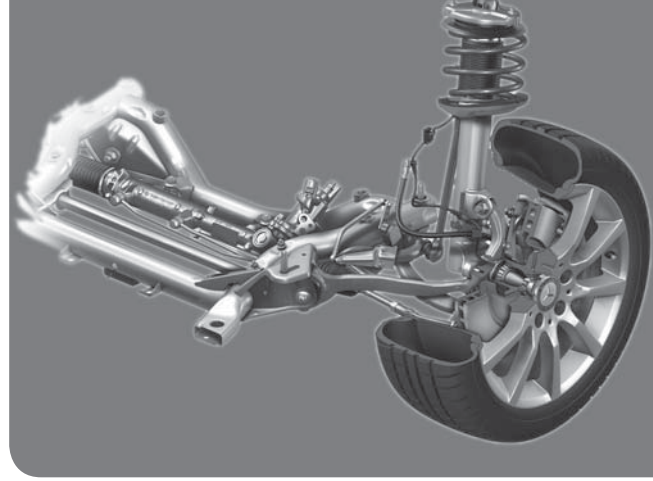


# Chapter

## *Suspension System Technology*



Name \_\_\_\_\_

Date \_\_\_\_\_

Instructor \_\_\_\_\_

Score \_\_\_\_\_

**Objective:** After studying this chapter, you will be able to explain the construction and operation of modern suspension systems.

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### Basic Suspension System

1. Name the parts of a suspension system.

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### Functions of a Suspension System

2. List the functions of a suspension system.

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3. What is chassis stiffness, and how is it measured?

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## Basic Suspension System

4. Define the six basic parts of a suspension system.

*Control arm:*

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*Steering knuckle:*

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*Ball joint:*

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*Suspension spring:*

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*Shock absorber or damper:*

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*Control arm bushing:*

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## Types of Suspension Systems

5. (Independent, Nonindependent) \_\_\_\_ suspension systems allow one wheel to move up and down with minimal effect on the other wheels.
6. (Independent, Nonindependent) \_\_\_\_ suspension has both the right and left wheels attached to the same solid axle.

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## Understeer and Oversteer

7. (Oversteer, Understeer) \_\_\_\_ means that the vehicle is slow to respond to steering changes in a turn.
8. (Oversteer, Understeer) \_\_\_\_ means that the rear tires try to skid around sideways in a sharp or hard turn.
9. What is neutral steering?

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Name \_\_\_\_\_

10. Explain *lateral acceleration* and how it is measured.

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## Suspension System Springs

11. Suspension system springs must \_\_\_\_\_ and \_\_\_\_\_ with bumps and holes in the road.

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For questions 12–15, match the following terms and identifying phrases.

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|---|------------------|
| _____ 12. Made of flat plates or strips of spring steel that are bolted together. | (A) Coil springs |
| _____ 13. A length of spring-steel rod wound into a spiral.                       | (B) Leaf springs |
| _____ 14. Made of a large spring-steel rod.                                       | (C) Air springs  |
| _____ 15. A two-ply rubber cylinder.  | (D) Torsion bars |

16. What is spring rate?

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17. \_\_\_\_\_ weight is the weight of the parts that are supported by the springs and suspension system.

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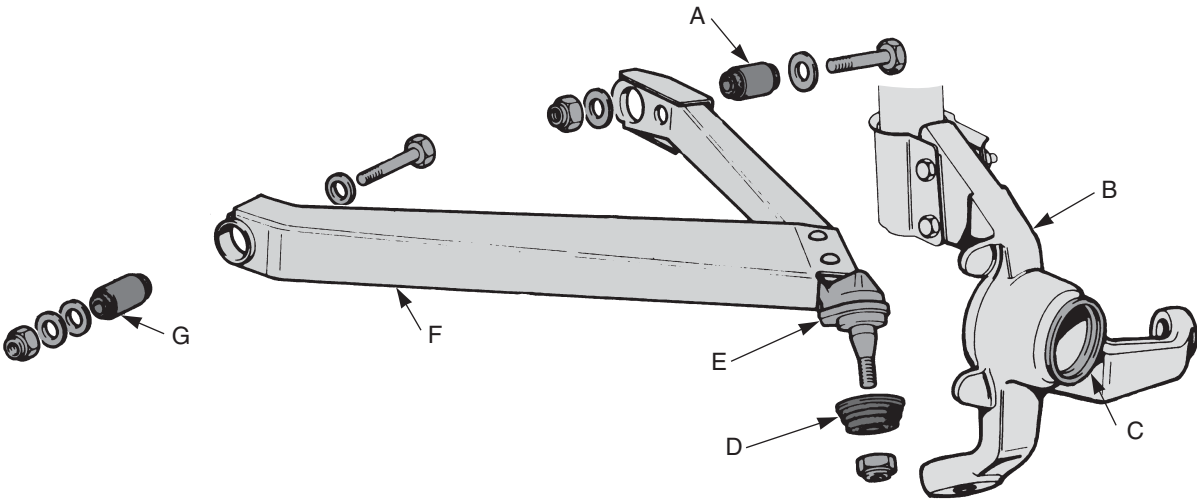
18. The \_\_\_\_\_ weight is the weight of the parts that are *not* supported by the springs.

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## Suspension System Construction

- \_\_\_\_\_ 19. A control arm holds the \_\_\_\_\_ in position as the wheel moves up and down.
- (A) steering knuckle
  - (B) bearing support
  - (C) axle housing
  - (D) All of the above.

20. Label the parts of the control arm.



- |           |           |
|-----------|-----------|
| (A) _____ | (E) _____ |
| (B) _____ | (F) _____ |
| (C) _____ | (G) _____ |
| (D) _____ |           |

21. What is a strut rod?

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22. What purpose do ball joints serve?

