

Starting System Testing and Repair

Name: _____ Date: _____

Instructor: _____ Score: _____ Textbook pages 520–537

Objective: After studying this chapter, you will be able to test and repair common starting system troubles.

Starting System Diagnosis

1. Define a *no-crank* problem. _____

2. Technician A says poor electrical connections can cause a no-crank problem. Technician B says that broken flywheel teeth can cause a no-crank problem. Who is right? _____
 (A) A only.
 (B) B only.
 (C) Both A and B.
 (D) Neither A nor B.
3. A single click sound, without cranking, may be due to all of the following, *except*: _____
 (A) burned solenoid contacts.
 (B) engine mechanical problems.
 (C) weak overrunning clutch.
 (D) bad starter motor.
4. List the causes of a humming sound after momentary engine cranking. _____

5. Technician A says normal cranking without starting is caused by the starter system. Technician B says normal engine cranking without starting is caused by worn pinion gear teeth. Who is right? _____
 (A) A only.
 (B) B only.
 (C) Both A and B.
 (D) Neither A nor B.
6. A *start/die* symptom is an indication of what conditions? _____

7. What is a *starting headlight test*? _____

8. List eight problems that can develop in a starting system.

9. A vehicle's lights stay bright with no cranking. What might be the problem?

10. Technician A says a discharged or poorly connected battery can operate the lights, but may *not* have enough power to operate the starting motor. Technician B says a discharged or poorly connected battery will *not* operate the lights or the starting motor. Who is right?
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

10. _____

11. Describe the procedure for performing a *starter current draw test*. _____

12. When performing a starter current draw test, you should crank the engine for no longer than _____ seconds. 12. _____

13. List the typical starter current draw values for the following engines. 13. (A) _____
(A) Engine with 4 or 6 cylinders = ___?___ amps. (B) _____
(B) Engine under 300 CID = ___?___ amps.

14. _____ tests will quickly locate a part with higher-than-normal resistance. 14. _____

15. During an insulated circuit resistance test on the starter solenoid, the volt-meter reads a 3.2 volt drop. Technician A says this could be caused by burned solenoid contacts. Technician B says this could be caused by pitted solenoid contacts. Who is right? 15. _____
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

16. Describe a *starter ground circuit test*. _____

Battery Cable Service

17. Technician A says you can remove starting system parts without disconnecting the battery. Technician B says if you do not disconnect the battery before removing starting system parts, an electrical fire could result. Who is right? 17. _____
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.
18. How do you do a battery cable connection test with a voltmeter? _____

19. All of the following should be taken into consideration when replacing battery cables, *except*: 19. _____
(A) cable length.
(B) cable diameter.
(C) using aluminum terminals.
(D) using lead terminals.
20. Technician A says when tightening the connections on the end of battery or starter cables, only snug down the fasteners. Technician B says many of the threaded studs, bolts, and nuts are made of soft lead and can strip and break easily. Who is right? 20. _____
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

Starter Solenoid Service

21. Which of the following is the *most likely* symptom of a bad starter solenoid? 21. _____
(A) Slow cranking.
(B) Starter engages, but does not turn the engine.
(C) Grinding noise when cranking.
(D) Fast cranking.

22. Describe how a starter solenoid can become defective. _____

23. A suspect starter solenoid has a voltage drop of 0.1 volt. Technician A says the starter solenoid is defective. Technician B says the cable connections are loose. Who is right? 23. _____
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

24. Briefly describe the procedure for replacing a solenoid that is mounted on the starter.

Ignition Switch Service

25. What can happen if an ignition switch is defective? _____

26. What should happen when you touch a test light to the starter solenoid start (S) terminal? 26. _____
(A) The test light will remain out when the key is turned to start the engine.
(B) The test light will glow when the key is turned to start the engine.
(C) The test light will glow all the time.
(D) The test light will remain out all the time.

Starter Relay Service

27. How can you tell if you have a faulty starting motor relay? _____

28. What tool should you use to test a starter relay? 28. _____

Neutral Safety Switch Service

29. A car will not start in park, but will start in neutral. Technician A says this is caused by a misadjusted neutral safety switch. Technician B says this is caused by a defective ignition switch. Who is right? 29. _____
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.

30. All of the following are locations for the neutral safety switch, *except*: 30. _____
- (A) transmission.
 - (B) steering column.
 - (C) shift lever.
 - (D) brake pedal.

31. Describe how to test a neutral safety switch. _____

Starter Service

32. All of the following are symptoms of a faulty starter motor, *except*: 32. _____
- (A) fast cranking.
 - (B) no cranking.
 - (C) starter cable overheating.
 - (D) abnormal noises while cranking.

