AUTOMOTIVE Youth Educational Systems YES The Passport to a Rewarding Automotive Career

ASE CERTIFIED

Modern Automotive Technology Chapter 8

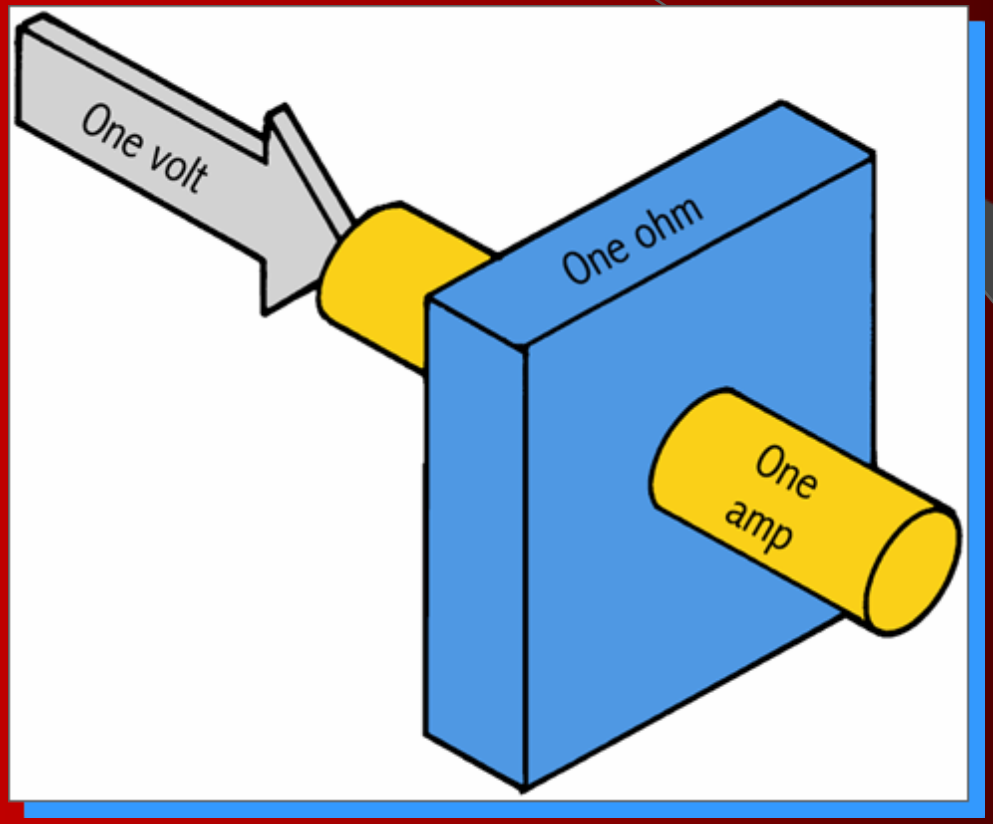
Basic Electricity and Electronics

North Montco Technical Career Center

Learning Objectives

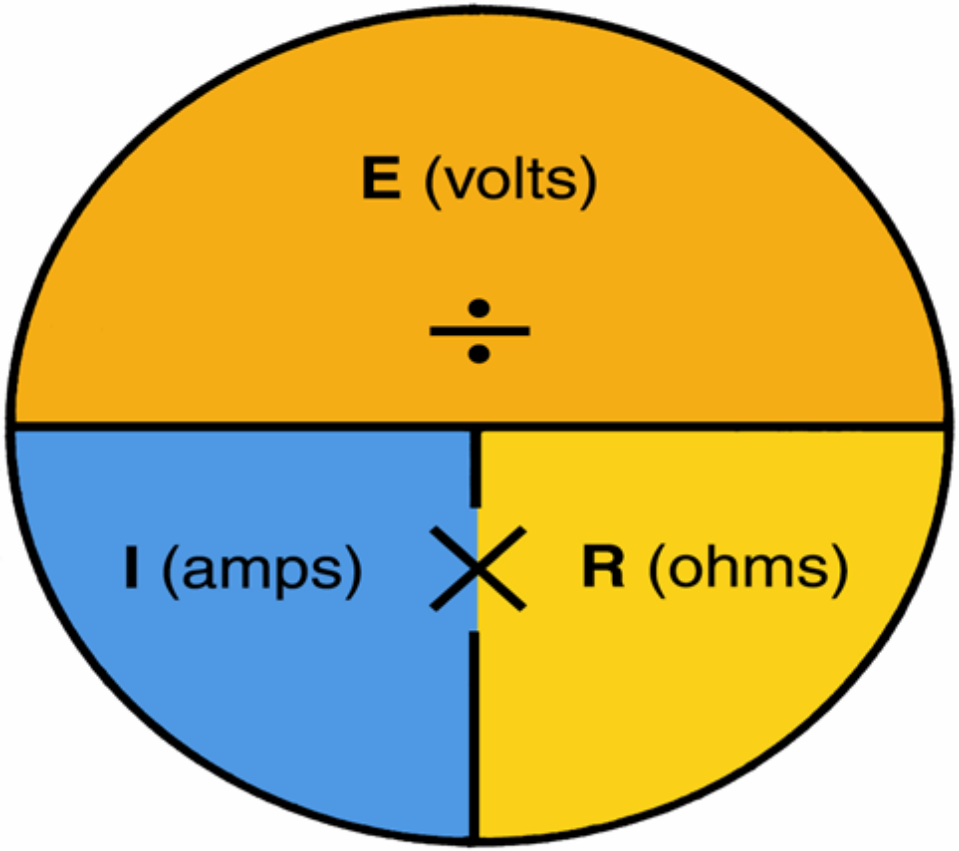
- Explain the principles of electricity
- Describe the action of electricity
- Compare voltage, current (amps) and resistance (ohms).
- Describe the principles of magnetism
- Identify basic electronic and electronic terms
- Explain different types of electrical wiring
- Read and follow all safety procedures when working on electric circuit

