

Chapter 28

12-Volt and HV Battery Technology



Name _____ Date _____

Instructor _____ Score _____

Objective: After studying this chapter, you will be able to describe the operation of a basic battery cell and the functions of automotive batteries.

1. What are the two types of automotive batteries?

2. Hybrid vehicles have batteries that can produce up to _____ volts of electricity.

Battery Principles

3. Define *12-volt battery*.

4. During _____ (charging/discharging), electrical energy is converted into chemical energy.

5. What does a simple battery cell consist of?

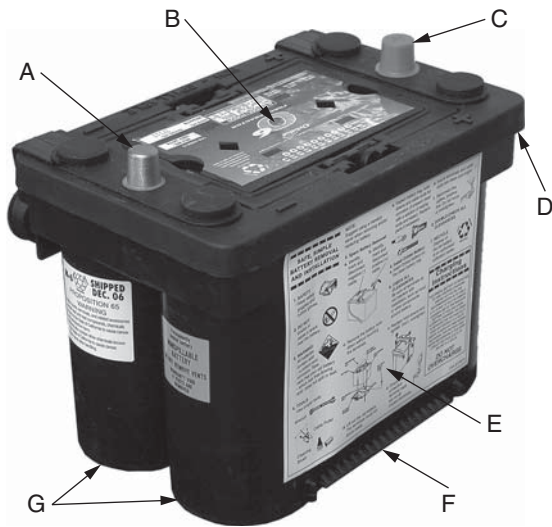
6. Define the term *load*.

Battery Functions

7. List the five functions of a battery.

- (1) _____
- _____
- (2) _____
- _____
- (3) _____
- _____
- (4) _____
- _____
- (5) _____
- _____

8. Identify the parts of this battery.



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

12-Volt Batteries

_____ 9. A 12-volt battery has _____ cells, which produce an open circuit voltage of _____ volts.

- (A) 12, 6
- (B) 6, 12.6
- (C) 6, 9
- (D) 12, 12.6

10. What are battery plates?

11. *True or False?* Batteries can have either side terminals _____ or top posts.

Name _____

12. What are separators?

13. What is the function of battery caps?

14. _____ is a mixture of sulfuric acid and distilled water. _____

15. The battery _____ shows the general charge condition of the battery. _____

For questions 16–18, match the following terms and identifying phrases.

- _____ 16. Electrical connectors with female threads that accept a bolt on the battery cable end. (A) Battery terminals
- _____ 17. Provide a means of connecting the battery plates to the car’s electrical system. (B) Battery posts
- _____ 18. Extend through the top of the battery cover. (C) Side terminals

19. Battery cables connect the battery _____ to the vehicle’s _____. _____

20. The positive battery cable is normally (red, black) _____; the negative battery cable is usually _____ (red, black). _____

21. What is a battery heat shield?

22. How can you tell if a battery is maintenance-free?

23. What kind of battery does not contain a liquid electrolyte?

12-Volt Battery Ratings

24. What does battery cold cranking rating indicate?

25. What is reserve capacity rating?

26. The amp-hour rating is a measurement of how much _____
current the battery can produce for _____ hours at
80°F (27°C) with battery voltage staying above _____ volts. _____

Battery Temperature and Efficiency

_____ 27. As battery temperature drops, battery power is _____.
(A) increased
(B) reduced
(C) unaffected
(D) fluctuating up and down

HV Batteries

28. Describe the function of an HV battery.

29. What are the latest HV batteries called?

30. HV batteries are _____ with a semi-solid electrolyte. _____

_____ 31. The HV battery is normally mounted in the _____ of the chassis.
(A) top
(B) side
(C) front
(D) rear

32. *True or False?* The electrolyte in lithium-ion HV batteries _____
is stable and protected against water damage.

Name _____

33. Define *HV battery pack*.

_____ 34. Battery pack voltage is as high as _____ volts.

- (A) 12
- (B) 7.5
- (C) 9.2
- (D) 12.6

35. Battery pack _____ protect against shorts and excessive current draw from each group of cells.

36. An HV battery (frame, cover) _____ encloses and protects the individual battery packs.

37. An HV battery (frame, cover) _____ holds the battery packs together.

38. How does an HV battery temperature sensor protect against overheating?

39. *True or False?* HV power cables can carry both high voltage dc and high voltage ac.

40. HV battery nominal operating voltage is the maximum _____ voltage available from the HV battery.

41. What determines how much current can be fed to the HV motor for a short period of time?

42. The cold cranking rating is the equivalent to the _____.

HV Capacitor Banks

43. Define *HV capacitor banks*.

44. HV capacitor banks are ideal for supplementing _____.

45. Name a benefit for hybrids using capacitor banks.

46. What element is needed for fuel cell propulsion?

47. What is the main drawback to fuel cell propulsion?

48. Describe how a flywheel generator works.
