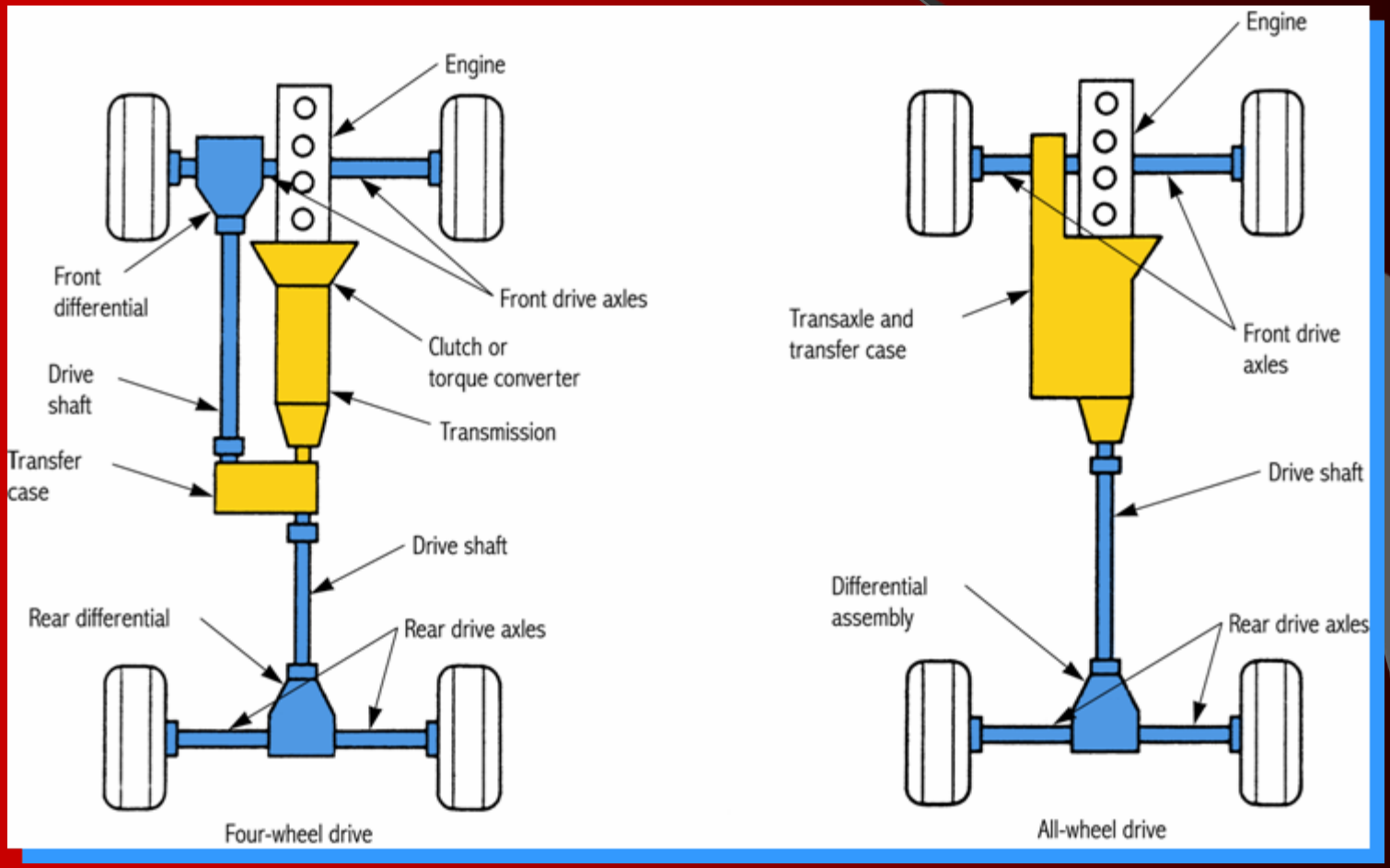
# Power Flow


Annulus gear
Main shaft
Planetary assembly
Sliding clutch
Drive sprocket
Rear output yoke
Input gear
Case
Lockplate
Drive chain sprockets
2H
4H
4L
Front output yoke
Driven sprocket

