



Modern Automotive Technology Chapter 69

Steering System Fundamentals



Learning Objectives

- Identify the major parts of a steering system.
- Explain the operating principles of steering systems.
- Compare the differences between a linkage steering and a rack-and-pinion steering system.
- Describe the operation of hydraulic and electric-assist power steering systems.
- Explain the operation of four-wheel steering systems.

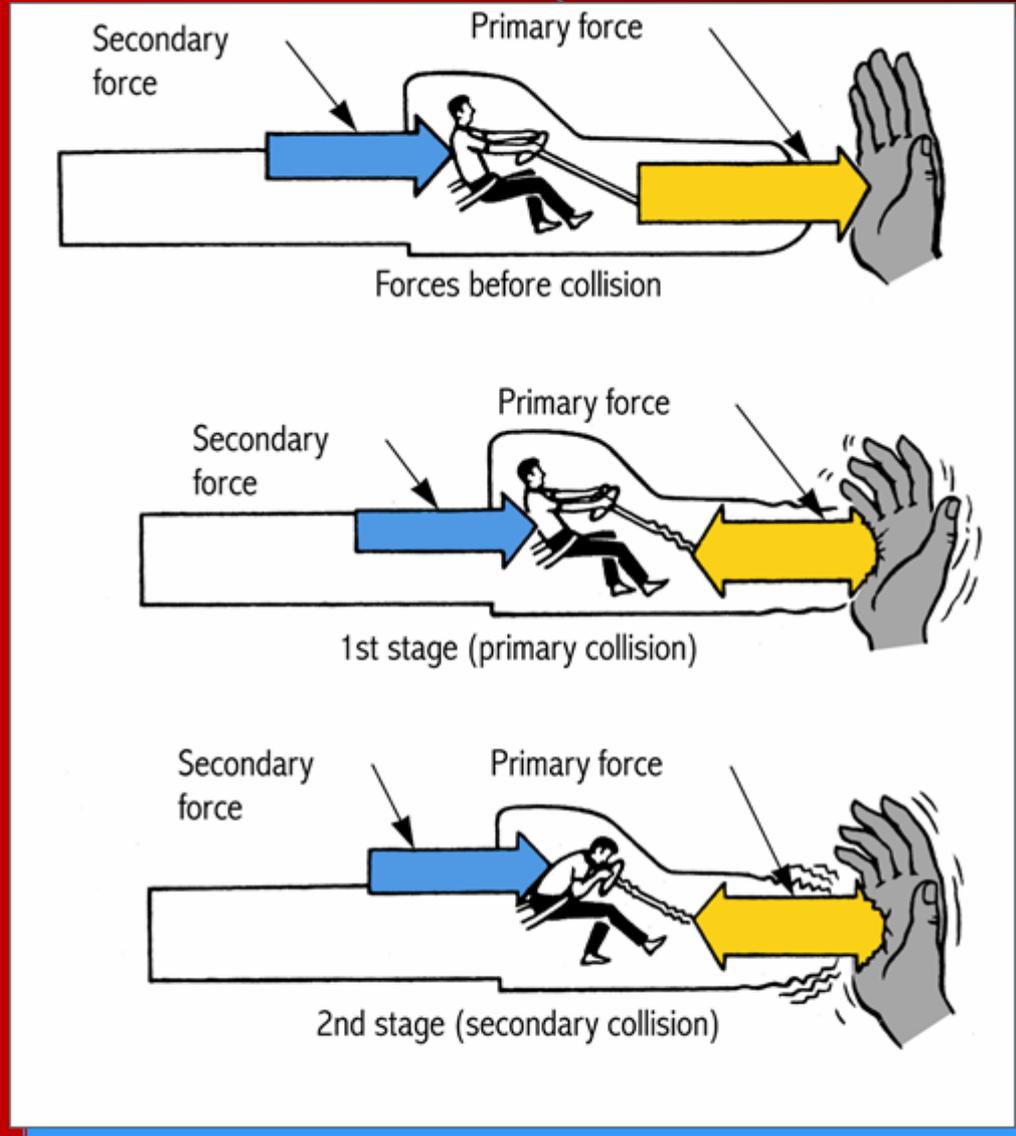


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1. A Steering Wheel is used by driver to rotate steering shaft that passes through steering column.
2. Steering Linkage connects steering gearbox to steering knuckles and wheels.

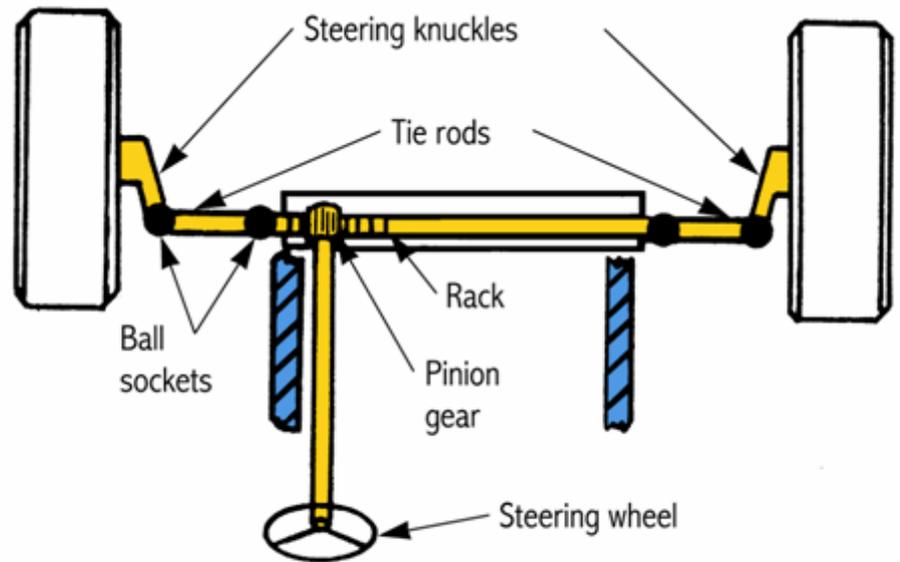
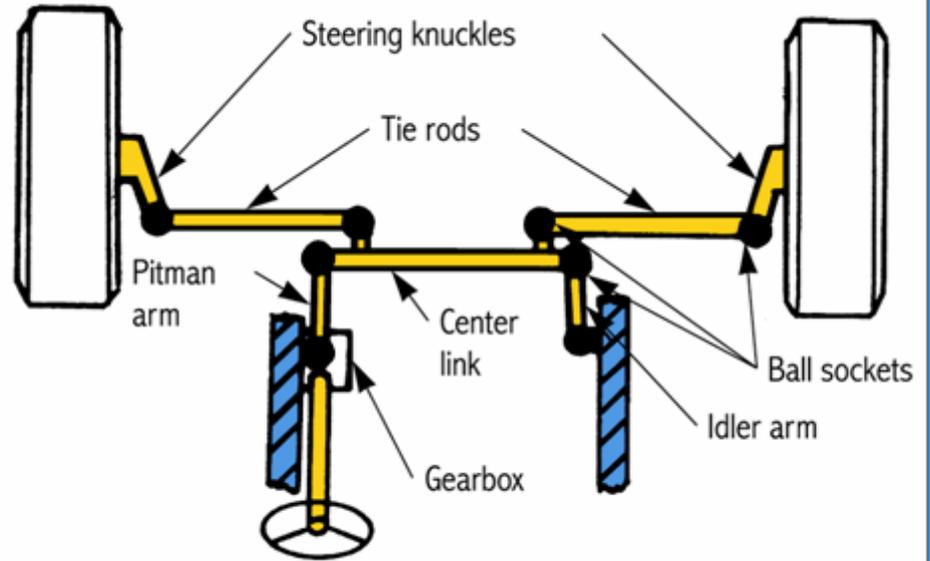


