

Video User's Guide

Charging System Operation

Introduction

This video will explain the basic operating principles of an automotive charging system. You will learn about the construction and operation of the components that make up this automotive system. You will discover the meaning of several new automotive terms such as rectifier assembly, reverse biased diode, forward biased diode, half wave rectification, full wave rectification, diode trio, integral voltage regulator, slip rings, and much more. Through illustrations and live demonstrations you will see why the alternator is considered the "heart" of a car's charging system. This film also summarizes the functions of each charging system component. The primary purpose of this program is to introduce you to the concepts of charging system operation. Once these concepts are understood, you will better prepare yourself for charging system diagnosis and repair.

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Student Objectives

After viewing this video, the student will be able to:

- Explain the function of an automotive charging system.
- Describe the construction and purpose of an automotive alternator.
- Explain the function of an alternator fan.
- Define the terms alternator stator and alternator rotor.
- Explain how a diode converts AC current into DC current.
- Define the terms halfwave rectification and full wave rectification,
- Describe the purpose of a heat sink.
- Explain the function of a charging system voltage regulator.
- List three types of voltage regulators.
- Explain how a heated windshield system operates.

To The Instructor

This video is designed to be a valuable supplement to your curriculum. Since young people are extremely acclimated to television, it is a natural way to help present important aspects of your subject matter. This video is designed to give a detailed, yet broad coverage of the topic.

Most educators agree that it is best to use as many instructional methods as possible. Utilize quality textbooks, workbooks, videos, lectures, demonstrations, overheads, and other methods to present the technical information. This will hold interest and help pupils understand the large amount of information required to succeed in today's complex world.

This video is organized into major sections or topics. Each section covers one major segment of the subject. Graphic breaks are given between each section so that you can stop the video for class discussion, demonstrations, to answer questions, or to

ask questions. This allows you to only watch a portion of the program each day or to present the complete video, depending on your curriculum requirements.

The video is designed to simplify the complex. Concise wording and carefully selected graphics are used to provide maximum learning in minimum time.

Close-up shots of components and service procedures are used to make every second of viewing instructional, as if each student was standing right behind you, watching over your shoulder while you were working or giving a demonstration.

Computer animation is used to explain difficult to comprehend principles or techniques. These images show how parts work, how they fit together, or how they vary in design.

Quiz Answer Key

1. b 2. d 3. c 4. b 5. c 6. a 7. c 8. b 9. a 10. b
11. d 12. d 13. b 14. e 15. b

Use your own judgment to evaluate the definitions, short answer questions and discussion topics.

Technical Terms

Write definitions for the following terms. Use a textbook or review the video if needed.

alternator / crankshaft pulley ! alternator drive belt ! AC current
DC current / alternator pulley / wiring harness / slip rings
claw poles ! alternator brushes ! alternator fan / alternator stater
alternator rotor / stater windings ! magnetic field / slip ring
bearing slip ring end frame ! drive end frame bearing / drive end
housing reverse biased diode ! forward biased diode / polarity /
heat sink half wave rectification ! full wave rectification / stater
output wire alternator rectifier assembly / contact point type
voltage regulator remotely mounted solid state voltage regulator /
transistor integral electronic voltage regulator / heated windshield
heated windshield control unit

Video Discussion Topics

Here are a few topics that might be used for a class discussion:

- 1. Why is the alternator pulley smaller than the crankshaft pulley?
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- 2. Describe the operation of a charging system alternator.
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- 3. What allows the alternator rotor shaft to spin freely in its housing?
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- 4. Describe the purpose of an alternator rotor.
-
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- 5. Where is an alternator fan normally located?
-
-
- 6. Explain the function of an alternator stator.
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- 7. List some of the differences between a contact point type voltage regulator and an integral electronic voltage regulator.
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-
- 8. How could a faulty alternator affect the operation of an automobile's electrically heated windshield?

Video Quiz

Choose the most correct answer after reading the statement:

1. The two major parts of a modern automotive charging system are the _____ and the voltage regulator.
a. capacitor b. alternator
c. coil d. relay
2. When the engine is cranked, battery power is drained quickly by the _____ motor.
a. wiper b. fan
d. compressor d. starting
3. To recharge the battery, the _____ must produce a voltage higher than battery voltage.
a. relay b. starter
c. alternator d. solenoid
4. _____ ride on the alternator slip rings to conduct current into the rotor windings.
a. Diodes b. Brushes
c. Transistors d. Resistors
5. A _____ is used to help circulate cool air through the alternator to prevent overheating and part damage.
a. motor b. vent
c. fan d. screen
6. A _____ is mounted around the spinning rotor windings to produce an electrical output from the alternator.
a. stator b. resistor
c. transistor d. relay
7. The alternator drive pulley is normally held on the rotor shaft with a large _____.
a. pin b. clip
c. nut d. screw

Short Answer

Briefly answer the following questions in your own words:

1. Name the functions of an automotive charging system.
2. How is an alternator normally attached to an engine?
3. How are magnetic fields produced in an alternator?
4. Which is more efficient, half wave rectification or full wave rectification?
5. Why is a heat sink often used in an alternator?
6. Where is an alternator's rectifier assembly usually located?
7. Explain the operation of an electronic voltage regulator.
8. Which is more efficient, a contact point type voltage regulator or an electronic voltage regulator?
9. Define the term diode trio.
10. Explain the meaning of the term dielectric compound.