

Chapter

29

12-Volt and HV Battery Service



Name _____ Date _____

Instructor _____ Score _____

Objective: After studying this chapter, you will be able to inspect 12-volt and HV batteries for problems and perform tests to determine if batteries need replacement.

12-Volt Battery Maintenance

1. What five steps are done during battery maintenance?

(A) _____

(B) _____

(C) _____

(D) _____

(E) _____

_____ 2. Technician A says you should wear eye protection when working around batteries. Technician B says even the film buildup on a battery can contain acid. Who is right?

- (A) A only.
- (B) B only.
- (C) Both A and B.
- (D) Neither A nor B.

_____ 3. Technician A says you should wash the top of a battery with a detergent solution. Technician B says you should wash the top of a battery with baking soda and water. Who is right?

- (A) A only.
- (B) B only.
- (C) Both A and B.
- (D) Neither A nor B.

4. What is a battery terminal test?

_____ 5. All of the following are procedures to perform a battery terminal test, *except*:

- (A) crank the engine while watching the voltmeter reading.
- (B) connect an ammeter to the appropriate cable ends.
- (C) disable the ignition or injection system.
- (D) connect a voltmeter to the appropriate cable ends.

6. What should you use to keep battery terminals from corroding?

7. What is a memory saver?

_____ 8. Technician A says the invisible hydrogen gas is not flammable. Technician B says that batteries can explode. Who is right?

- (A) A only.
- (B) B only.
- (C) Both A and B.
- (D) Neither A nor B.

9. If battery electrolyte is low, fill the cells to the correct level _____ with _____.

10. A battery _____ measures the specific gravity (and the _____ state of charge) for battery electrolyte.

_____ 11. A discharged battery will have _____.

- (A) lower specific gravity than a fully charged battery
- (B) higher specific gravity than a fully charged battery
- (C) lower specific gravity than water
- (D) the same specific gravity as water

_____ 12. A hydrometer test indicates a battery's electrolyte has a specific gravity of 1.269 at 90°F (32.5°C). Technician A says the battery is fully charged. Technician B says the battery may be defective or in need of recharging. Who is right?

- (A) A only.
- (B) B only.
- (C) Both A and B.
- (D) Neither A nor B.

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13. What should happen if the specific gravity in any cell varies excessively from the other cells?

14. How do you check battery state of charge with a voltmeter?

15. What is the purpose of a cell voltage test?

16. What is a battery drain test?

_____ 17. A battery drain test indicates a drain of .75 amps. Technician A says this is an acceptable drain. Technician B says this is a normal parasitic drain caused by the clock and computer. Who is right?

- (A) A only.
- (B) B only.
- (C) Both A and B.
- (D) Neither A nor B.

18. A battery charger is a(n) _____ and diode rectifier circuit that changes wall outlet voltage to slightly above battery voltage.

_____ 19. Technician A says charging a frozen battery can cause the case to rupture and may cause an explosion. Technician B says a frozen battery will usually have plate and cell damage. Who is right?

- (A) A only.
- (B) B only.
- (C) Both A and B.
- (D) Neither A nor B.

12-Volt Jump Starting

_____ 20. When jump starting, connect the two batteries in order, _____.

- (A) positive to negative and negative to positive
- (B) negative to negative and positive to positive
- (C) negative to positive and positive to positive
- (D) positive to positive and negative to negative

- _____ 21. Technician A says you can short jumper cables together and connect them backward. Technician B says by connecting the last negative jumper cable away from the battery, the battery gas will explode. Who is right?
- (A) A only.
 - (B) B only.
 - (C) Both A and B.
 - (D) Neither A nor B.