Collapsible Column Operation



Steering Linkage

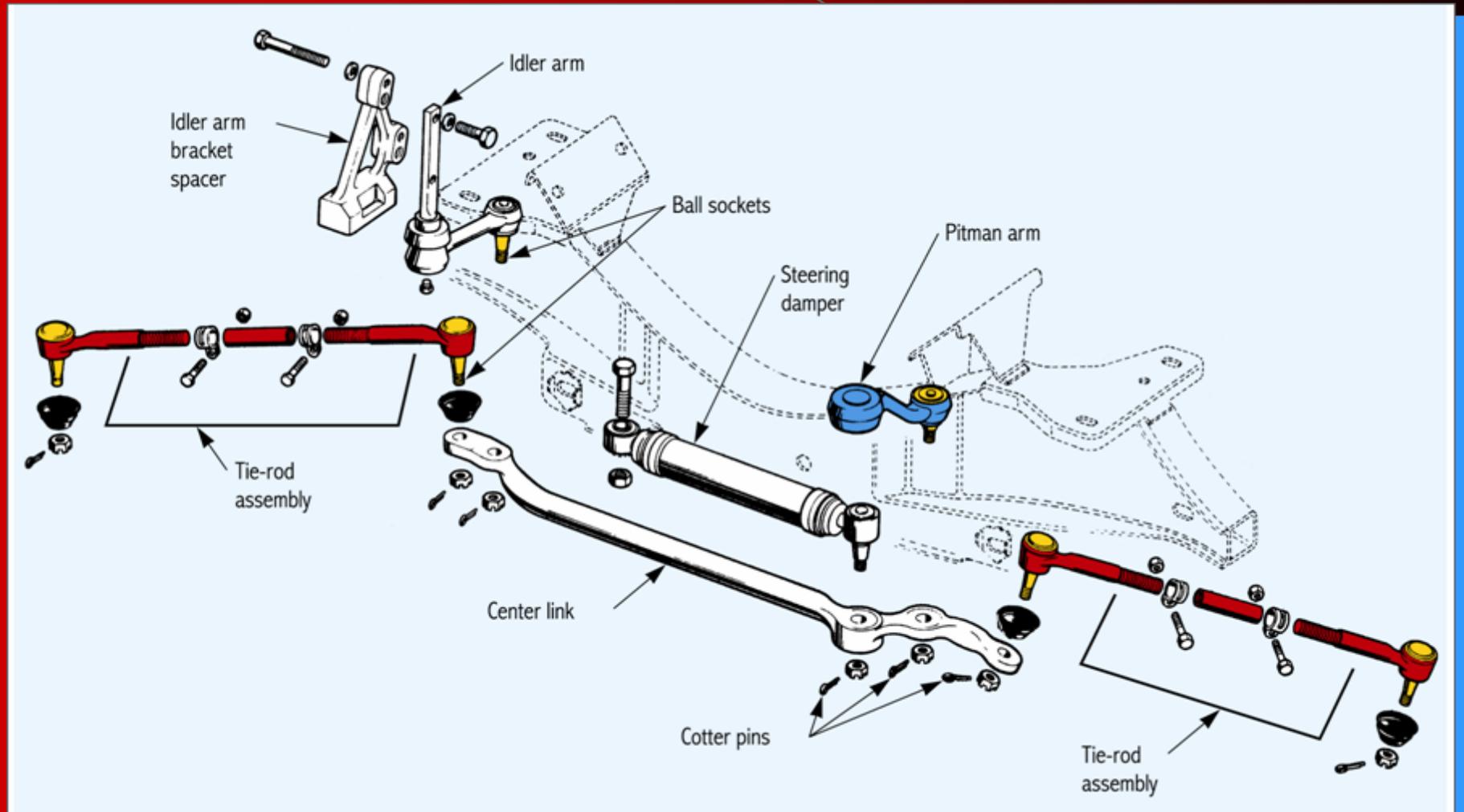
Basic Linkage Steering



Basic Rack-and-Pinion Steering



Steering Linkage

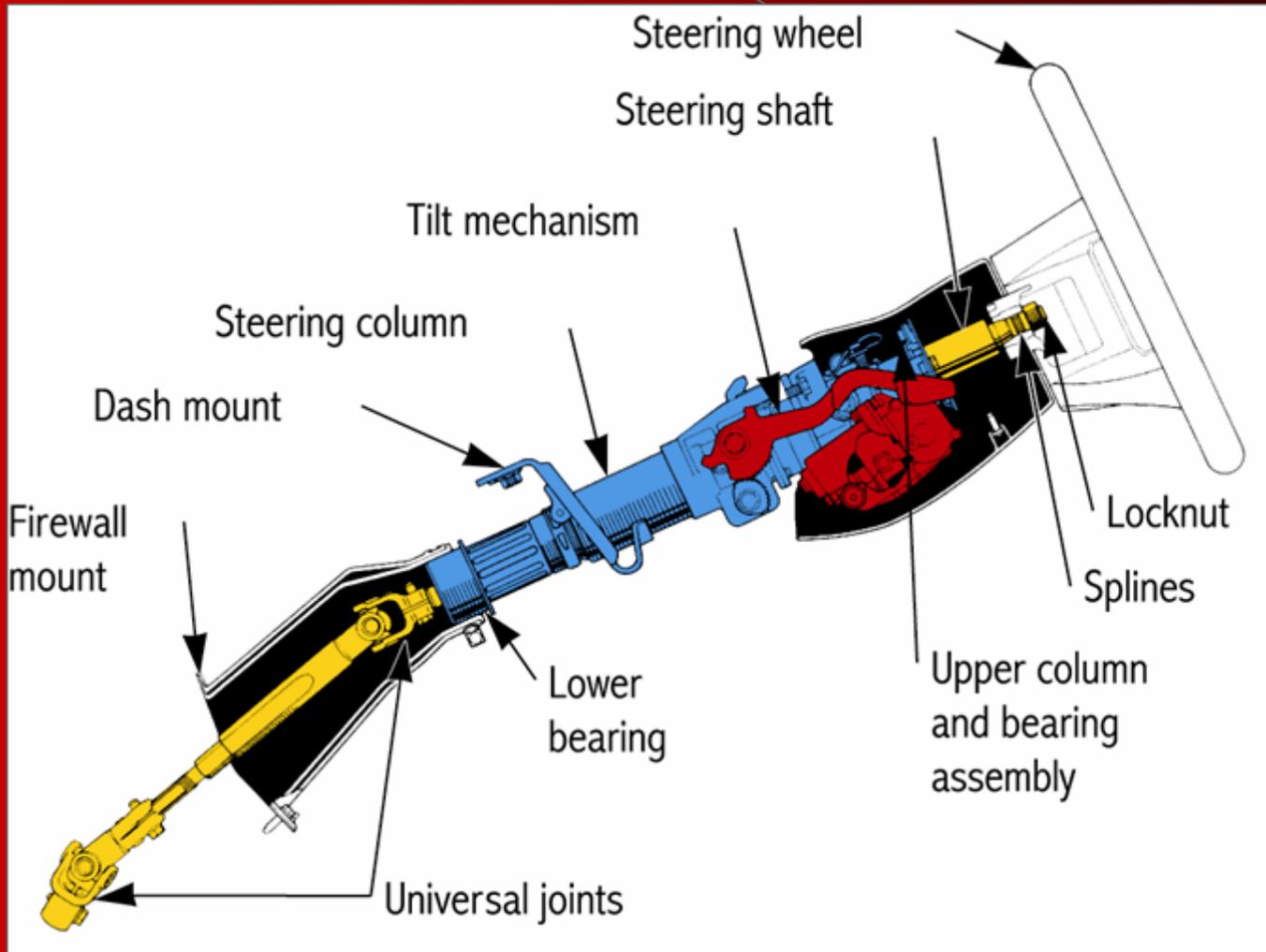