Current, Voltage, and Resistance



One volt can push one amp of current through one ohm of resistance

Ohm's Law



E (volts) = I × R

I (amps) = E ÷ R

R (ohms) = E ÷ I

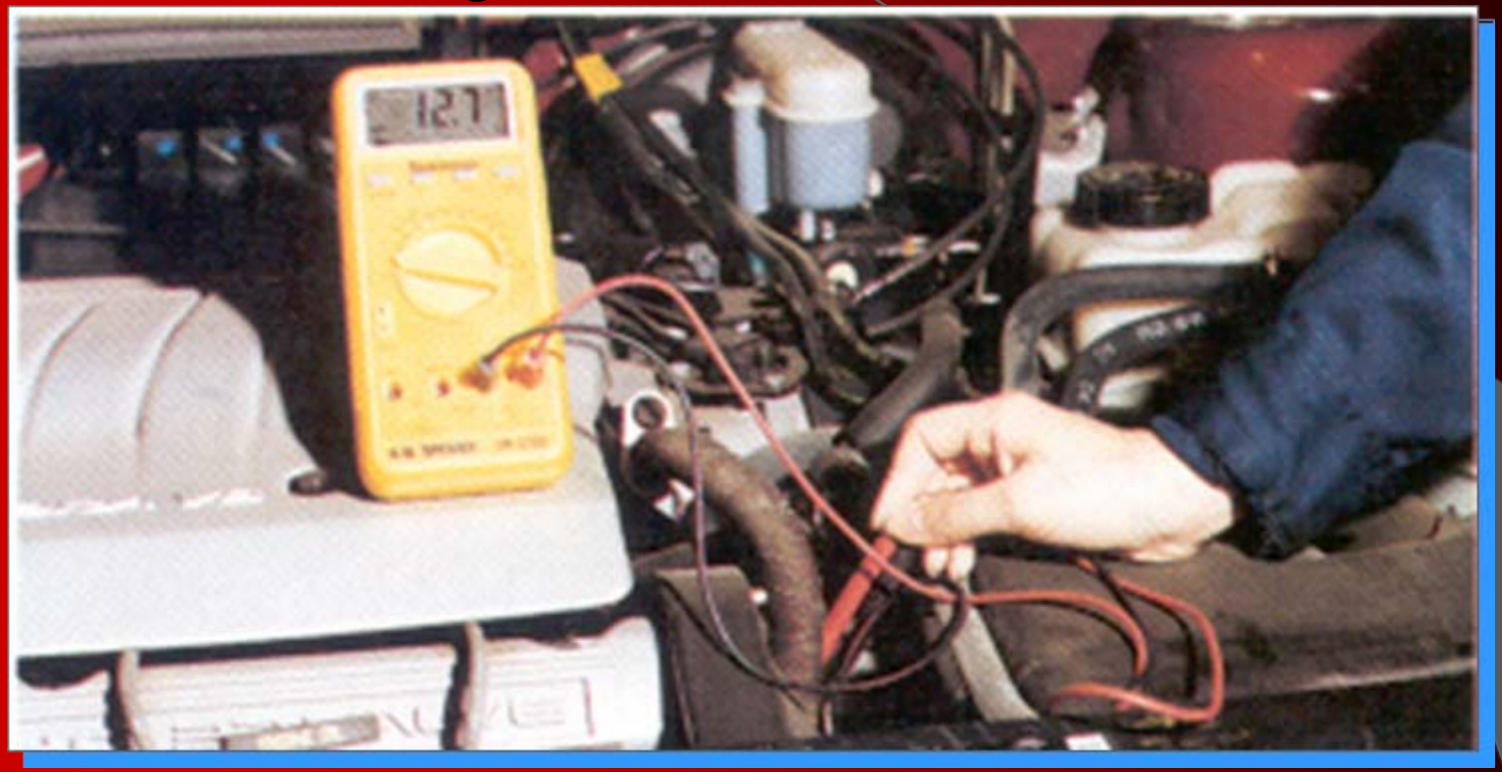
Multimeter

Digital Volt Ohm Meter

Digital display on a modern multimeter

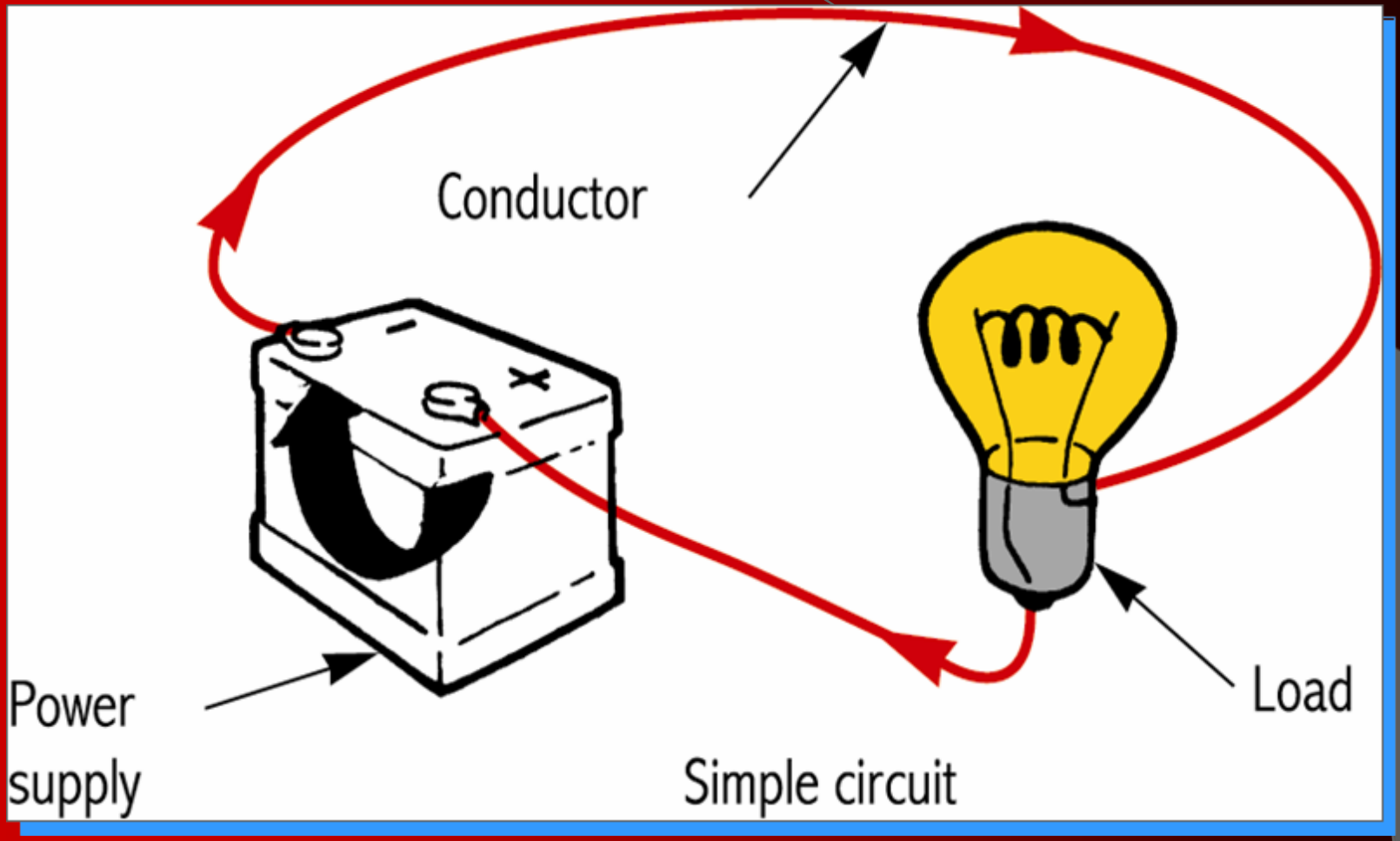
Multimeter

