




UNIT I: ELECTRICAL FUNDAMENTALS

 LESSON I – SAFETY PROCEDURES FOR WORKING WITH
ELECTRICAL SYSTEMS



INTRODUCTION

Automotive electrical systems are low in voltage (typically 12 volts), but they carry very high current, making them dangerous if handled incorrectly. Mistakes like using bare hands on a battery, touching energized terminals, or working without personal protective equipment (PPE) can lead to shock, burns, explosions, or fire. Safety is not just a policy—it is a life-saving practice that must be learned and repeated every day.



LEARNING OBJECTIVES

1. Identify common electrical hazards found in an automotive servicing environment.
2. Explain the proper use and importance of Personal Protective Equipment (PPE) when working with electrical systems.
3. Describe the standard safety procedures such as lock-out/tag-out (LOTO), tool inspection, and workshop cleanliness that reduce the risk of electrical accidents.



UNDERSTANDING THE RISKS

Even a 12-volt battery can release hundreds of amps—enough to melt metal and ignite flammable vapors. Batteries can explode if improperly connected or overcharged. A short circuit in a crowded engine bay can cause arc flashes, resulting in burns and fire.

COMMON HAZARDS EXAMPLES

- Shorted tools or wires
- Working in damp conditions
- Wearing metal jewelry near live circuits
- Faulty equipment and ungrounded tools



PERSONAL PROTECTIVE EQUIPMENT (PPE)

- PPE is a technician's first line of defense against electrical hazards.

Insulated gloves: Protect hands from electric current

Safety goggles: Shield eyes from sparks or acid splashes

Rubber boots: Prevent grounding and shock

Apron or overalls: Provide full-body protection from burns

Important: Always remove jewelry and wear dry, properly rated protective gear.

TOOL AND EQUIPMENT INSPECTION

Before beginning any work:

- Inspect wires, tools, and meters for cuts, corrosion, or burns.
- Ensure all test equipment is functioning and calibrated.
- Do not use damaged cords or plugs, even temporarily.
- Use tools rated for automotive electrical applications.

Even a minor oversight—like a cracked test lead—can result in equipment failure, shock, or system damage.



LOCK-OUT/TAG-OUT (LOTO)

Purpose: To prevent accidental energization of electrical circuits during servicing.

Procedure:

- Turn off the ignition switch.
- Disconnect the negative battery terminal first.
- Place a visible tag or lock stating “Do Not Reconnect – Work In Progress.”
- Confirm zero voltage using a multimeter or test light.
- Only the technician who installed the lock/tag may remove it.

This ensures no one else accidentally energizes the system while you are working.



ENVIRONMENTAL AND FIRE SAFETY

Good housekeeping is part of electrical safety:

- Keep work area clean and dry.
- Store oily rags and flammable liquids away from the battery or wiring zones.
- Have a Class C fire extinguisher (for electrical fires) within reach.
- Never use water on an electrical fire—it may cause shock or spread the flame.



KEY SAFETY REMINDERS

- Always treat all circuits as live until verified safe.
- Never substitute electrical tape for proper insulation or tools.
- Never rush when working with batteries, starters, or ignition systems.
- Double-check connections and verify voltage before and after repairs.



REFERENCES

- Auto Electrical System Module – Competency-Based Learning Material
<https://www.scribd.com/document/601714455/Auto-Electrical-System-Module-PDF>

TESDA – Training Regulations: Automotive Servicing NC II
<https://www.tesda.gov.ph>

YouTube – Girlie Garage
“Basic Automotive Electrical Safety – THE HUB”
<https://www.youtube.com/watch?v=milXq7mdQr8>