# Four-Wheel Drive versus All-Wheel Drive

- Four-wheel drive has a transfer case separate from the transmission
  - drive ranges such as 2H, 4H, and 4L are provided
- All-wheel drive has the transfer case included as part of the transaxle

# Four-Wheel Drive versus All-Wheel Drive



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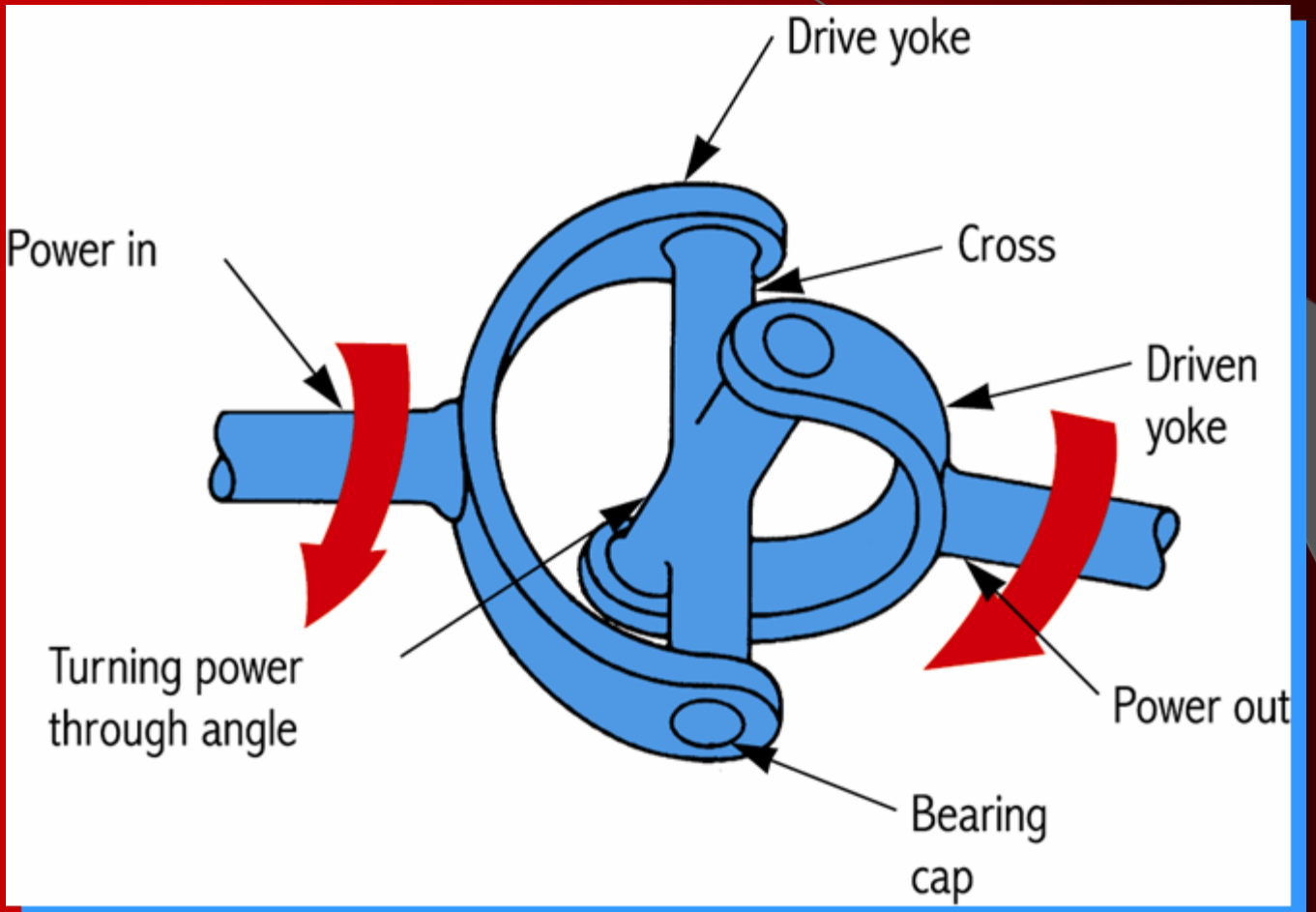
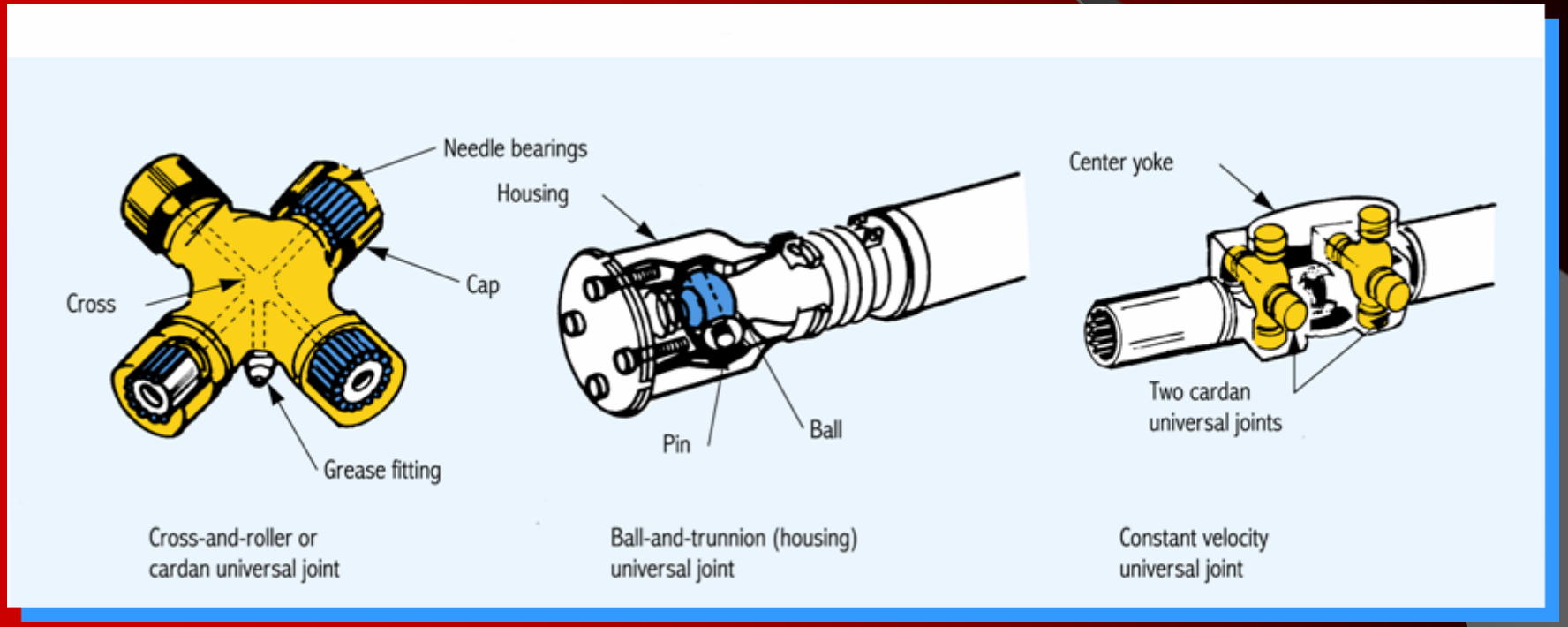
7. The Front Universal Joint is a swivel connection that fastens the slip yoke to the drive shaft.

8. The cross and roller joint, also called a Cardan Universal Joint is the most common type of drive shaft universal joint.

