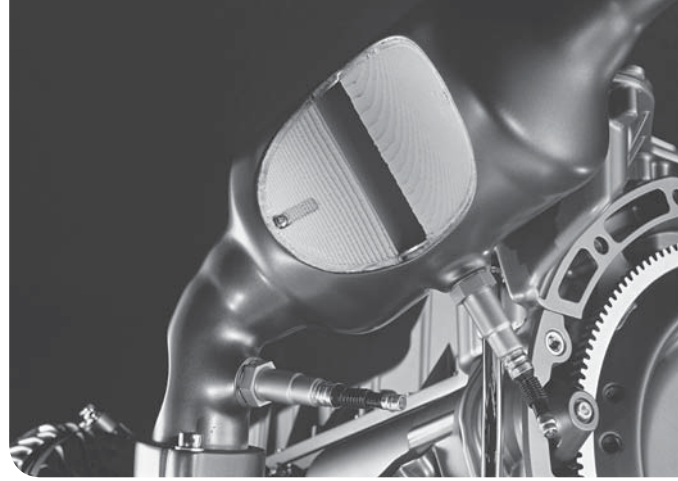


# Chapter 52

## ***Emission Control System Testing, Service, and Repair***



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

Instructor \_\_\_\_\_ Score \_\_\_\_\_

**Objective:** After studying this chapter, you will be able to inspect and troubleshoot emission control systems.

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### **Computer-Controlled Emission System Service**

1. Name the systems that can affect the vehicle's operation and can increase emissions.

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2. Briefly explain the purpose of a scan tool to check emission control systems.

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3. What is an emission maintenance reminder?

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### **Inspecting Emission Control Systems**

4. Using scan tool information, finding the source of the emission control problems should begin by inspecting what two things?

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5. \_\_\_\_\_ is the ratio of heat actually developed in the \_\_\_\_\_ the combustion process to the heat that would be released if the combustion were perfect.

6. If CO<sub>2</sub> and O<sub>2</sub> are not toxic substances, why are they measured?

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## Exhaust Gas Analyzer

7. Describe what an exhaust gas analyzer measures.

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8. Name four things that an exhaust gas analyzer can determine causes excessive emissions.

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9. What does a five-gas exhaust analyzer measure?

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10. *True or False?* Exhaust gas analyzer tests are performed \_\_\_\_\_  
on a vehicle with a cold engine.

11. In your own words, explain a hydrocarbon (HC) reading measured by an exhaust analyzer.

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12. Name three things that can cause a higher-than-normal HC reading.

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13. Explain CO readings.

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Name \_\_\_\_\_

14. A high carbon monoxide reading would indicate a \_\_\_\_\_ (lean/rich) \_\_\_\_\_ air-fuel mixture. A low or no carbon monoxide reading would indicate a (lean/rich) \_\_\_\_\_ air-fuel mixture.
15. Name a typical cause of high carbon monoxide readings.  
\_\_\_\_\_  
\_\_\_\_\_
16. A five-gas analyzer can measure oxides of \_\_\_\_\_, while \_\_\_\_\_ a four-gas analyzer cannot.
17. Name a typical cause of high NO<sub>x</sub> emissions.  
\_\_\_\_\_  
\_\_\_\_\_
18. Explain O<sub>2</sub> readings.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
19. The \_\_\_\_\_ level in the engine exhaust sample is an accurate indicator of a vehicle's air-fuel mixture.

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## State Emissions Testing Programs

20. An emissions testing program involves taking exhaust gas readings, as well as checking the vehicle for the presence of a(n) \_\_\_\_\_ and a(n) \_\_\_\_\_.
21. What is the IM 240 test?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
22. Describe an evaporative emissions system pressure test.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

23. Briefly explain smoke generator testing.

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\_\_\_\_\_ 24. The EPA estimates that approximately \_\_\_\_\_% of the vehicles tested will fail their emission tests.  
(A) 10  
(B) 15  
(C) 25  
(D) 50

25. Identify and explain the five major sections of a vehicle inspection report.

(A) \_\_\_\_\_

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(B) \_\_\_\_\_

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(C) \_\_\_\_\_

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(D) \_\_\_\_\_

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(E) \_\_\_\_\_

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26. What is the purpose of a drive trace report?

