

# 18

# On-Board Diagnostics and Scan Tools

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Instructor: \_\_\_\_\_ Score: \_\_\_\_\_ Textbook pages 258–279

**Objective:** After studying this chapter, you will have a basic understanding of automotive on-board computer self-diagnostic capabilities and scan tools applications.

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## On-Board Diagnostic Systems

1. An automotive computer system scans its input and output circuits to detect an incorrect \_\_\_\_\_.  
(A) current  
(B) voltage  
(C) resistance  
(D) All of the above. 1. \_\_\_\_\_
2. A vehicle's engine \_\_\_\_\_ module can detect engine misfiring and air-fuel mixture problems. 2. \_\_\_\_\_
3. Explain why on-board diagnostics is considered a time-saver when servicing automotive computer systems.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. What does *OBD I* stand for? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. OBD II is designed to \_\_\_\_\_.  
(A) keep the vehicle running efficiently for at least 100,000 miles  
(B) detect part deterioration  
(C) monitor the condition of hardware that affects emissions  
(D) All of the above. 5. \_\_\_\_\_
6. OBD II systems can produce over \_\_\_\_\_ engine performance-related trouble codes. 6. \_\_\_\_\_

7. Define *malfunction indicator light*. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

8. An MIL is flashing continuously in an OBD II equipped vehicle. Technician A says this problem is not critical but should be repaired. Technician B says this flashing MIL means the trouble could damage the catalytic converter and is, therefore, considered critical. Who is right?  
 (A) A only.  
 (B) B only.  
 (C) Both A and B.  
 (D) Neither A nor B.

8. \_\_\_\_\_

9. Explain *trouble code conversion*. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

10. \_\_\_\_\_ are digital signals produced and stored by the computer when an operating parameter is exceeded.

10. \_\_\_\_\_

11. A(n) \_\_\_\_\_ is an acceptable minimum and maximum value.

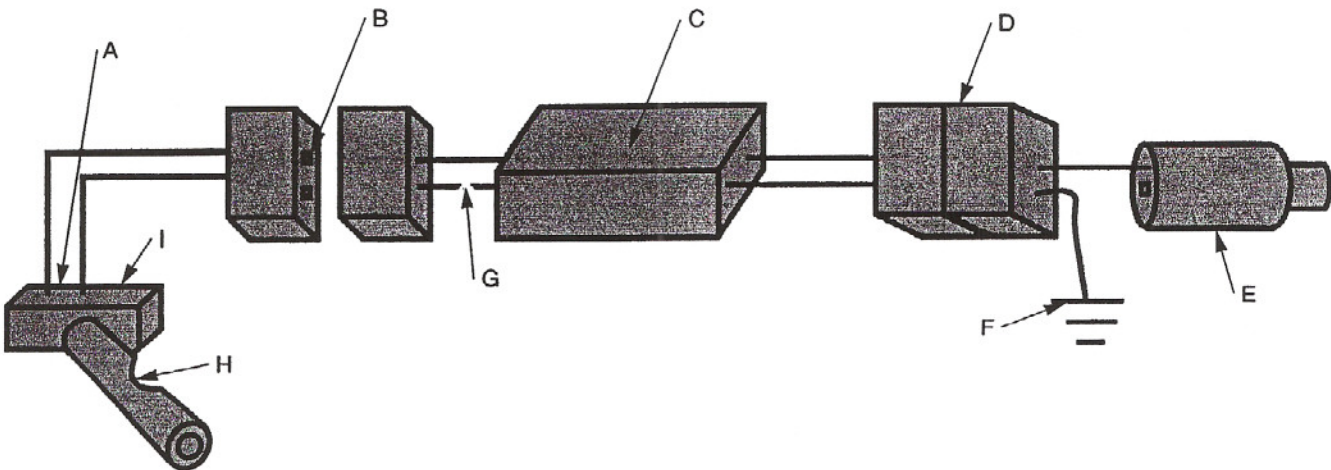
11. \_\_\_\_\_

12. \_\_\_\_\_ percent of all engine performance problems are caused by faults in the computer or one of its sensors.