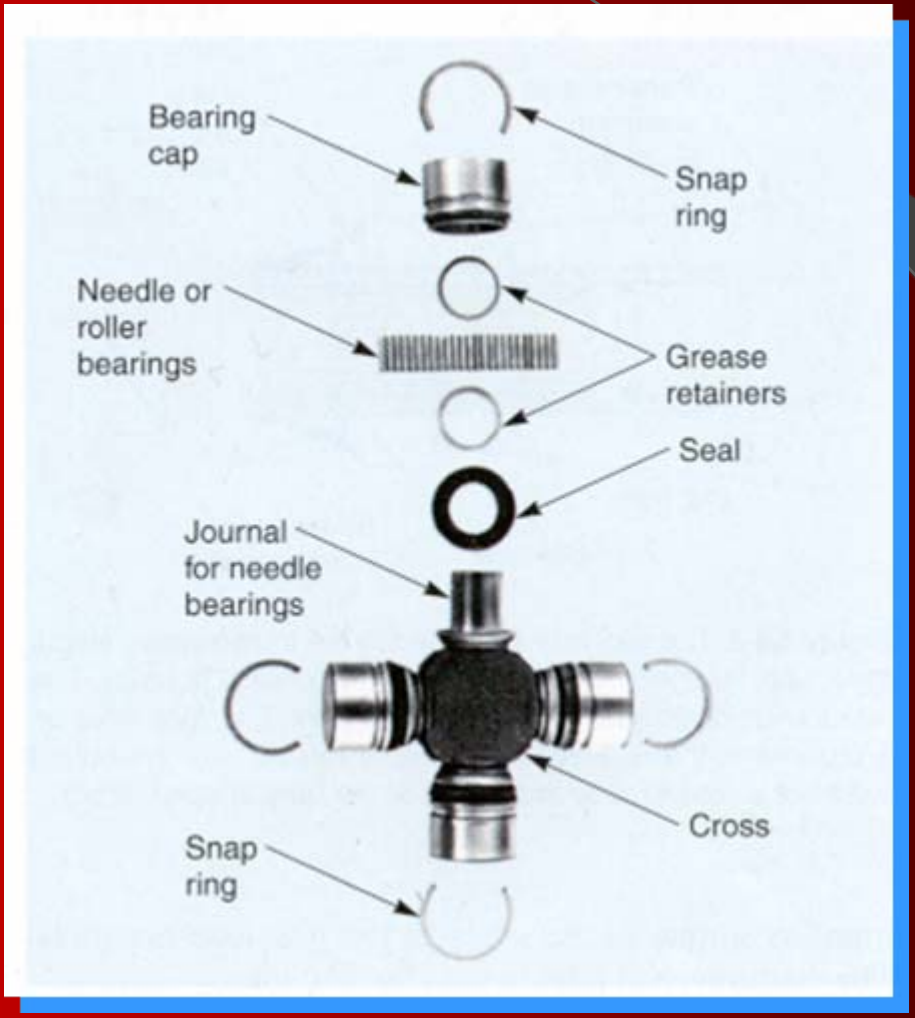
# Universal Joint



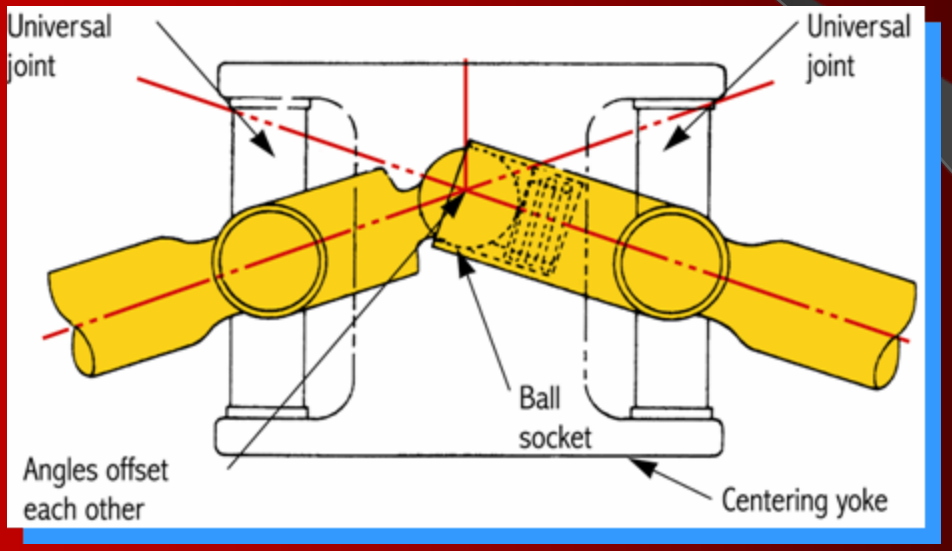
# Types of Universal Joints



# Cross-and-Roller