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27. The average allowable emission level for the specified \_\_\_\_\_ model year is called the \_\_\_\_\_.

28. When evaluating a drive trace report, if CO emissions \_\_\_\_\_ are high, \_\_\_\_\_ fuel has been detected.

Name \_\_\_\_\_

29. When evaluating a drive trace report, if NO<sub>x</sub> emissions are high, \_\_\_\_\_ are too high, causing nitrogen oxide pollution.
30. When troubleshooting an electrically powered vacuum solenoid, check it for \_\_\_\_\_.

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## PCV System Service

31. Identify three possible problems created by an inoperative PCV system.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
32. A leaking PCV system can cause a vacuum leak and produce a \_\_\_\_\_ air-fuel mixture, causing a rough engine idle.
33. What problem can a restricted PCV system cause?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
34. *True or False?* To quickly test a PCV valve, pull the valve out of the engine and shake it. If the PCV valve rattles when shaken, replace the valve.
35. What does a PCV valve tester measure?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
36. Crankcase dilution (excessive blowby or fuel in the oil) will usually show up as a 1% or more (increase, decrease) \_\_\_\_\_ in oxygen or a 1% or more (increase, decrease) \_\_\_\_\_ in carbon monoxide.

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## Evaporative Emissions System Service

37. What are three possible problems caused by a faulty evaporative emissions control system?
- \_\_\_\_\_
- \_\_\_\_\_
38. Maintenance on an evaporative emissions control system typically involves cleaning or replacing the \_\_\_\_\_ in the charcoal canister.

39. What is a good way to inspect the condition of the fuel tank filler cap?

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40. When replacing an evaporative emission systems hose, \_\_\_\_\_ use special \_\_\_\_\_ hose.

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## EGR System Service

41. What will happen if the EGR valve sticks open? What will happen if it sticks closed?

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42. Describe how to test a vacuum EGR system.

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43. Most problems with electronic EGR valves can be \_\_\_\_\_ quickly isolated with a(n) \_\_\_\_\_.

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## Air Injection System Service

44. What does air injection system maintenance typically include?

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\_\_\_\_\_ 45. Without air injection, the exhaust analyzer's oxygen reading should drop approximately \_\_\_\_\_%.  
(A) 2–5  
(B) 5–10  
(C) 10–20  
(D) 20–25

Name \_\_\_\_\_

- \_\_\_\_\_ 46. Typically, an air pump should produce about \_\_\_\_\_ psi of pressure.
- (A) 1–2
  - (B) 2–3
  - (C) 5–7
  - (D) 8–10

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## Pulse Air System Service

47. Exhaust analyzer oxygen readings should \_\_\_\_\_ when \_\_\_\_\_ the pulse air system is disabled.
48. How are the aspirator valves of a pulse air system tested?

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## Catalytic Converter Service

49. An exhaust \_\_\_\_\_ test will check for a clogged catalytic \_\_\_\_\_ converter and other system parts.
50. With OBD II vehicles, how is the catalytic converter's condition monitored?
51. When installing a new catalytic converter and header \_\_\_\_\_ pipe, use new \_\_\_\_\_ and reinstall all heat shields.

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## Oxygen Sensor Service

52. What is a consequence of oxygen sensors becoming coated or fouled with exhaust by-products?
53. If a scan tool readout shows that the O<sub>2</sub> sensor output \_\_\_\_\_ voltage is abnormal, a technician might want to measure the sensor's \_\_\_\_\_ with a multimeter.

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54. By comparing actual \_\_\_\_\_ (zirconia-type sensor) or \_\_\_\_\_ levels (titania-type sensor) to scan tool readout values and manufacturer's specifications, you can determine whether the sensor, wiring, or ECM is at fault.

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## OBD II Drive Cycle

55. The OBD II drive cycle is normally performed whenever the \_\_\_\_\_ or \_\_\_\_\_ has been disconnected, or after diagnostic trouble codes have been erased.

56. To begin the drive cycle, coolant temperature should be below \_\_\_\_\_.

57. A typical drive cycle will take from \_\_\_\_\_ to \_\_\_\_\_ minutes to complete.

58. Performing the drive cycle with the vehicle on a chassis \_\_\_\_\_ will allow the scan tool to gather readings in the shortest possible time.