Digital Volt Ohm Meter



Also called a DVOM–combines an ohmmeter, ammeter, and voltmeter in one tool

Simple Circuit

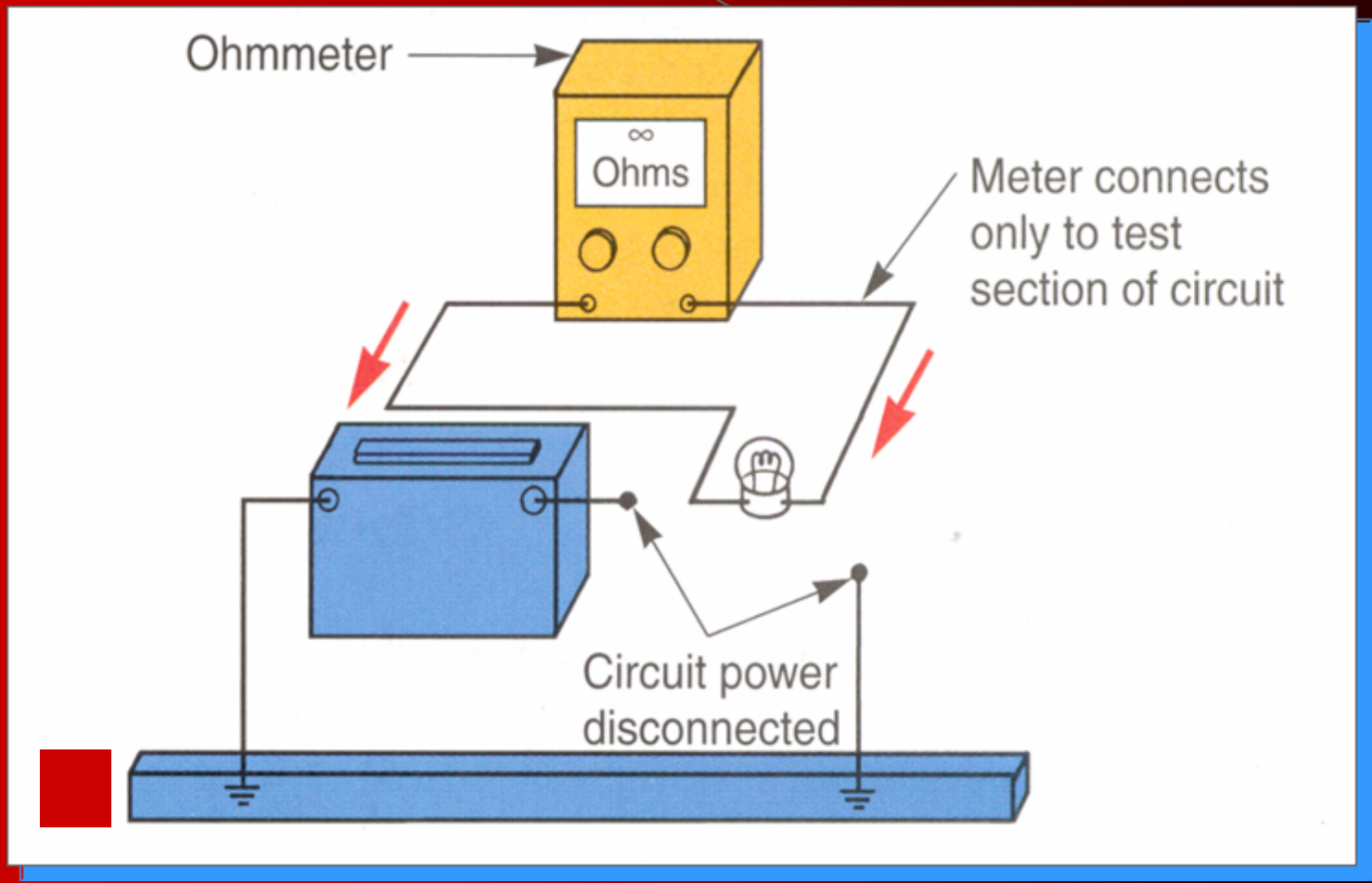


Chapter 8

1. RESISTANCE is the opposition to current flow.

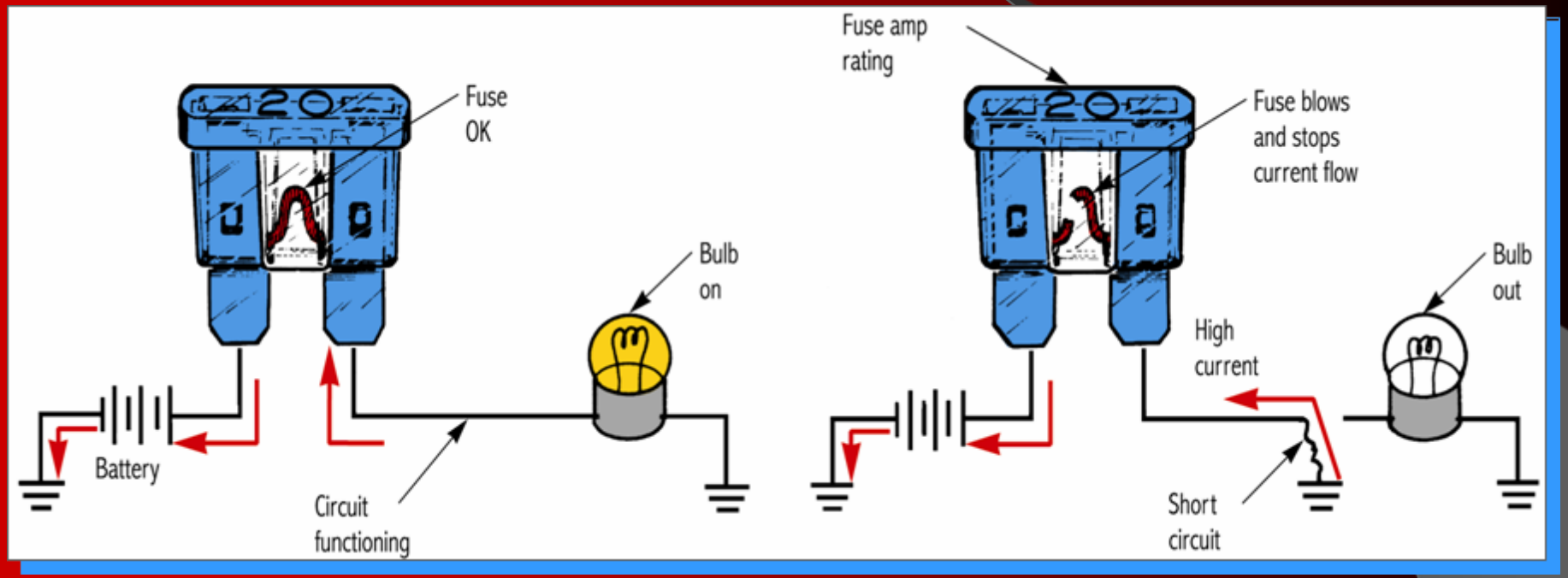
2. A FUSE protects a circuit against damage caused by a short circuit.

