Chapter 32

Charging System Technology

Name _____ Date _____

Instructor _____ Score _____

Objective: After studying this chapter, you will be able to describe the construction of major 12-volt charging system components and outline the operation of a high-voltage (HV) charging system.

12-Volt Charging System Functions

1. Name three functions of the charging system.

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   _____

   _____

   _____

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   _____

2. What is an alternator?

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   _____

   _____

3. What does the voltage regulator do?

   _____

   _____

   _____

4. What purpose does the drive belt serve?

   _____

   _____

   _____

5. The _____ is an ammeter, voltmeter, or warning light that informs the driver of charging system condition. _____

6. The charging system _____ is the wiring that electrically connects the components together. _____

7. How does the battery serve the charging system?

_____

_____

_____

_____ 8. Technician A says the voltage regulator keeps alternator output at a preset charging voltage. Technician B says the charging voltage is 13–15 volts. Who is right?
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

Alternator

9. The _____ is a set of windings that surrounds the rotor. _____

10. The (rotor, stator) _____ is located in the center of the alternator housing. _____

11. The simple alternator produces a(n) _____ current output. _____

12. An automobile electrical system is designed to use _____ current. _____

_____ 13. The alternator current must be _____ into direct current before entering the vehicle's electrical system.
(A) forward biased
(B) rectified
(C) reverse biased
(D) None of the above.

14. What is a diode?

_____

_____

_____

15. A(n) _____ diode acts as a conductor. _____

16. A(n) _____ diode acts as an insulator. _____

_____ 17. Technician A says an alternator uses several diodes. Technician B says using several diodes results in smooth current flow. Who is right?
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

Name _____

_____ 18. All of the following are main components in a typical alternator, *except*:
(A) rotor assembly.
(B) brush assembly.
(C) charge indicator.
(D) housing.

19. Describe the makeup of the alternator rotor.

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20. Describe alternator bearings and state their purpose.

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21. Describe alternator slip rings and state their purpose.

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_____ 22. Technician A says alternator rear bearings are frequently held in place with a small plate and screws. Technician B says alternator front bearings are usually press-fit. Who is right?
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

23. Small _____ hold the brushes in contact with the slip rings. _____

24. Define *alternator rectifier*.

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25. A(n) _____ may be used to supply current to the rotor field windings. _____

26. Where are rectifier diodes placed?

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_____

27. Describe the construction of an alternator stator.

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_____

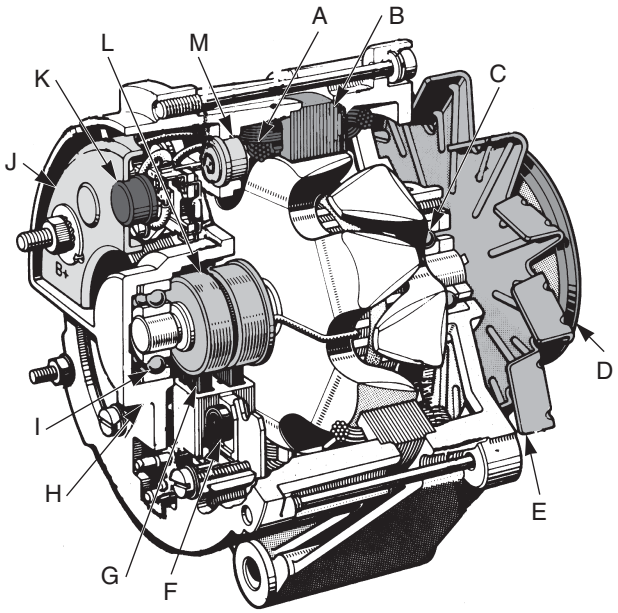
28. What is the job of the alternator fan?

_____

_____

_____

29. Identify the parts of this alternator shown below.



(A) _____

(B) _____

(C) _____

(D) _____

(E) _____

(F) _____

(G) _____

(H) _____

(I) _____

(J) _____

(K) _____

(L) _____

(M) _____

30. Describe an alternator pulley.

_____

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31. Explain the construction and elements of a voltage regulator.

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32. The voltage regulator can maintain a preset charging voltage of _____ volts. _____

Name _____

_____ 33. Technician A says an electronic voltage regulator is a sealed unit and cannot be repaired. Technician B says the circuits of an electronic voltage regulator are surrounded by a rubber-like gel. Who is right?
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

34. What is the most common type of voltage regulator used today?

_____

35. Explain how the electronic voltage regulator works.

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36. What two factors determine whether the regulator increases or decreases charging output?

_____

_____

_____ 37. Technician A says alternator speed determines whether the regulator increases or decreases charging output. Technician B says alternator temperature determines whether the regulator increases or decreases charging output. Who is right?
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

38. The _____ is sometimes used to supplement or replace the conventional voltage regulator to more precisely control the charging circuit. _____

39. The control module can monitor charging system output and react to changing operating conditions. Explain what this means.

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_____

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40. The _____ is the percentage of time that current is fed to the alternator's field windings. _____

41. Why do some modern electronic voltage regulators progressively switch on charging voltage?

_____

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_____

_____ 42. Voltage regulator switching is very fast, about _____ cycles per second to help prevent radio noise.
(A) 40
(B) 60
(C) 200
(D) 400

43. A battery _____ is used to measure battery temperature so the charging system can alter charging output as needed. _____

44. What is an alternator failsafe circuit?

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_____

_____

_____

_____

_____ 45. An alternator uses all of the following for power, *except*:
(A) V-belt.
(B) chain.
(C) cogged V-belt.
(D) ribbed belt.

Charge Indicators

_____ 46. All of the following are charge indicators, *except*:
(A) MIL light.
(B) warning light.
(C) voltmeter indicator.
(D) ammeter indicator.

47. Describe the operation of an alternator warning light.

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Name _____

48. The voltmeter simply shows voltage, which is an indicator of _____ output and charging system condition. _____

49. What is overcharging?

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_____ 50. Technician A says extended overcharging is okay. Technician B says overcharging can result in battery overheating. Who is right?
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

Hybrid Charging Systems

51. Name three major parts of a hybrid charging system.

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52. What will happen when a hybrid vehicle has been driven its maximum range on electric power alone?

_____

_____

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