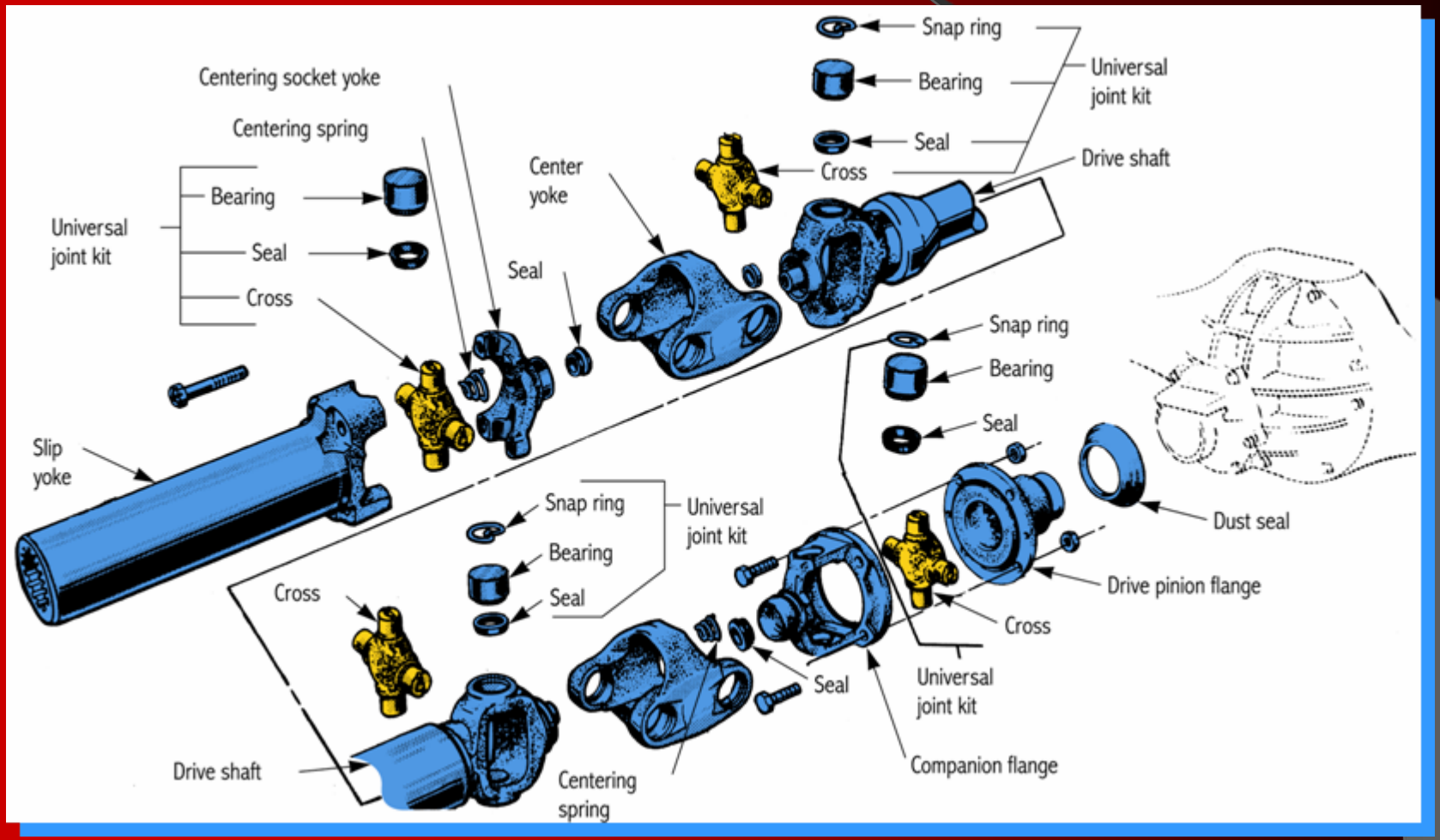


# Constant Velocity Joint




Speed changes at the output of the first joint are offset by speed changes at the other joint