Ohmmeter Connections



Never connect an ohmmeter to a “live” circuit

Fuse

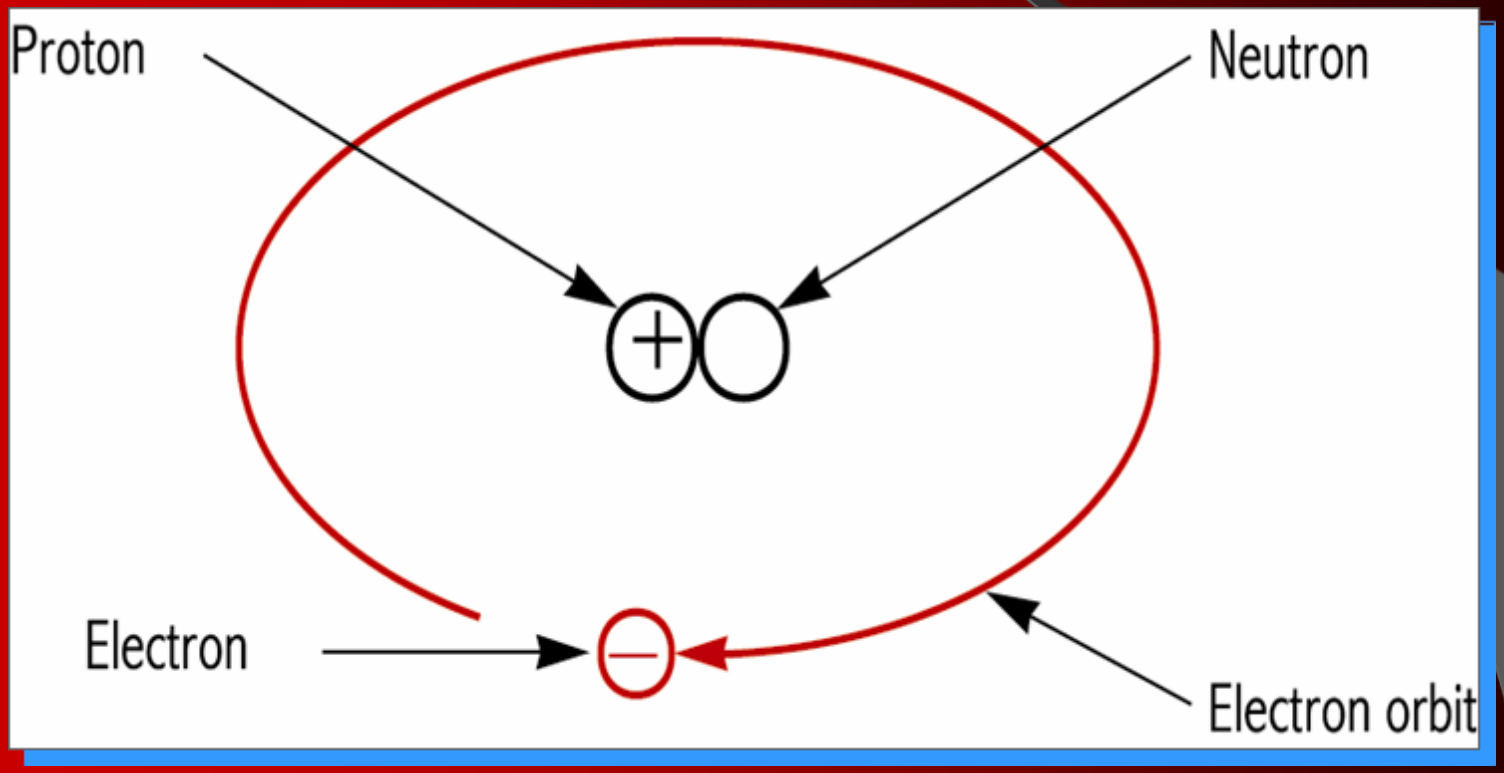

Fuse
OK
Bulb
on
Battery
Circuit
functioning
Fuse amp
rating
Fuse blows
and stops
current flow
Bulb
out
High
current
Short
circuit

Chapter 8

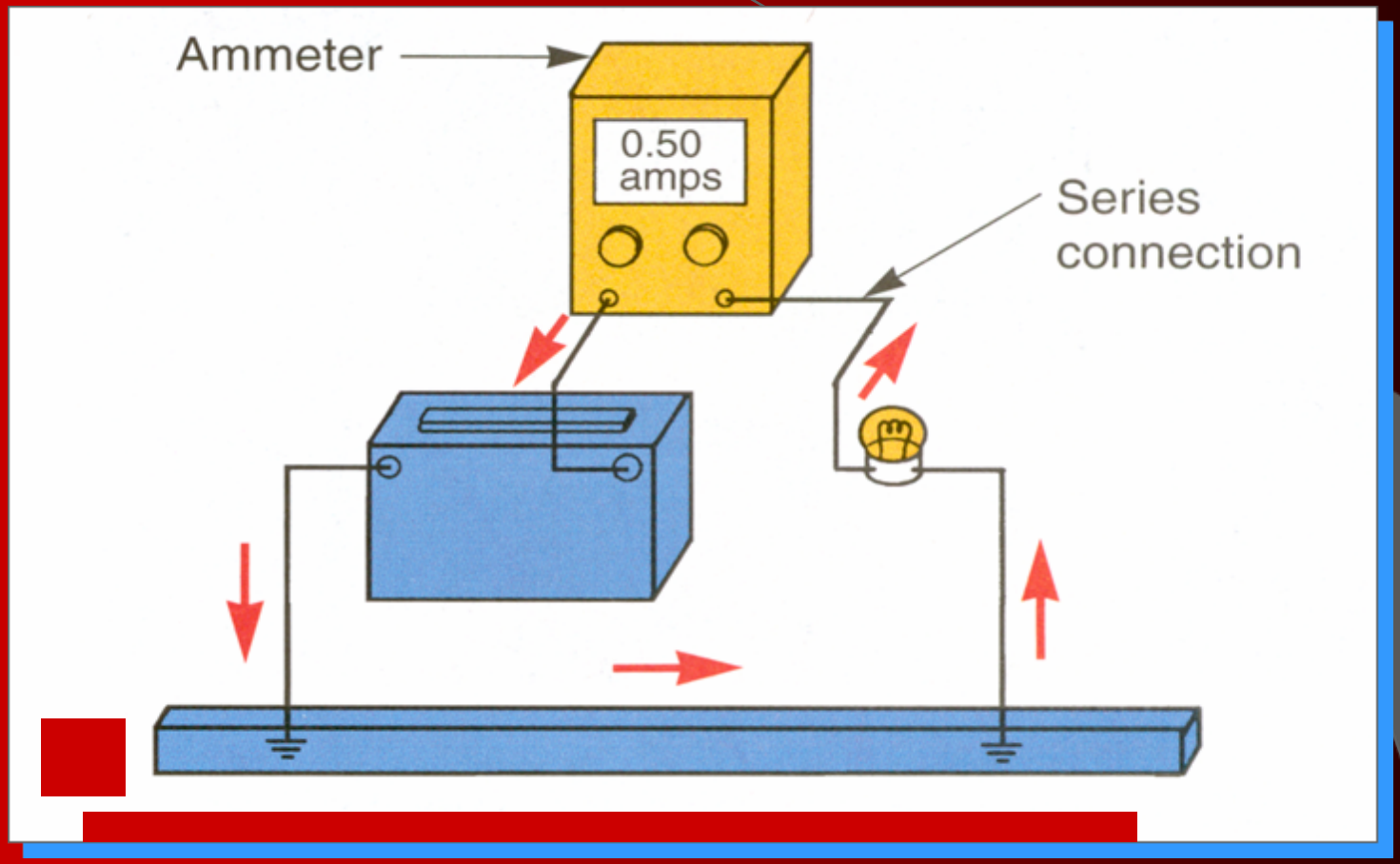
3. An ATOM consists of small particles called protons, neutrons, and electrons.