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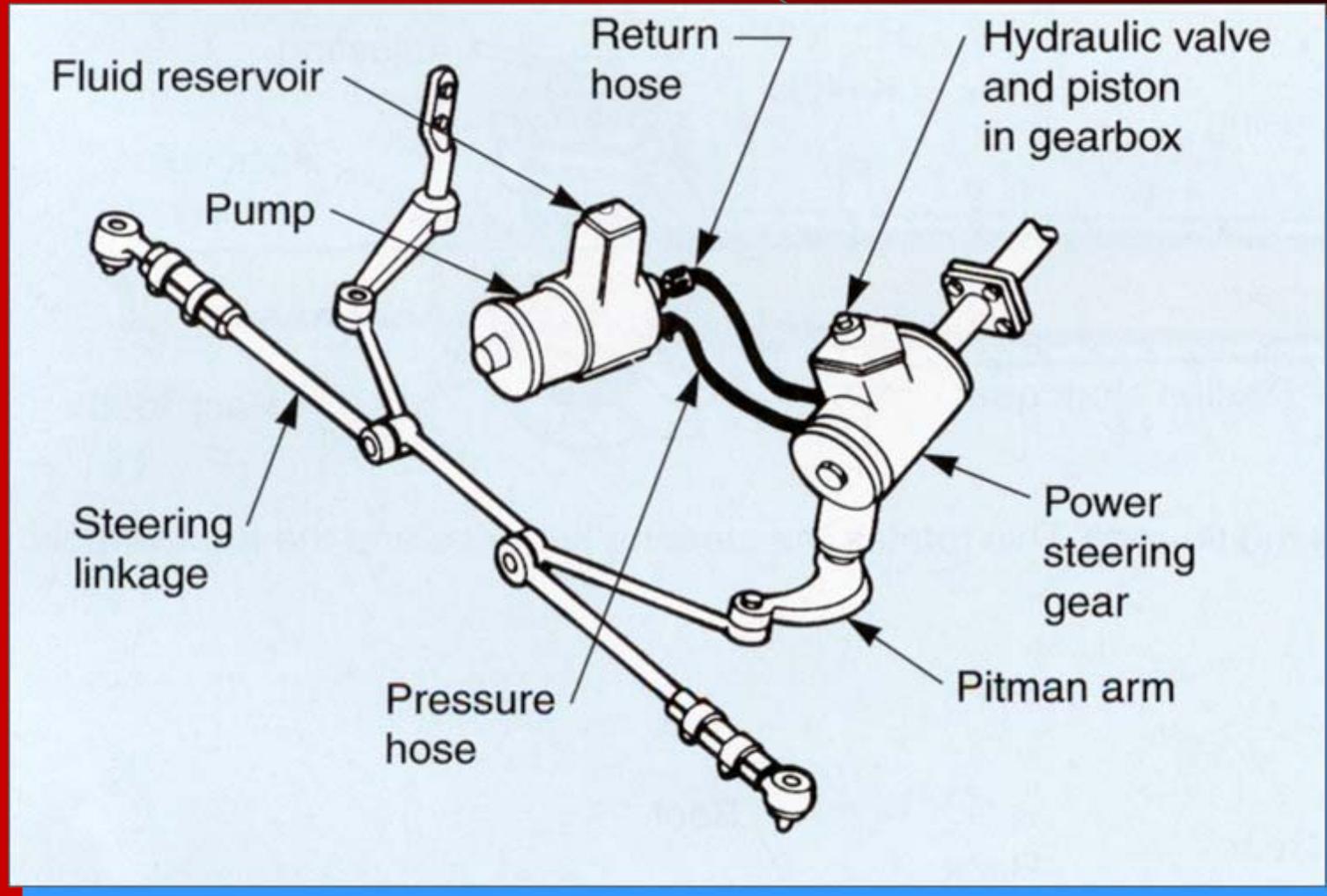
3. The Steering Column supports the steering wheel and steering shaft.
4. The Power Steering Pump produces the hydraulic pressure for steering system operation.