# Constant Velocity Drive Shaft



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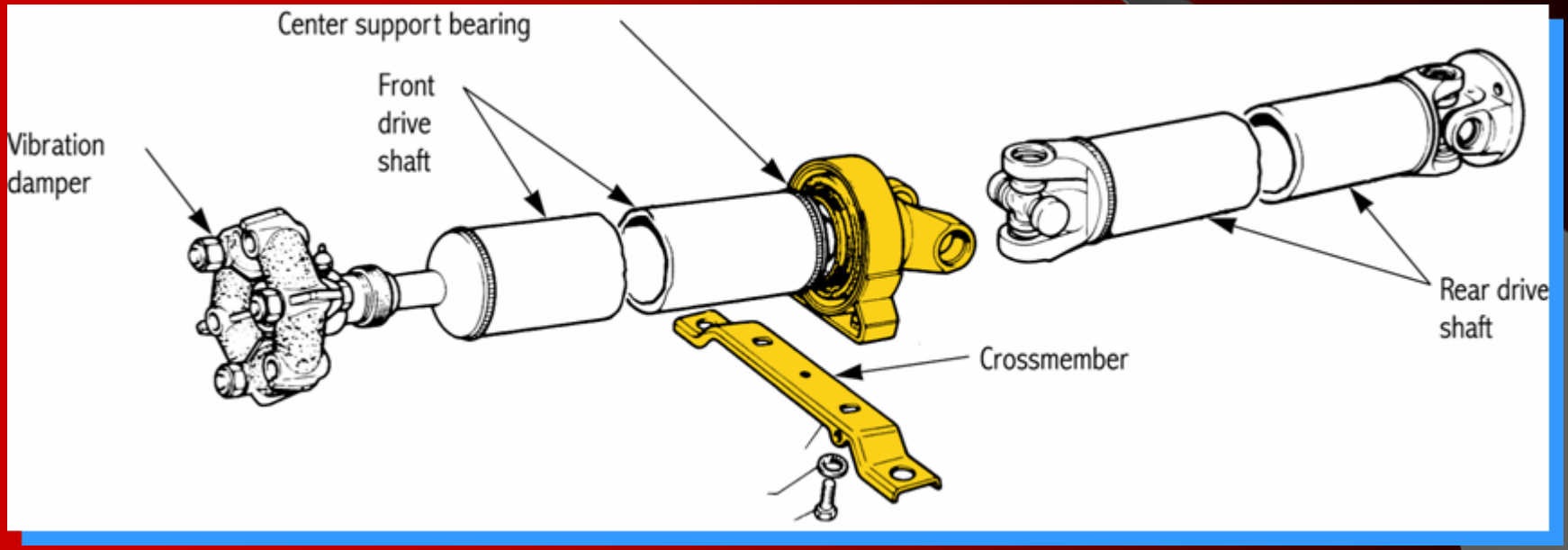