4. CURRENT is the flow of electrons through a conductor.

Atom

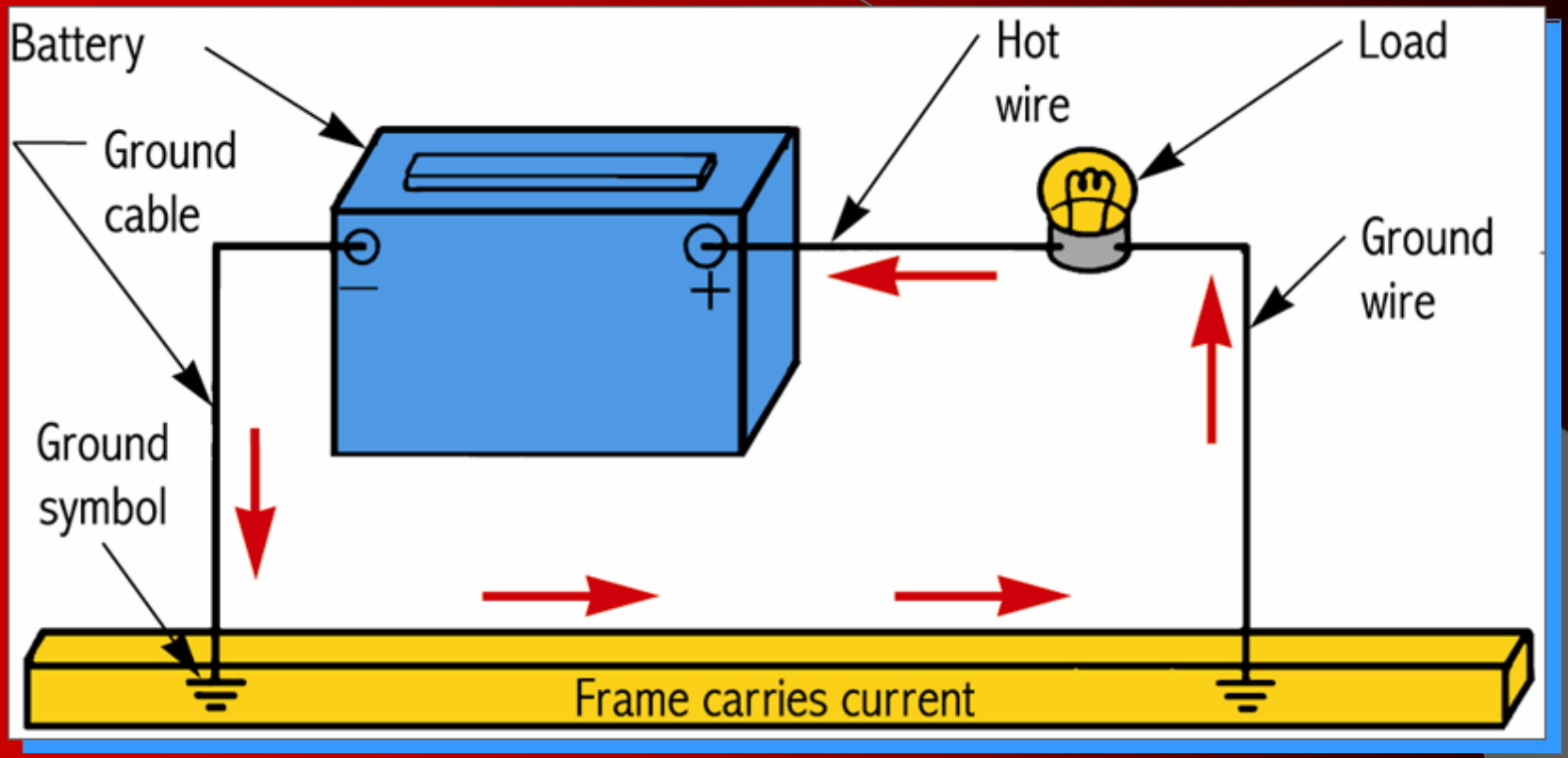


Ammeter Connections



An ammeter is connect in SERIES to the circuit

One-Wire Circuit



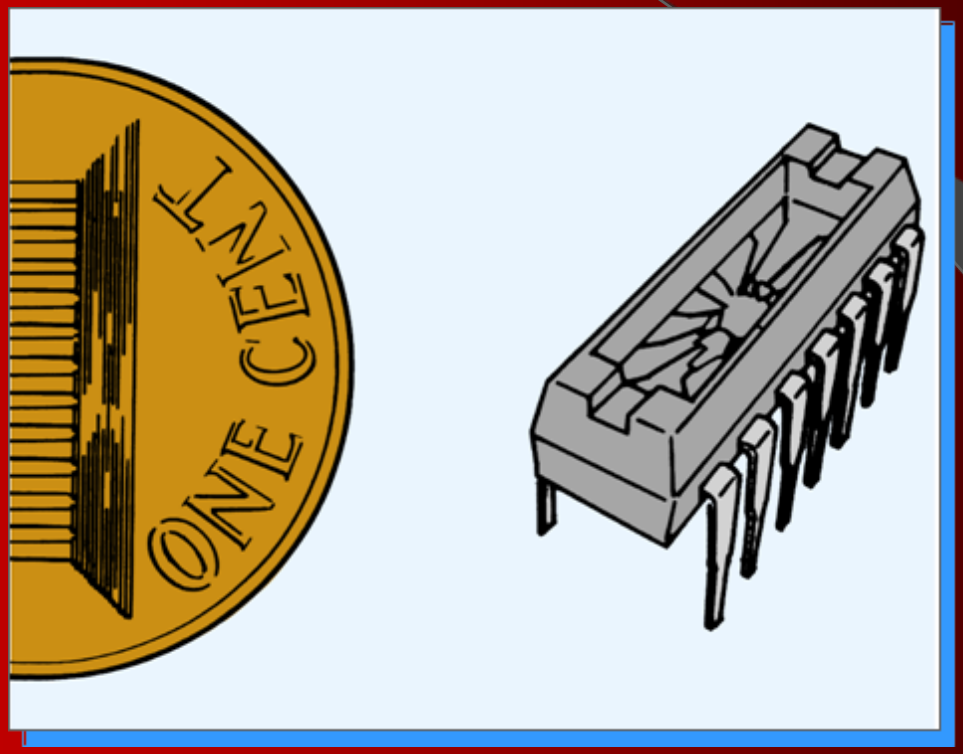
Vehicle’s frame or body serves as an electrical conductor

Chapter 8

5. An INTEGRATED CURCUIT contains almost microscopic diodes, transistors, resistors, and capacitors in a chip.

6. VOLTAGE is the force or electrical pressure that causes current flow.

Integrated Circuit (IC)



Contains microscopic diodes, transistors, resistors, and capacitors in a wafer-like chip