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23. What limits spring oscillations to smooth the vehicle's ride?

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24. Shock absorber \_\_\_\_ occurs when the vehicle's tire is \_\_\_\_\_  
forced upward upon hitting a bump.

25. How does a gas-charged shock absorber operate?

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Name \_\_\_\_\_

26. How does a self-leveling shock absorber operate?

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27. \_\_\_\_\_ shock absorbers provide a means of changing shock stiffness.

\_\_\_\_\_

28. What components does a strut assembly consist of?

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29. How is a strut shock absorber different from a conventional shock absorber?

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30. How does a sway bar work?

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31. Sway bar links connect the sway bar to the \_\_\_\_\_.

\_\_\_\_\_

32. A(n) \_\_\_\_\_ rod is sometimes used on rear suspension systems to prevent side-to-side axle movement during cornering.

\_\_\_\_\_

33. A(n) \_\_\_\_\_ keeps the suspension system from hitting the frame structure.

\_\_\_\_\_

34. If you hear a loud bang or thud when going over a large bump in the road, what might be happening and what might this be telling you?

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## Long-Short Arm Suspension

35. Why does a long-short arm suspension system use two different length control arms?

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## Torsion Bar Suspension

36. Explain the construction, operation, and adjustment of a torsion bar suspension system.

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## MacPherson Strut Suspension

37. Explain the construction/operation of a MacPherson strut suspension system.

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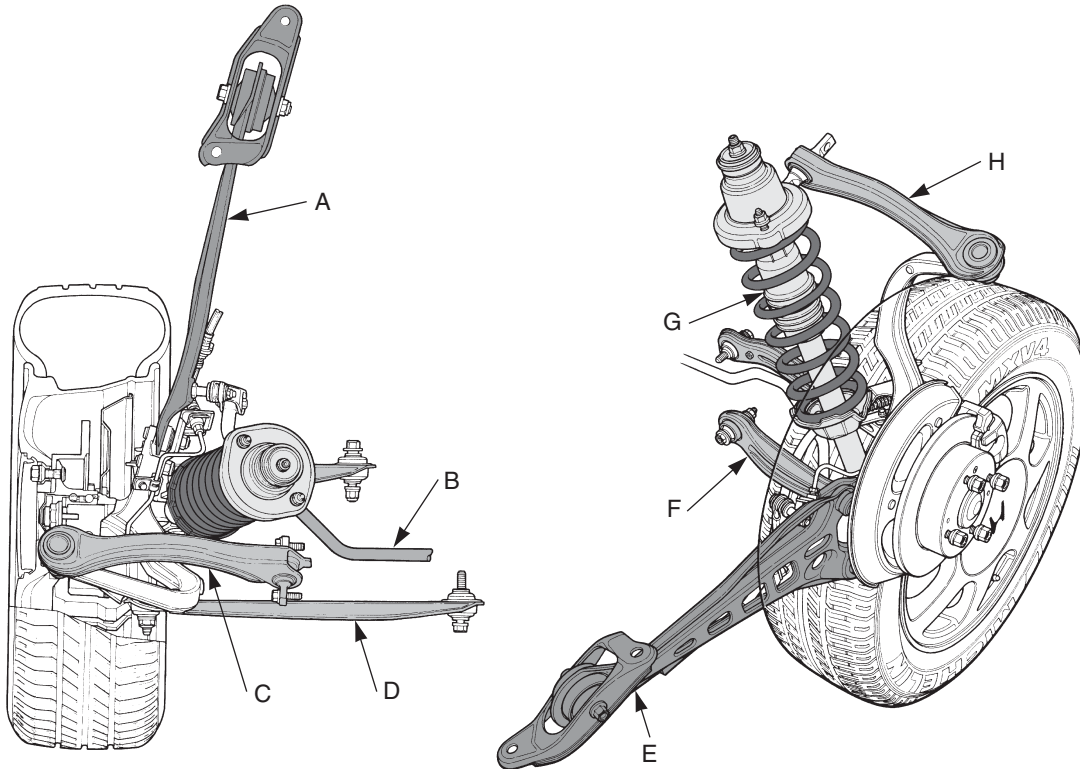
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Name \_\_\_\_\_

38. Identify the parts of the double wishbone suspension system.



(A) \_\_\_\_\_

(E) \_\_\_\_\_

(B) \_\_\_\_\_

(F) \_\_\_\_\_

(C) \_\_\_\_\_

(G) \_\_\_\_\_

(D) \_\_\_\_\_

(H) \_\_\_\_\_

## Rear Suspension System

39. *True or False?* Rear suspension systems are similar to front suspension systems, but they normally do *not* provide for steering.

\_\_\_\_\_

40. What is a dead axle?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

41. What is semi-independent suspension?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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## Suspension Leveling Systems

42. What is the main function of a suspension leveling system?

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43. A(n) \_\_\_\_ (automatic/manual) suspension leveling system uses air shocks and an electric compressor to counteract changes in passenger and luggage weight.

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44. (Automatic/Manual) \_\_\_\_ suspension leveling systems use air shocks or air springs, height sensors, and a compressor to maintain curb height.

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45. Explain these three basic parts of an electronic height control system.

*Height sensor:*

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*Sensor link:*

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*Solenoid valve:*

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## Electronic Suspension System

46. Explain these major parts of a typical electronic shock absorber system.

*Steering sensor:*

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*Brake sensor:*

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*Acceleration sensor:*

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*Mode switch:*

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Name \_\_\_\_\_

*Electronic control module:*

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*Shock actuators:*

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47. How can a sonar sensor be used in an electronically controlled suspension system?

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## Active Suspension System

48. In an active suspension system, \_\_\_\_\_ on each hydraulic ram provide the main control for the system by reacting to suspension system movement and sending signals to the computer.

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