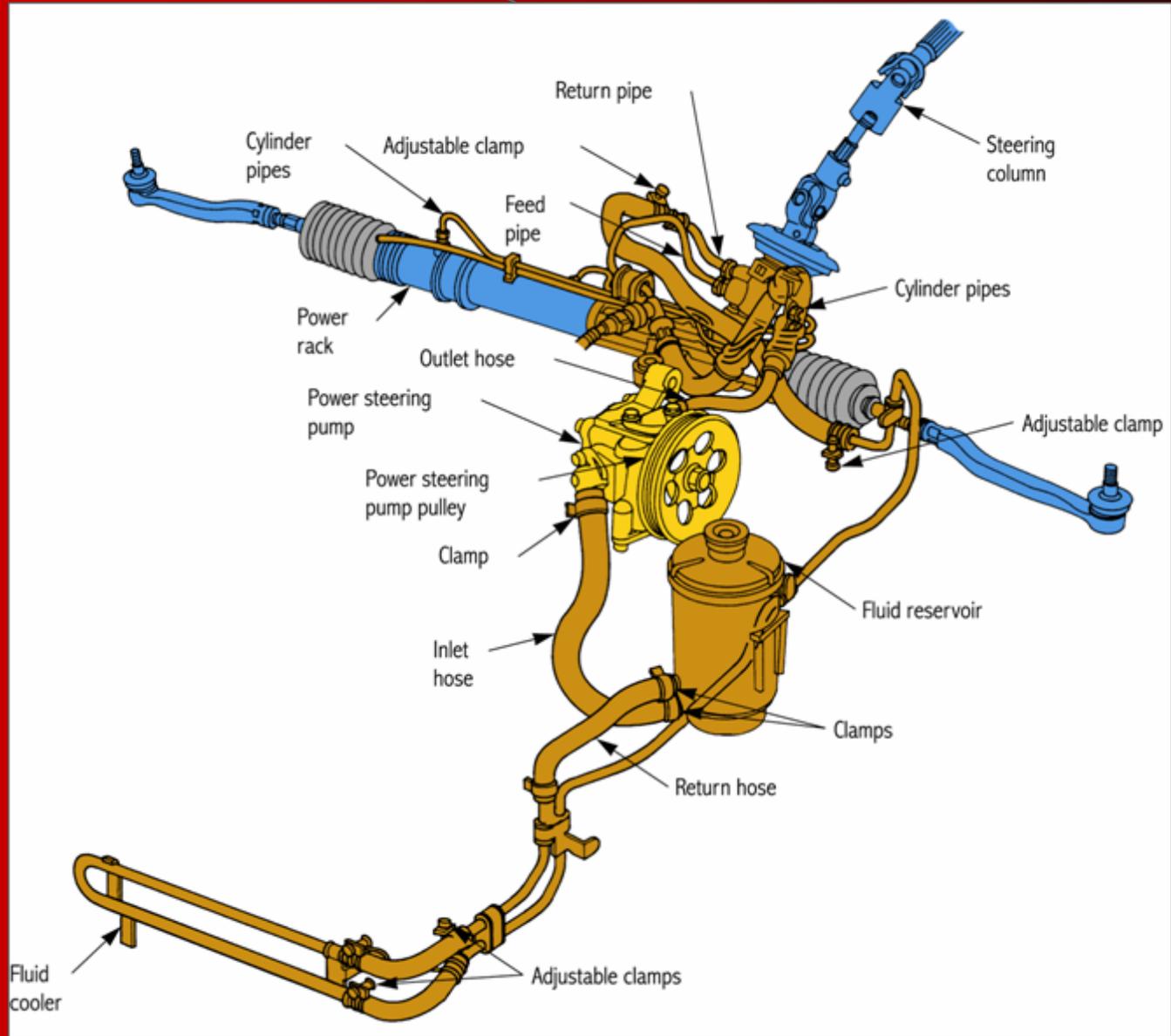
Steering Column Components



Integral-Piston Linkage



Pump and System

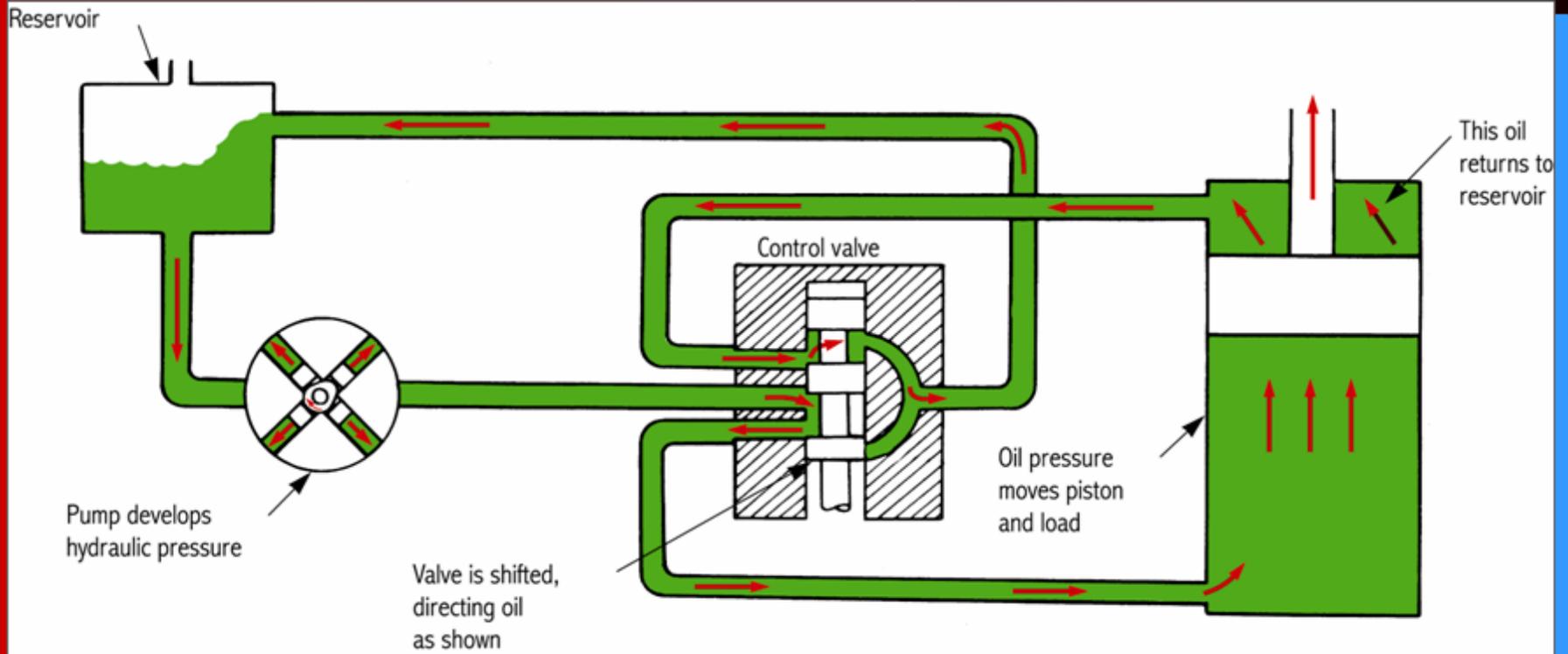


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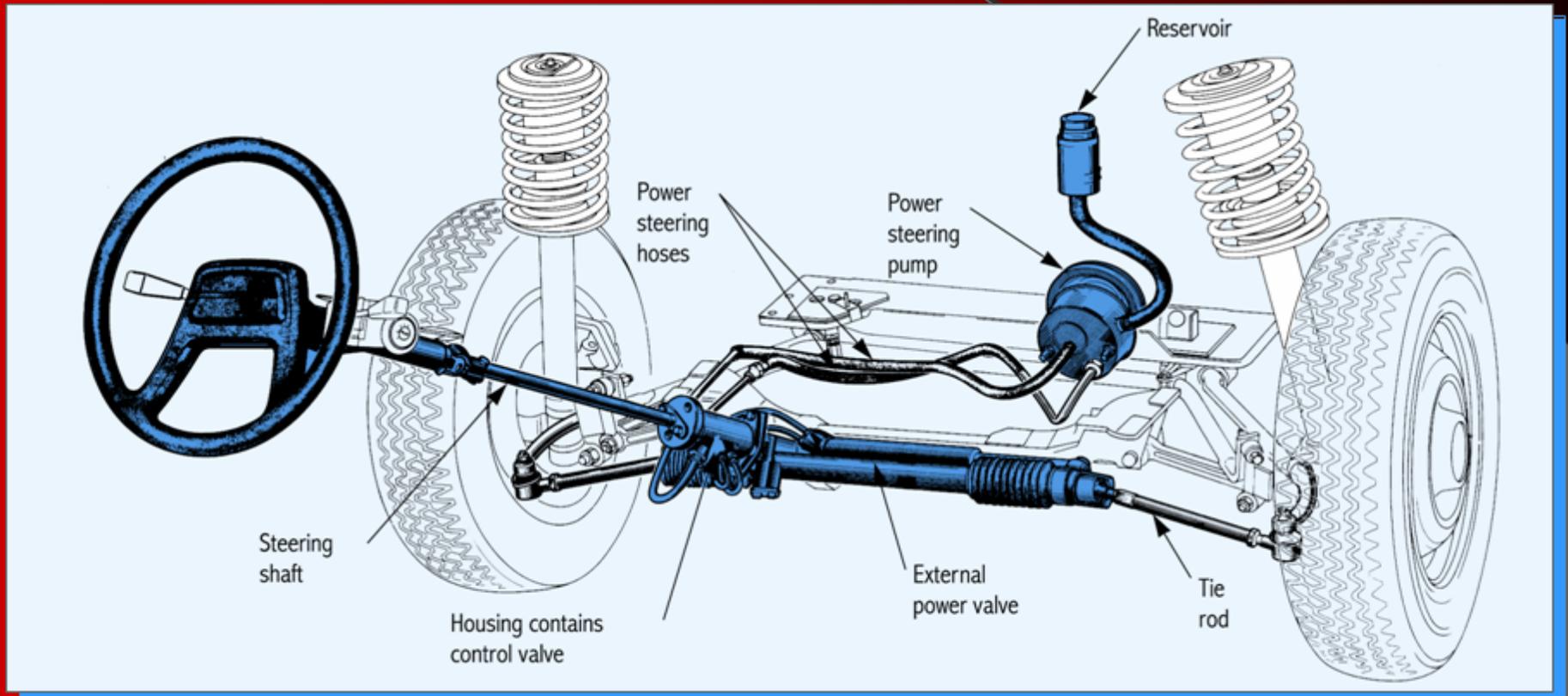
5. The Power Piston is formed by attaching a hydraulic piston to the center of the rack.
6. The Steering Shaft transfers turning motion from steering wheel to steering gearbox.