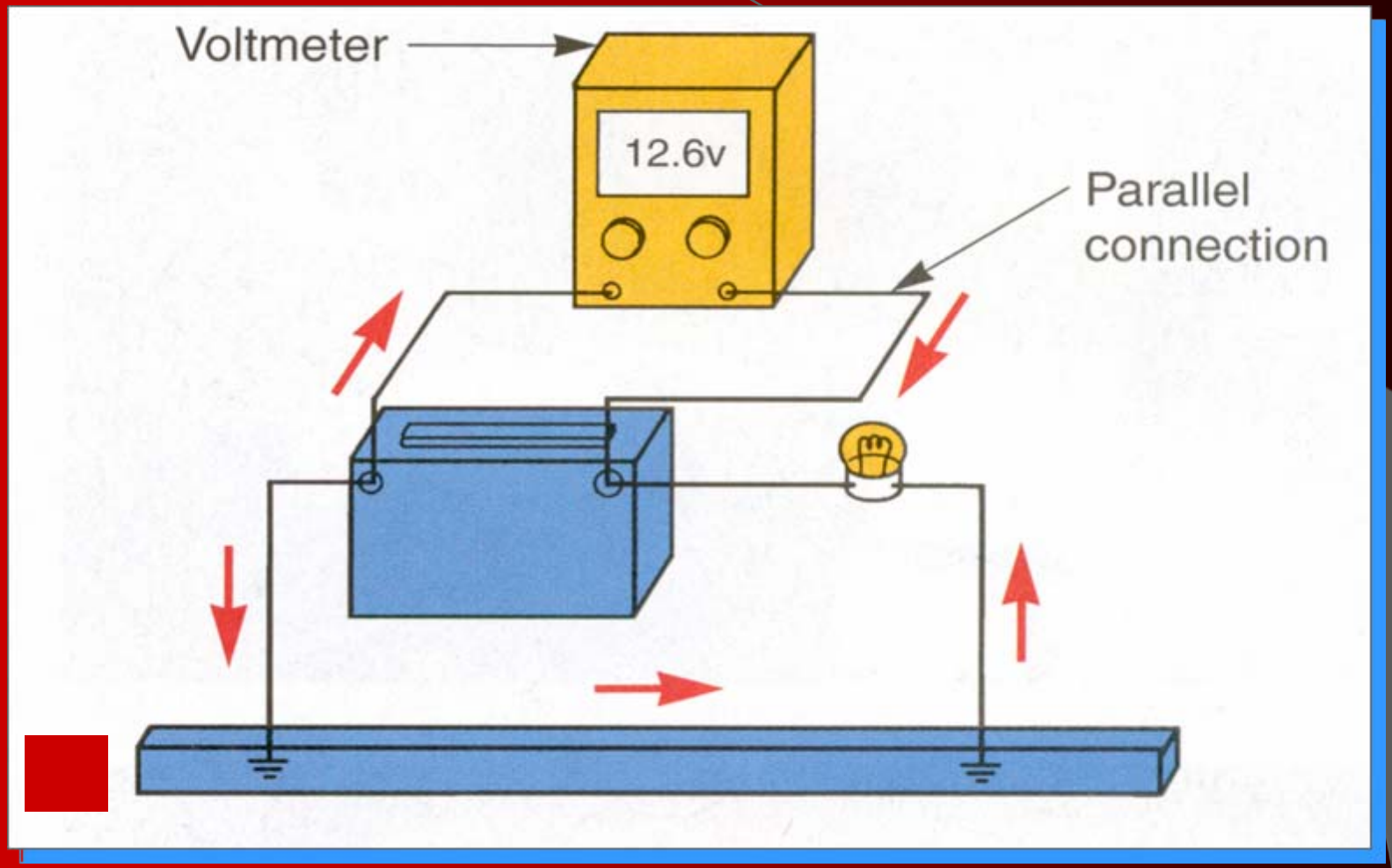
Chapter 8

Basic Electricity and Electronics

7. ELECTRICITY is the movement of electrons from atom to atom.

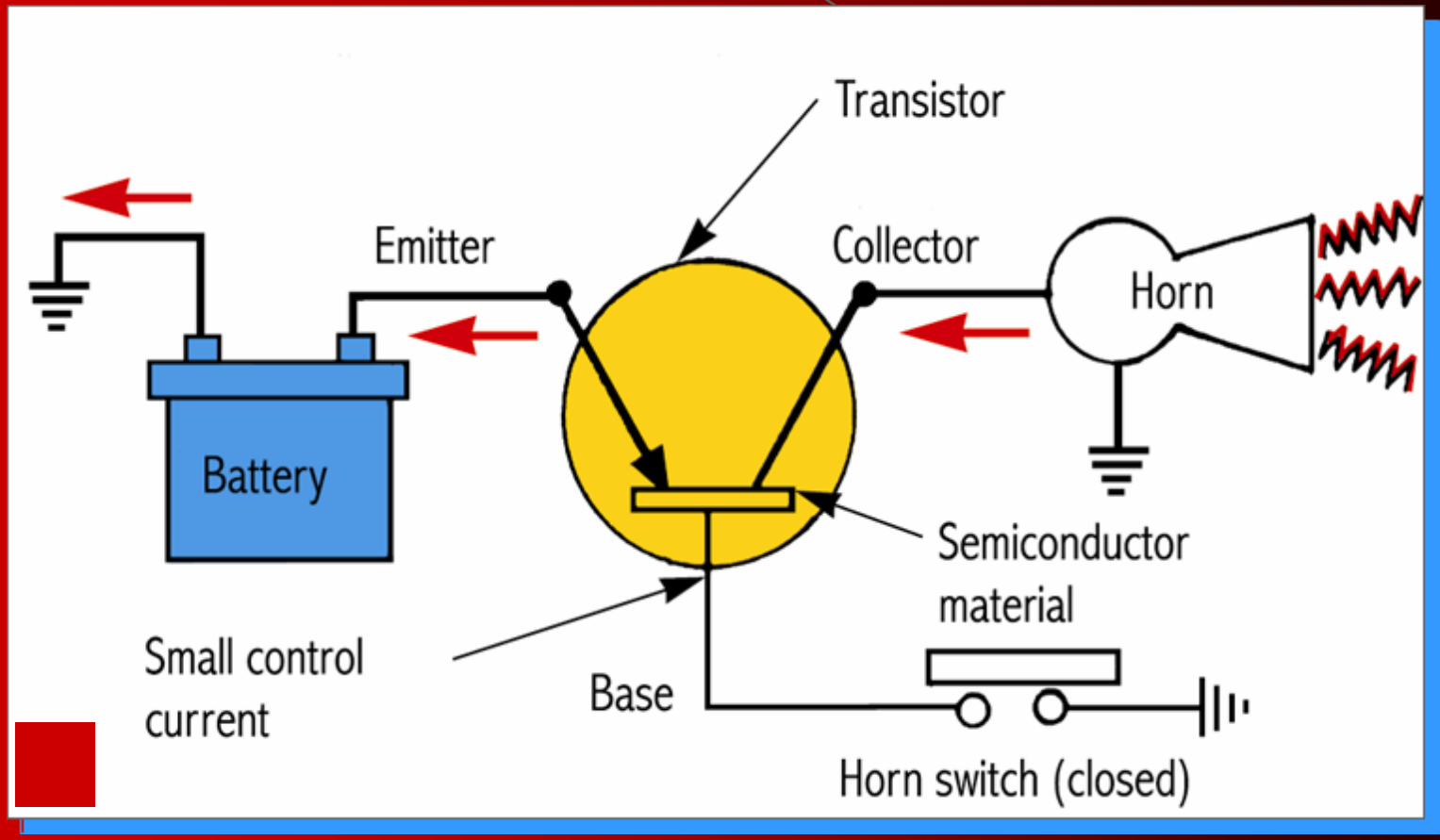
8. INSULATORS do not contain free electrons.

