

Introduction to Automotive Electrical and Electronic Systems

Classroom Manual Objectives

Upon completion and review of this chapter, you should be able to know and understand:

- The importance of learning automotive electrical systems.
- The role of electrical systems in today's vehicles.
- The interaction of the electrical systems.
- The purpose of the starting system.
- The purpose of the charging system.
- The role of the computer in today's vehicles.
- The purpose of vehicle communication networks.
- The purpose of various electronic accessory systems.
- The purpose of passive restraint systems.
- The purpose of alternate propulsion systems.

Classroom Manual Overview

This chapter includes a discussion of automotive electrical and electronic systems. The focus is to provide a basic overview of the automotive electrical systems that are discussed in greater detail in later chapters. This will provide the student with knowledge of the purposes of the automotive electrical systems. The intent is to get the student, excited about this segment of the automotive repair industry and to support their decision to study this field.

Reading Assignments

Classroom Manual, pages 1-15

Terms to Know

Air bag systems	Fuel cell	Passive restraint systems
Antitheft system	Heated windshield system	Power door locks
Automatic door locks (ADL)	Horn	Power mirrors
Bus	Hybrid electric vehicle (HEV)	Power windows
Charging system	Ignition switch	Starting system
Computer	Keyless entry system	Voltage regulator
Cruise control	Lighting system	Windshield wipers
Easy exit	Memory seat	
Electric defoggers	Multiplexing	
Electric vehicle (EV)	Network	
Electrical accessories	Neutral safety switch	

Lecture Outline and Notes

I. Objectives

- A. Review the chapter's objectives.

II. Introduction

- A. Discuss the importance of understanding the concepts of electricity in order to service today's vehicles. Be sure to emphasize that the student should feel comfortable asking questions. Explain the purpose of this chapter is to introduce the student to the purpose of many of the electrical systems on today's vehicles and that these systems will be discussed in greater detail in later chapters.

III. Why Become an Electrical System Technician

- A. Discuss how the automotive electrical and electronic systems have evolved during the past twenty years. Also, discuss what the future of the electrical systems may hold. Explain that there is no system on today's vehicles that is immune from electrical or electronic operation.

IV. The Role of Electricity in the Automobile

- A. Explain how today's electrical systems have evolved from being a series of stand-alone systems to that of being interconnected. Discuss the concept of networks and how a single component failure can result in multiple malfunctions.

V. Introduction to the Electrical Systems

- A. The Starting System
Discuss the purpose of the starting system. Explain the components and their basic functions.
- B. The Charging System
Discuss the purpose of the charging system. Explain the components and their basic functions.
- C. The Lighting System
Discuss the different types of lighting systems and their purposes. Explain the components and their basic functions.
- D. Vehicle Instrumentation Systems
Discuss the purpose of the vehicle instrumentation systems.
- E. Electrical Accessories
Discuss the purpose and basic function of the following electrical accessories:
 - 1. Horns
 - 2. Windshield wipers
 - 3. Electric defoggers
 - 4. Power mirrors
 - 5. Power windows
 - 6. Power door locks
- F. Computer
Discuss the role of the automotive computer and its functions.
- G. Vehicle Communication Networks
Explain the function of multiplexing and data bus networks.
- H. Electronic Accessory Systems
Explain the basic function and purpose of the following systems:
 - 1. Electronic cruise control systems

2. Memory seats
3. Electronic sunroofs
4. Antitheft systems
5. Automatic door locks
6. Keyless entry
- I. Passive Restraint Systems
Discuss the purpose of passive restraint systems.
- J. Alternate Propulsion Systems
Explain the function and basic operation of the electric vehicle (EV), hybrid electric vehicle (HEV), and the fuel cell-powered vehicle.

VI. Summary

- A. Review the material covered, emphasizing the main points and key words.
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Chapter 1 Classroom Manual Answers to Review Questions

CLASSROOM MANUAL, PAGES 15-16

Short Answer Essays

Note: Questions 1 through 3 do not have a correct answer. These questions allow the instructor to "get to know" the student.

4. A fuel cell powered vehicle is basically an electric vehicle, except the fuel cell produces and supplies electrical power to the electric motor instead of batteries. An electric vehicle operates on a large battery pack that is recharged by connection to the electric grid.
5. A hybrid electric vehicle relies on power from the electric motor, the engine, or both. The battery can be charged by the engine.
6. Keyless entry allows the driver to unlock the doors or the deck lid from outside of the vehicle without the use of the key.
7. Automatic door lock systems can prevent the door from being opened while the vehicle is in motion, can help to prevent the door from opening in the event of an accident, and protects the occupants from others attempting to enter the vehicle unlawfully.
8. The starting system is designed to change the electrical energy that is being stored in the battery, into mechanical energy to rotate the engine.
9. The charging system is used to restore the electrical power to the battery that was used during engine starting and generates the current to operate all of the electrical accessories while the engine is running. The purpose of the charging system is to convert the mechanical energy of the engine into electrical energy to recharge the battery and run the electrical accessories.
10. To deploy in the event of an accident that is severe enough to cause injury.

Fill-in-the-Blanks

1. multiplexing
2. monitor
3. computer
4. electrical
5. easy exit
6. ignition switch

7. security
8. mechanical, electrical (in order)
9. passive
10. electric hybrid vehicle

Multiple Choice

1. B
2. D
3. C
4. B
5. C
6. A
7. D
8. C
9. A
10. D