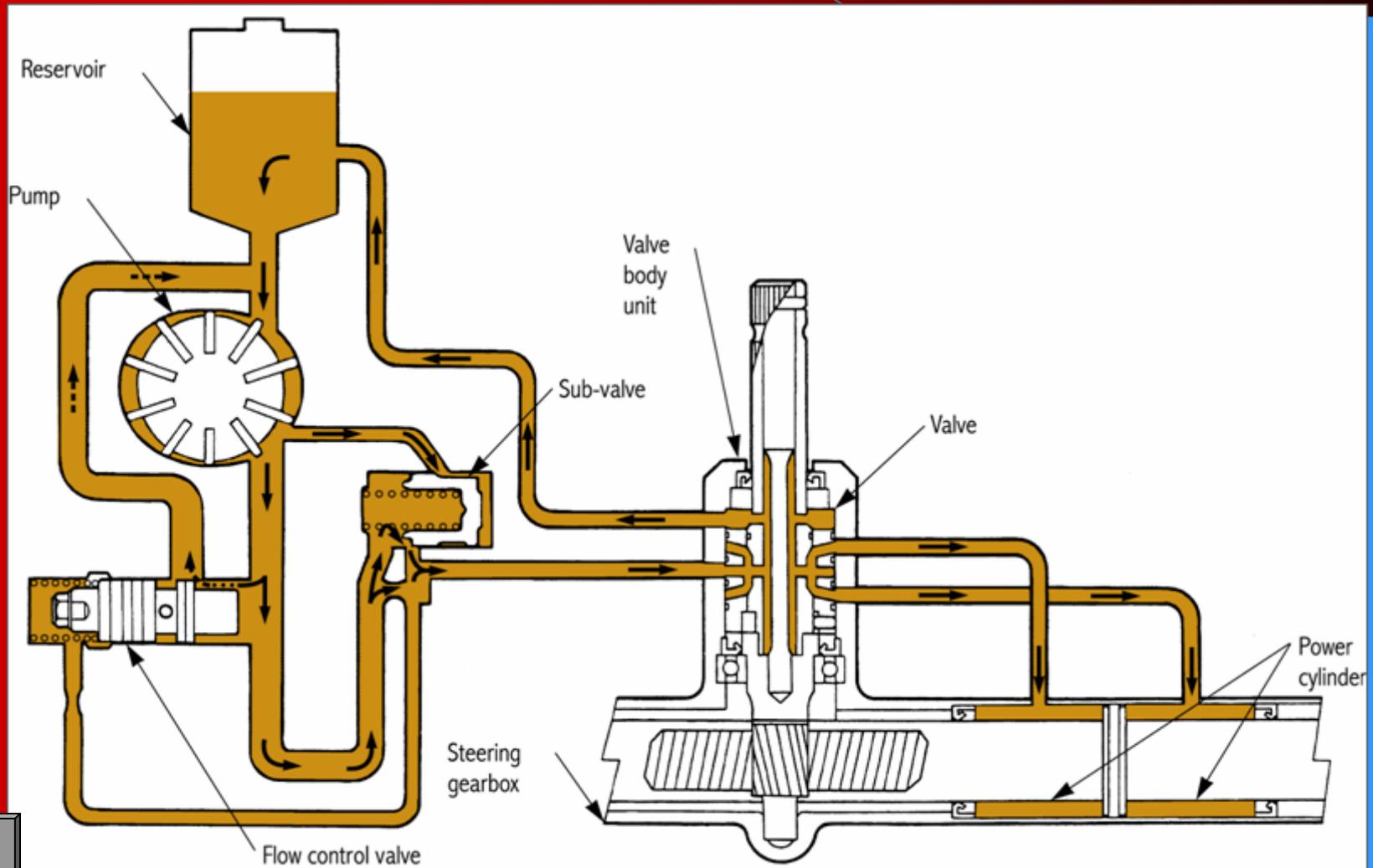
Basic Power Steering



Power Rack-and-Pinion Steering



Power Rack-and-Pinion System



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7. Ball Sockets allows linkage arms to swivel up and down for suspension action and from left to right for turning.
8. The Pressure-Relief Valve used in a power steering system controls maximum oil pressure.