12. \_\_\_\_\_

- (A) Fifteen
- (B) Twenty
- (C) Sixty
- (D) Eighty

13. Identify the common problems that can affect an engine's performance and computer operation.



- (A) \_\_\_\_\_
- (B) \_\_\_\_\_
- (C) \_\_\_\_\_
- (D) \_\_\_\_\_
- (E) \_\_\_\_\_

- (F) \_\_\_\_\_
- (G) \_\_\_\_\_
- (H) \_\_\_\_\_
- (I) \_\_\_\_\_

Name \_\_\_\_\_

**Scanning Computer Problems**

14. What is a *scan tool*? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
15. A(n) \_\_\_\_\_ tool is another name for a scan tool. 15. \_\_\_\_\_
16. What are *scan tool program cartridges*? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
17. A(n) \_\_\_\_\_ cartridge provides data for one or more vehicle manufacturers. 17. \_\_\_\_\_
18. Describe the function of a *data link connector*. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
19. Name at least three of the most common locations for the data link connector.  
 \_\_\_\_\_  
 \_\_\_\_\_
20. The standardized DLC connector used with OBD II systems has \_\_\_\_\_ pins. 20. \_\_\_\_\_  
 (A) four  
 (B) sixteen  
 (C) eighteen  
 (D) None of the above.
21. Sometimes it is necessary to use a(n) \_\_\_\_\_ in order for the scan tool connector to communicate with different pin configurations. 21. \_\_\_\_\_
22. What are *scan tool prompts*? What purpose do they serve? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
23. Why does a scan tool require *VIN* information? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



24. Why should you always correct the cause of the *lowest number* diagnostic trouble code first?

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25. OBD II requires all auto manufacturers to use a set of standardized \_\_\_\_\_ 25. \_\_\_\_\_  
trouble codes.

26. What does the *letter* in all OBD II trouble codes represent? \_\_\_\_\_

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27. What does the *first digit* of an OBD II trouble code indicate? \_\_\_\_\_

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28. The *second number* in the OBD II code indicates the \_\_\_\_\_ of the system 28. \_\_\_\_\_  
where the fault is located.

29. What do the *last two digits* of an OBD II trouble code indicate? \_\_\_\_\_

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30. Define *hard failure*. \_\_\_\_\_

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31. Define *soft failure*. \_\_\_\_\_

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■ Match the descriptions on the left with the types of computer system failures on the right.

32. The circuit or component has a fixed value, no output, or an output that is out of specifications. (A) High-input failure 32. \_\_\_\_\_

(B) General circuit failure

33. Produces a voltage, current, or signal frequency below normal operating parameters. (C) Improper range/performance failure 33. \_\_\_\_\_

(D) Low-input failure

34. Results when the signal reaching the on-board computer has more voltage, more current, or a higher frequency signal than normal. 34. \_\_\_\_\_

35. Occurs when a sensor or actuator is producing values slightly lower or higher than normal. 35. \_\_\_\_\_

Name \_\_\_\_\_

36. What are *datastream values*? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
37. How is the computer's *key-on/engine-off diagnostics mode* activated? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
38. What should be done if you work in the *key-on/engine-off diagnostic mode* for over 30 minutes?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
39. List the procedures used to perform a *wiggle test*. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
40. What is the function of *engine-on/key-on diagnostics*? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
41. A(n) \_\_\_\_\_ test involves activating various switches while using a scan tool. 41. \_\_\_\_\_

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### **Energizing OBD I Systems without a Scan Tool**

42. List at least two methods of activating on-board diagnostics of a vehicle using an OBD I system without using a scan tool.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

43. List five different ways to read computer trouble codes without the use of a scan tool.

- (1) \_\_\_\_\_
- (2) \_\_\_\_\_
- (3) \_\_\_\_\_
- (4) \_\_\_\_\_
- (5) \_\_\_\_\_

44. A(n) \_\_\_\_\_ code is read by counting the number of needle deflections between each pause. 44. \_\_\_\_\_

45. You should use only a(n) \_\_\_\_\_ test light or multimeter when testing computer circuits. 45. \_\_\_\_\_

46. A(n) \_\_\_\_\_ trouble code is produced by indicator lights on the side of the computer. 46. \_\_\_\_\_

47. What is the purpose of a trouble code chart? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

48. Normally, trouble codes will be automatically erased after \_\_\_\_\_ engine starts or warm-ups. 48. \_\_\_\_\_

- (A) 30-50
- (B) 50-60
- (C) 70-80
- (D) 80-90

49. Describe three methods used to erase trouble codes from the computer.

- (1) \_\_\_\_\_
- (2) \_\_\_\_\_
- (3) \_\_\_\_\_

50. While determining the trouble code on an automobile, a technician watches the engine light flash four times, pause, then flash three more times. What trouble code is indicated? 50. \_\_\_\_\_