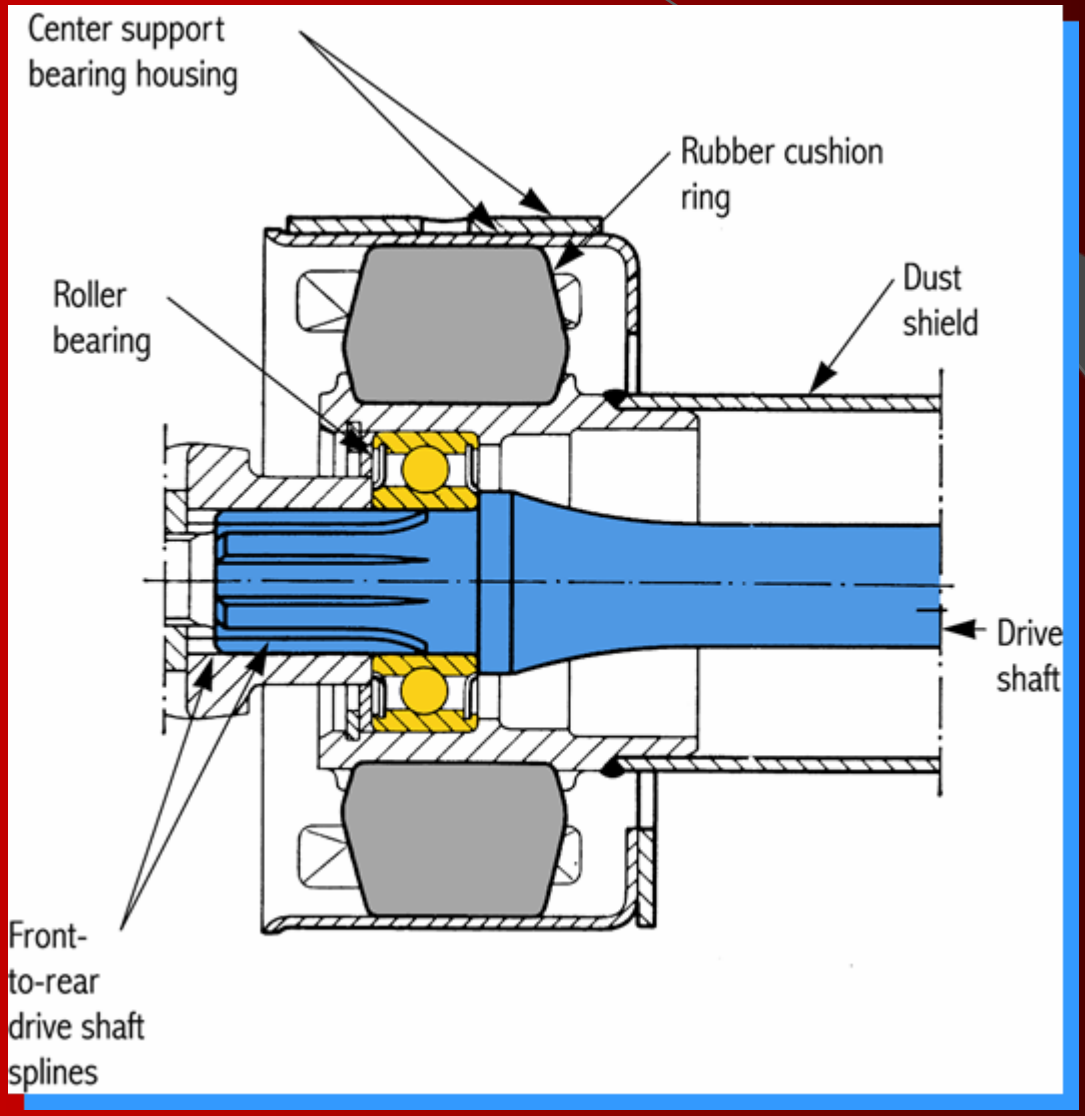
9. To hold the middle of a two-piece drive shaft, a Center Support Bearing is needed.