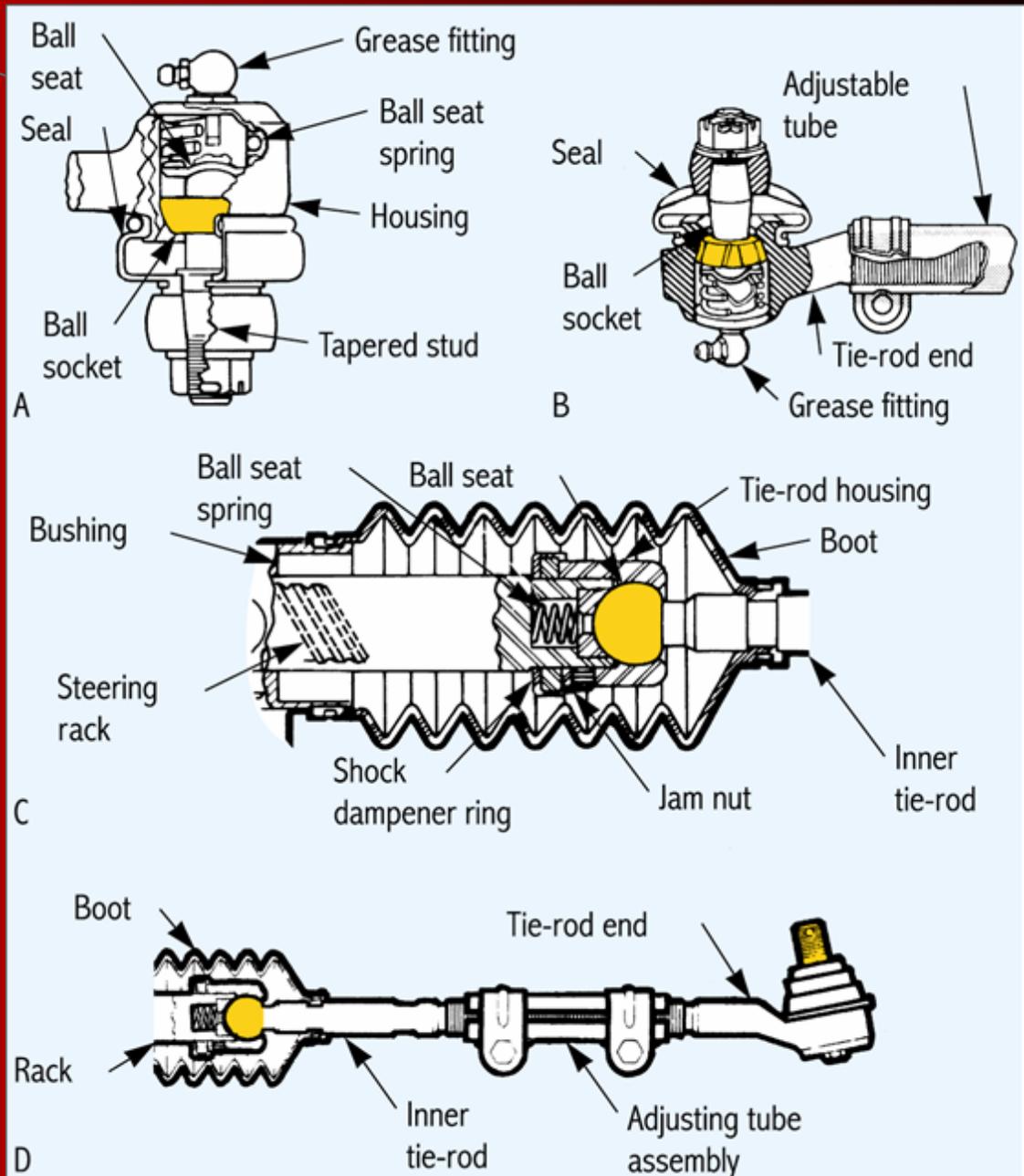
Ball Sockets

A. Idler arm

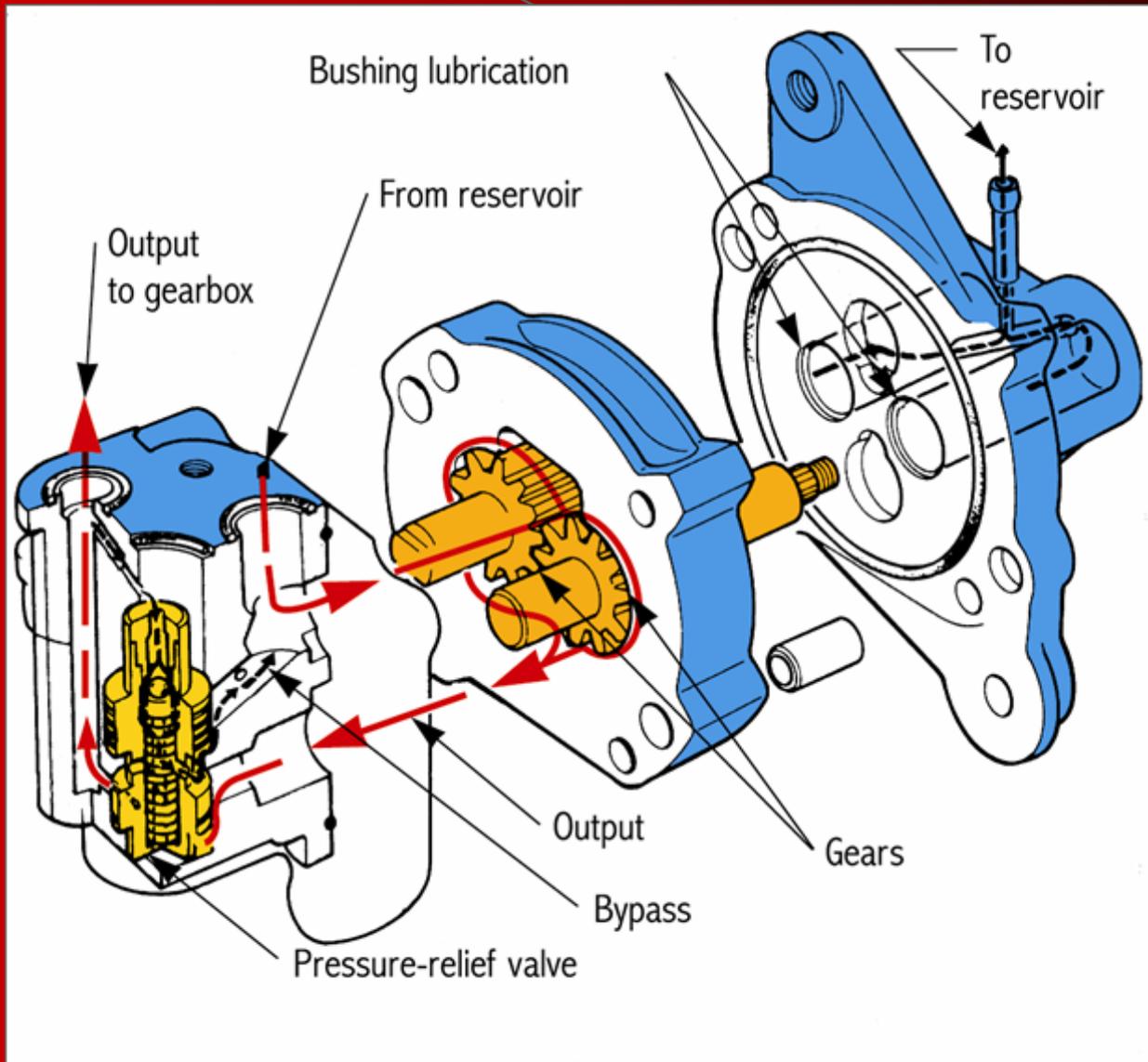
B. Tie-rod end

C. Tie-rod inner end

D. Tie-rod (rack-and-pinion)



Pressure-Relief Valve

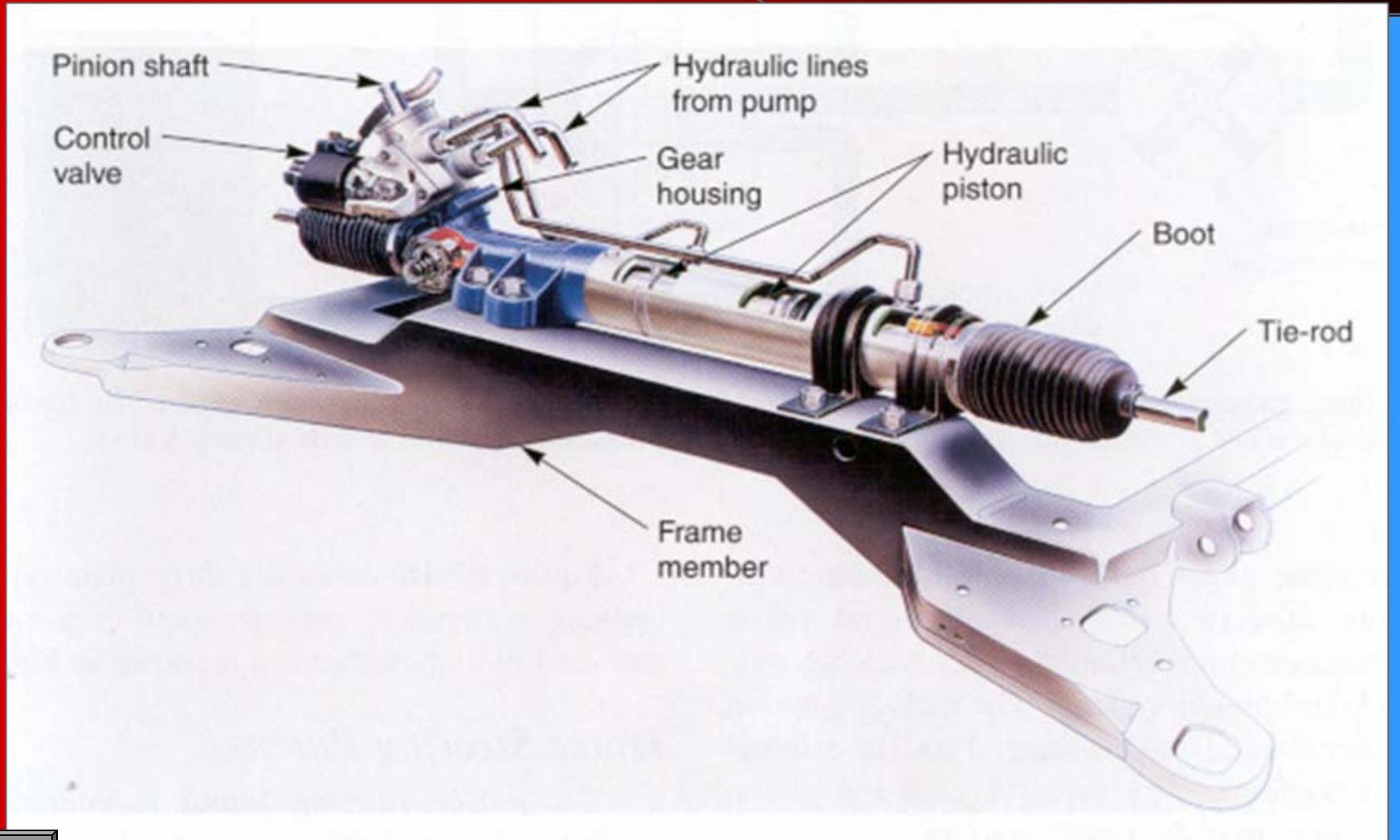


