

Chapter

27

Hybrid Drive Systems Diagnosis and Repair



Name _____ Date _____

Instructor _____ Score _____

Objective: After studying this chapter, you will be able to use on-board diagnostics to find the source of problems in a hybrid drive system.

Hybrid Problem Diagnosis

1. A hybrid ____ constantly monitors the system for high-voltage leakage into the metal chassis of the vehicle. _____

Hybrid Service Safety

2. Most hybrid vehicles conduct almost ____ volts ac and ____ volts dc at hundreds of amps. _____
3. Name three safety precautions you should take when working on a hybrid vehicle.

4. What insulation rating should insulation gloves have?

5. What type of shoes should you wear when working on a hybrid vehicle?

6. *True or False?* You should spray water on a fire caused by a lithium ion battery. _____
7. What actions should be taken when towing a hybrid vehicle?

8. What is a "hot hybrid" system?

9. What is the first step when disabling an HEV for repair?

10. *True or False?* A hybrid's drive train may be engaged and ready to accelerate even without the internal combustion engine running.

11. Most hybrids automatically disable the ____ and ____ when the air bags deploy in a collision.

____ 12. How wide should the perimeter of a high-voltage buffer zone be?
(A) 1'.
(B) 3'.
(C) 5'.
(D) 10'.

13. *True or False?* To prevent electric shock when working on high-voltage circuits, you should wait at least 30 seconds after removing the high-voltage disconnect.

HV Battery Service

14. Replacement warranties on HV batteries can last ____ years or ____ miles.

15. *True or False?* NiMH batteries should not be stored for long periods.

16. If an HV battery fails to accept and hold a charge, a(n) ____ will be set in memory.

17. The control module will disable the ____ drive train when problems are detected in the battery circuit.

Checking HV Battery Relays and Contactors

18. If the battery power indicator reads okay, but battery power is not reaching the HV PCM, check the battery ____ and ____.

HV Power Cable Service

19. What can happen to a loose HV power cable?

Name _____

HV Power Control Module Service

20. The HV PCM steps voltage up or down using _____. _____
21. When the ignition key is turned to *Run*, the hybrid control module energizes the HV _____. _____
22. Bad high-power contactor lugs in the HV PCM can burn and develop (high, low) _____ resistance after prolonged service. _____
23. What happens when contactor lugs go bad?

24. A faulty HV PCM can call for replacement of the entire _____ unit or just the affected _____. _____
25. What can happen if power cables are either undertightened or overtightened?

Hybrid Cooling System Service

26. *True or False?* If the cooling system is air cooled, place a stethoscope on the electric pump to determine if it is running. _____

Motor-Generator Service

27. The most common motor-generator design requires you to remove the _____ or _____ to access the motor-generator assembly. _____
28. What problems can result in a motor-generator trouble code?

29. Worn motor-generator bearings can cause excessive _____ shaft runout. _____
30. Motor-generator stator problems will trip trouble codes when the circuit _____, _____, or _____ for any stator winding is not correct. _____

- 31. When testing motor-generator resistance, connect a(n) _____
_____ to each conductor going to the motor-generator
stator windings and the ground.
- 32. Any motor-generator stator winding that has _____
resistance has been burned or broken open, and does
not generate its magnetic fields.
- 33. Any motor-generator stator winding that has _____
resistance to ground might be physically damaged
and shorted to ground.
- 34. High voltages produced in a hybrid vehicle can
cause _____.
- 35. When your scan tool shows a problem with a particular
hybrid component but the component tests good, check
for _____ in the corresponding circuit.