Voltmeter Connections



A voltmeter is connect in PARALLEL to the circuit

Transistor Versus Relay



Transistor operation

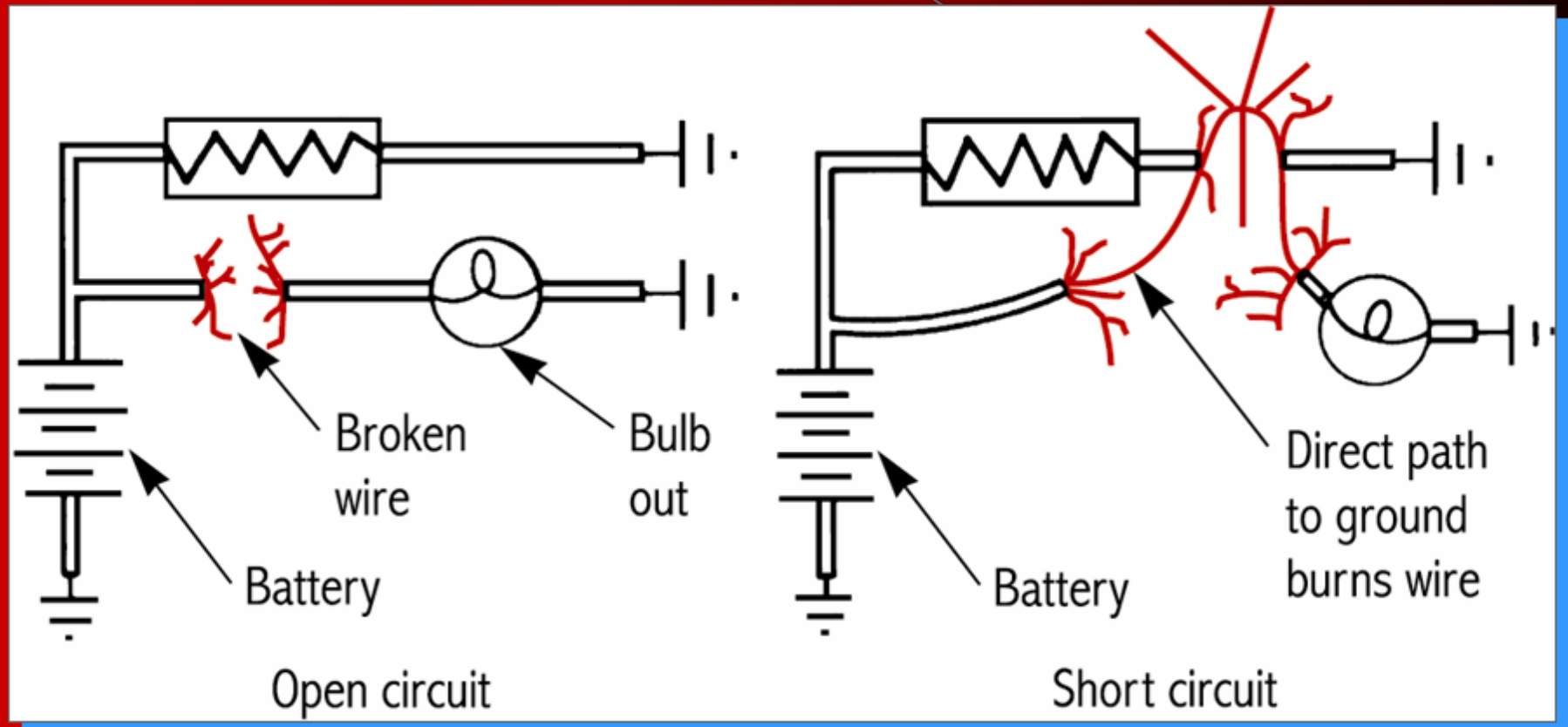
Chapter 8

Basic Electricity and Electronics

9. A SHORT-CURCUIT is caused when a defective wire or component touches ground.

10. CONDUCTORS have atoms that allow the flow of electricity; contain free electrons.

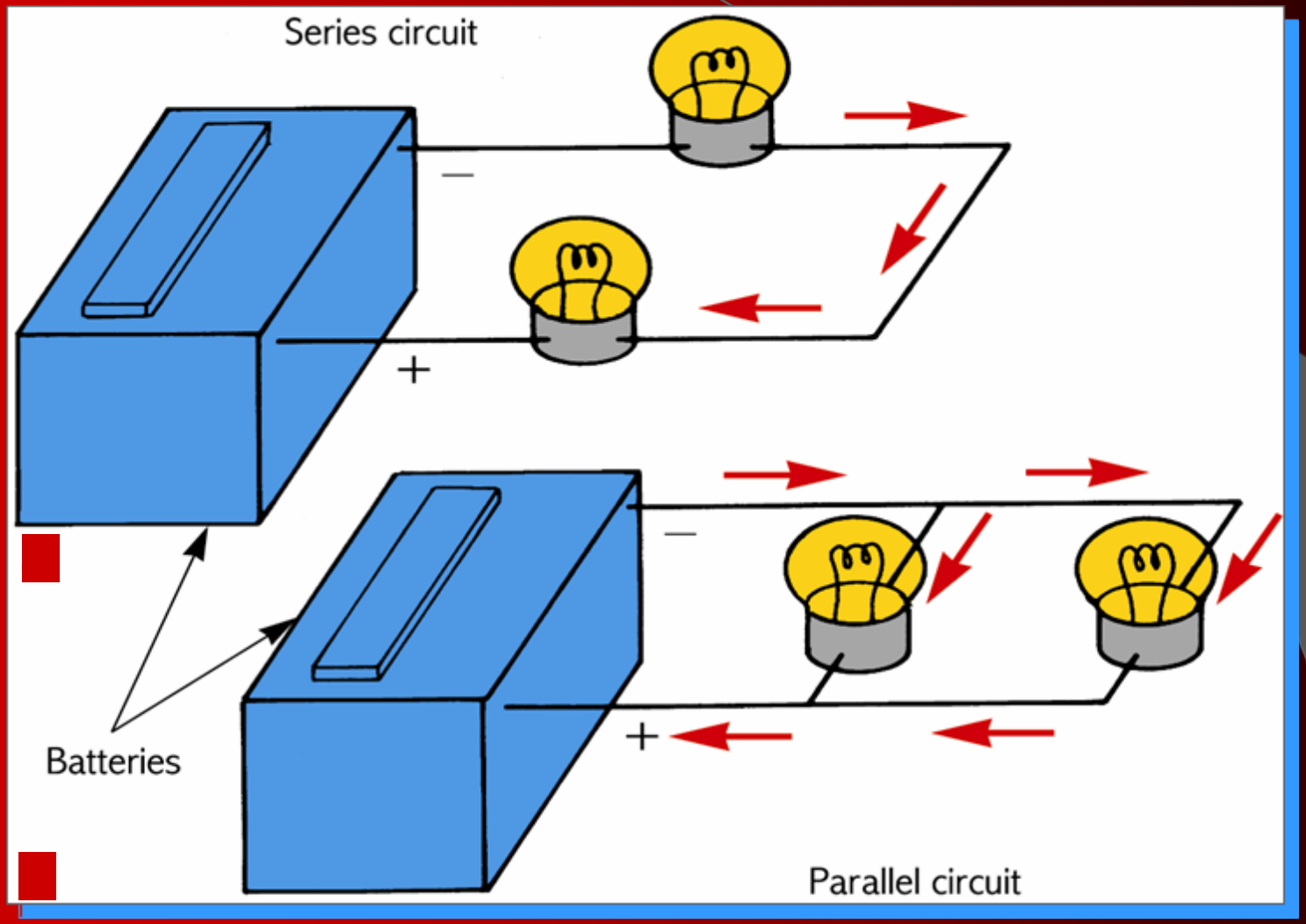
Circuit Faults



Conductors

- Allow the flow of electricity
- Contain atoms with free electrons
  - one to three electrons in the outer orbit
- Free electrons are not locked in orbit around the nucleus
  - electrons can be forced to move from one atom to another
- Copper, gold, and silver are good conductors