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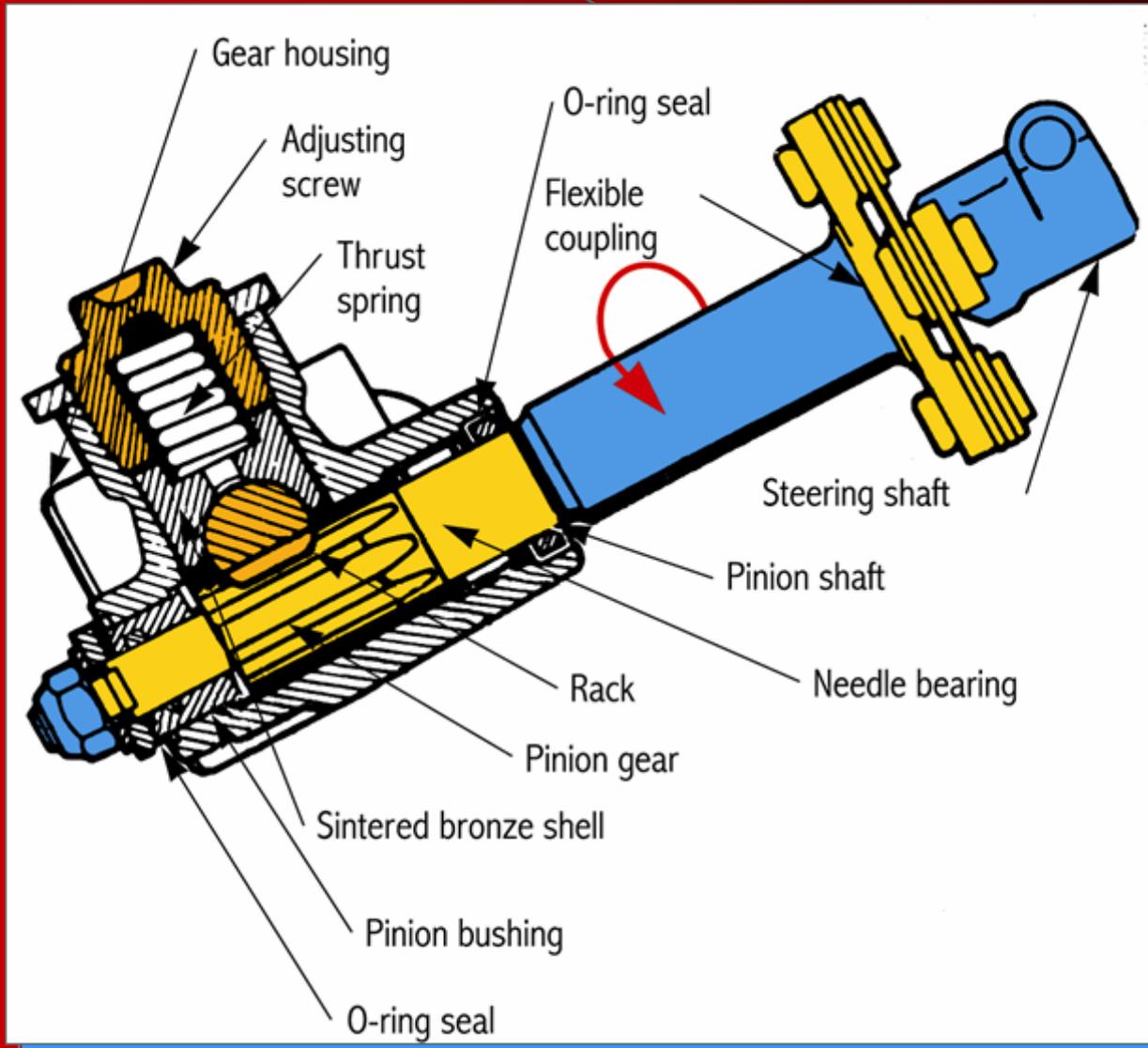
9. A Power Cylinder is a precisely machined tube designed to accept the power piston in rack-and-pinion steering systems.