12-Volt Battery Load Test

22. A(n) _____ tests the battery under full load conditions. _____
23. Most load testers have a(n) _____ type ammeter lead. _____
- _____ 24. During a load test, if the amp-hour rating is given, you should load the battery to _____ its rating.
- (A) two times
 - (B) three times
 - (C) four times
 - (D) five times
25. If a battery is rated at 90 amp-hours, what amperage should be used for a load test?
- _____
26. Many batteries are ranked in SAE _____, rather than _____ amp-hours.
- _____ 27. To determine the load test for a battery rated in cold crank amps, divide the cold crank rating by _____.
- (A) two
 - (B) twenty
 - (C) three
 - (D) two hundred
28. During a load test, if the 12V battery reads _____ volts _____ or more, the battery is good.

Activating Dry-Charged 12-Volt Batteries

29. A new dry-charged battery must be filled with _____ before installation.
- _____ 30. Technician A says you should use a metal funnel when pouring electrolyte into a dry-charged battery. Technician B says you should use a plastic funnel. Who is right?
- (A) A only.
 - (B) B only.
 - (C) Both A and B.
 - (D) Neither A nor B.

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Removing and Installing a 12-Volt Battery

- _____ 31. Which of the following is the correct order for removing a battery?
- (A) Loosen the battery hold-down, use a battery strap to remove the battery, disconnect the cables.
 - (B) Use a battery strap to remove the battery, loosen the battery hold-down, disconnect the cables.
 - (C) Disconnect the cables, use a battery strap to remove the battery, loosen the battery hold-down.
 - (D) Disconnect the cables, loosen the battery hold-down, use a battery strap to remove the battery.
- _____ 32. Technician A says you should always wear safety glasses when carrying a battery. Technician B says you should use a battery strap or battery carrier to carry a battery. Who is right?
- (A) A only.
 - (B) B only.
 - (C) Both A and B.
 - (D) Neither A nor B.
- _____ 33. All of the following criteria must be used when selecting a replacement battery, *except*:
- (A) battery must fit properly.
 - (B) power rating must be equal to factory recommendations.
 - (C) the tray edge must not cut through the plastic case.
 - (D) power rating must be less than factory recommendations.

HV Battery Service

- _____ 34. HV battery service life averages about _____.
- (A) 60,000 miles (100,000 km)
 - (B) 150,000 miles (240,000 km)
 - (C) 30,000 miles (50,000 km)
 - (D) 350,000 miles (560,000 km)
35. What two parts must a hybrid vehicle have for it to be conventionally jump started without component damage?
- _____
- _____
- _____ 36. Hybrid vehicle jump starting is being discussed. Technician A says that if a hybrid can be jump started, the jumper cables should be connected to the 12-volt battery positive-to-negative and positive-to-negative. Technician B says that connecting two HV batteries together with jumper cables is the safest way. Who is right?
- (A) A only.
 - (B) B only.
 - (C) Both A and B.
 - (D) Neither A nor B.
37. List three values an HV battery control module monitors.
- _____
- _____
- _____

38. An HV battery load test drive measures _____ and _____ levels into and out of the large battery pack while driving or during simulated driving.

- _____ 39. What is the first step in removing the HV battery from a vehicle?
- (A) Remove the large fasteners or connectors that secure the HV power cables to the HV battery.
 - (B) Remove the HV battery cover.
 - (C) Depower the electrical system according to the vehicle manufacturer’s instructions.
 - (D) Unbolt the HV battery hold-down flange from the vehicle frame.

- _____ 40. Technician A says that water should be poured over a damaged lithium-ion HV battery if it is smoking. Technician B says that after removing an HV battery, the battery should be sent to a specialty shop to be refurbished or recycled. Who is right?
- (A) A only.
 - (B) B only.
 - (C) Both A and B.
 - (D) Neither A nor B.

- _____ 41. A bad HV power cable connection can cause all of the following problems, *except*:
- (A) reduced current flow.
 - (B) lowered motor-generator torque.
 - (C) shortened HV battery recharging times.
 - (D) cable overheating.

42. HV power cable resistance should be less than _____ per _____ of cable.