10. The Rear Universal Joint is another flex joint connecting the drive shaft to the differential yoke.

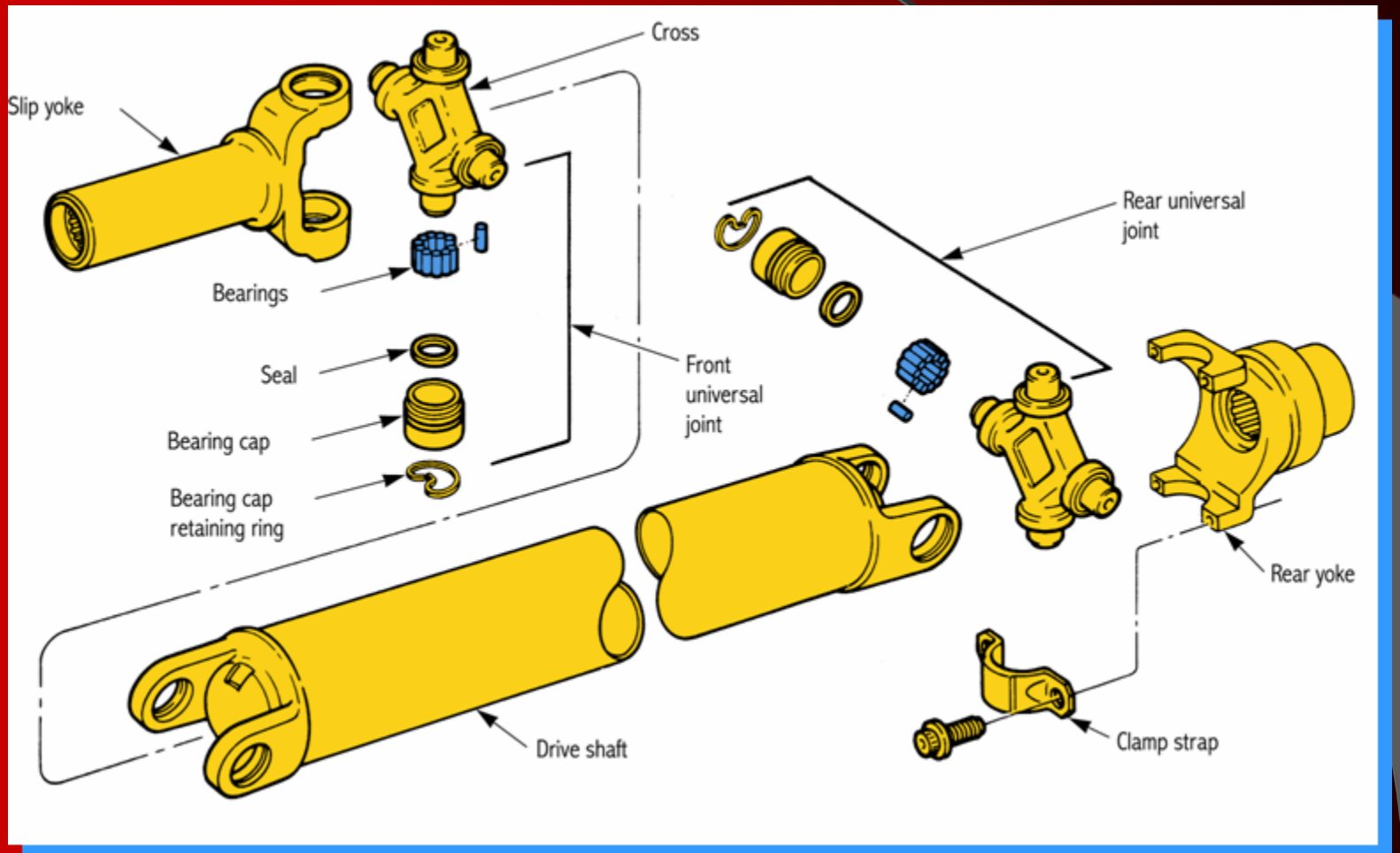
# Center Support Bearing



# Center Support Bearing



# Cross-and-Roller Driveshaft Assembly



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