10. The Steering Gearbox changes turning motion into straight line motion to the left or right.



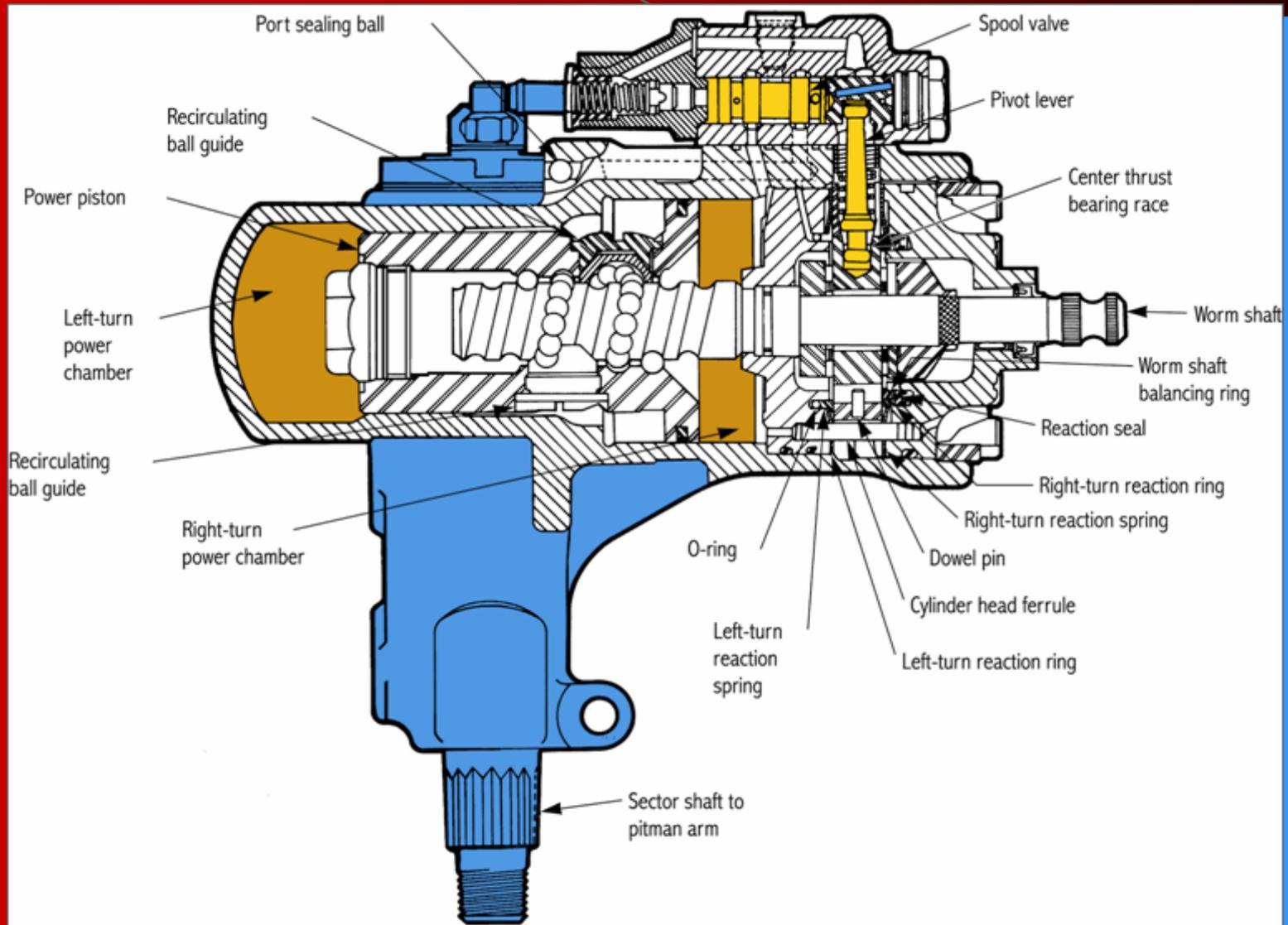
Power Rack-and-Pinion



Steering Gear



Spool Valve-Type Gear



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