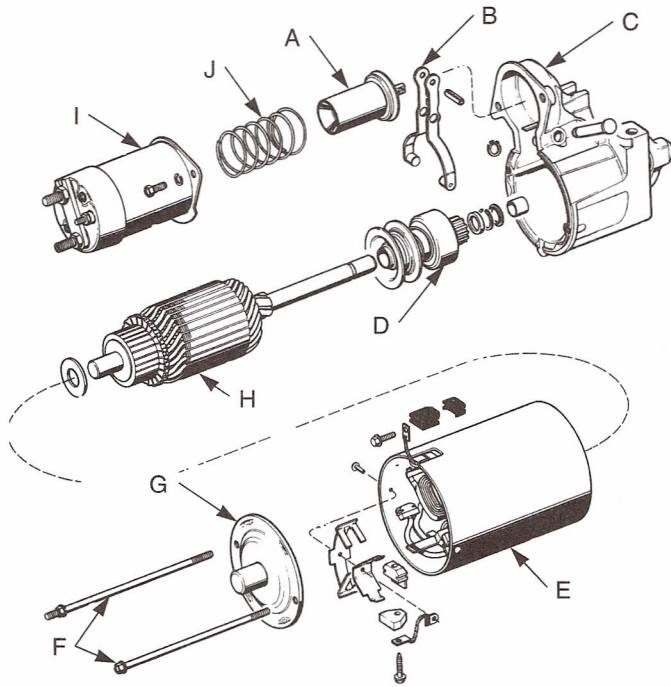
33. List the five major steps for a *starting motor rebuild*.

34. Technician A says many shops do not rebuild starter motors. Technician B says the cost of labor is too high to make in-shop starter rebuilding economical. Who is right? 34. _____
- (A) A only.
 - (B) B only.
 - (C) Both A and B.
 - (D) Neither A nor B.

35. Which of the following is *false* about starter repairs? 35. _____
- (A) The pinion gear can be replaced without complete starting motor disassembly.
 - (B) When the starter must be repaired, it has to be completely disassembled.
 - (C) When the starter must be repaired, you may only need to disassemble a section of the starter.
 - (D) By removing only the drive and C-lock, the brushes are not removed.

36. List, in order, the procedure for starter removal.

37. Identify the parts and problems common to a starting motor.



- (A) _____
- (B) _____
- (C) _____
- (D) _____
- (E) _____
- (F) _____
- (G) _____
- (H) _____
- (I) _____
- (J) _____

38. What should you check for whenever you remove a starter? 38. _____

39. Technician A says if the shims are not replaced, the pinion and flywheel gears will not mesh properly. Technician B says the shims have no effect on pinion and flywheel gear alignment. Who is right?

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

38. _____

39. _____

40. Some late-model engines place the starting motor under the engine _____. 40. _____

41. List the six steps for starter disassembly.

- (1) _____
- _____
- (2) _____
- _____
- (3) _____
- _____
- (4) _____
- _____
- (5) _____
- _____
- (6) _____
- _____

42. After the starter has been disassembled, blow all the parts clean with _____. 42. _____

42. _____

Name _____

43. All of the following parts *cannot* be cleaned with solvent, *except*: 43. _____
 (A) armature.
 (B) overrunning clutch.
 (C) brushes.
 (D) drive end housing.
44. Worn starter brushes can cause _____. 44. _____
 (A) reduced starter torque
 (B) excessive starter current draw
 (C) noisy starter operation
 (D) Both A and B.
45. How are the brush wire leads attached? _____

46. Technician A says you should inspect the armature windings and commutator for signs of burning or overheating. Technician B says if the armature has been rubbing on a field pole shoe, the shaft may be bent. Who is right? 46. _____
 (A) A only.
 (B) B only.
 (C) Both A and B.
 (D) Neither A nor B.
47. Describe how to use a *growler* properly. _____

48. What test do you use to check armature continuity? 48. _____
49. If the armature windings are in good condition, the commutator should be cleaned using _____. 49. _____
 (A) solvent
 (B) a fine chamois
 (C) very fine sandpaper
 (D) emery cloth
50. After machining, the _____ between each commutator may need to be undercut. 50. _____
51. A field coil is being tested for an open. Technician A says you can use a battery-powered test light. Technician B says you can use a voltmeter. Who is right? 51. _____
 (A) A only.
 (B) B only.
 (C) Both A and B.
 (D) Neither A nor B.
52. What should happen if ohmmeter leads are touched across the field coil and ground?

53. When should the overrunning clutch be replaced? _____

54. Technician A says you should replace the pinion gear during starter service. Technician B says if the pinion is to be reused, you should check the gear teeth for wear. Who is right? 54. _____

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

55. All the following should be lubricated when reassembling the starter, *except*: 55. _____

- (A) brushes.
- (B) armature shaft bushings.
- (C) pinion gear splines.
- (D) starter drive yoke.

56. How can brushes be locked out of the way during starter reassembly? _____

57. What should be done to the starter *before* it is mounted on the engine? _____

58. Define *starter pinion gear clearance*. _____

59. What would happen if the shims are left out during starter installation? _____

60. Technician A says if the starter has a solenoid on it, you should connect the wires on the solenoid before bolting the starter to the engine. Technician B says you should connect the wires to the solenoid after the starter is bolted to the engine. Who is right? 60. _____

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