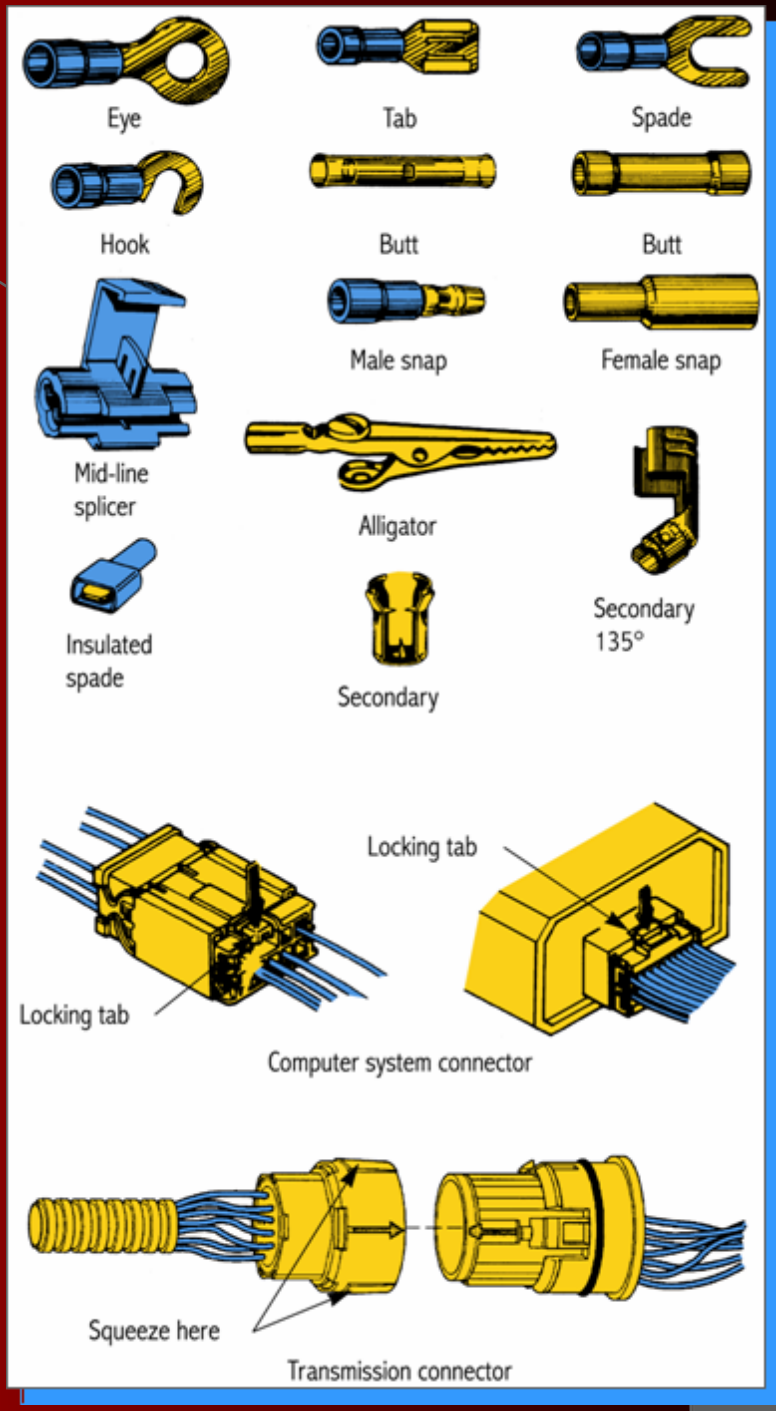
Series and Parallel Circuits



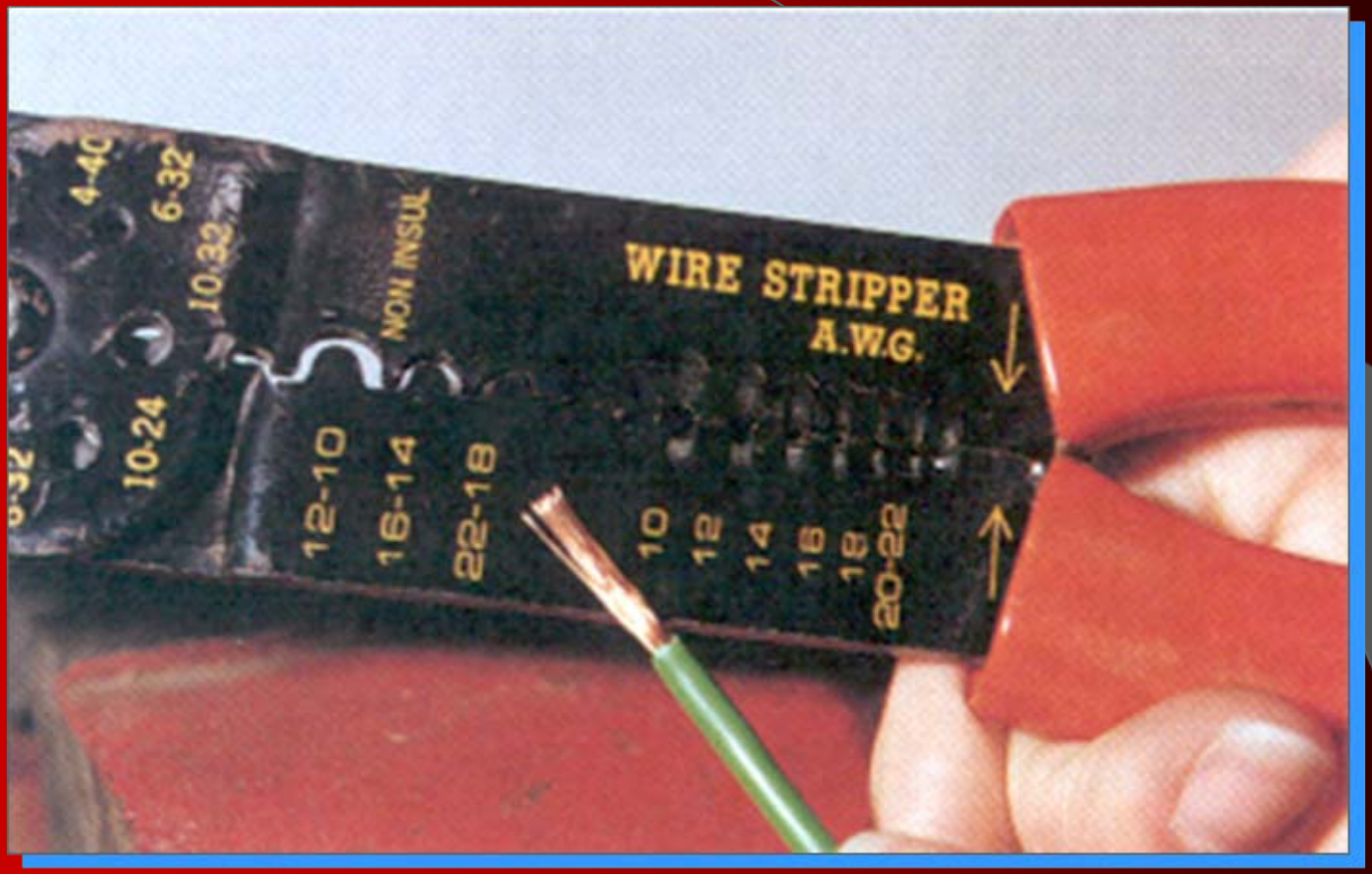
Wiring Repairs

- Crimp connectors and terminals
  - used to quickly repair wiring
  - allow a wire to be connected to another wire or component
- Harness connectors
  - multi-wire terminals that connect several wires together
  - two-part plastic housing snaps together

Wire Terminals and Connectors

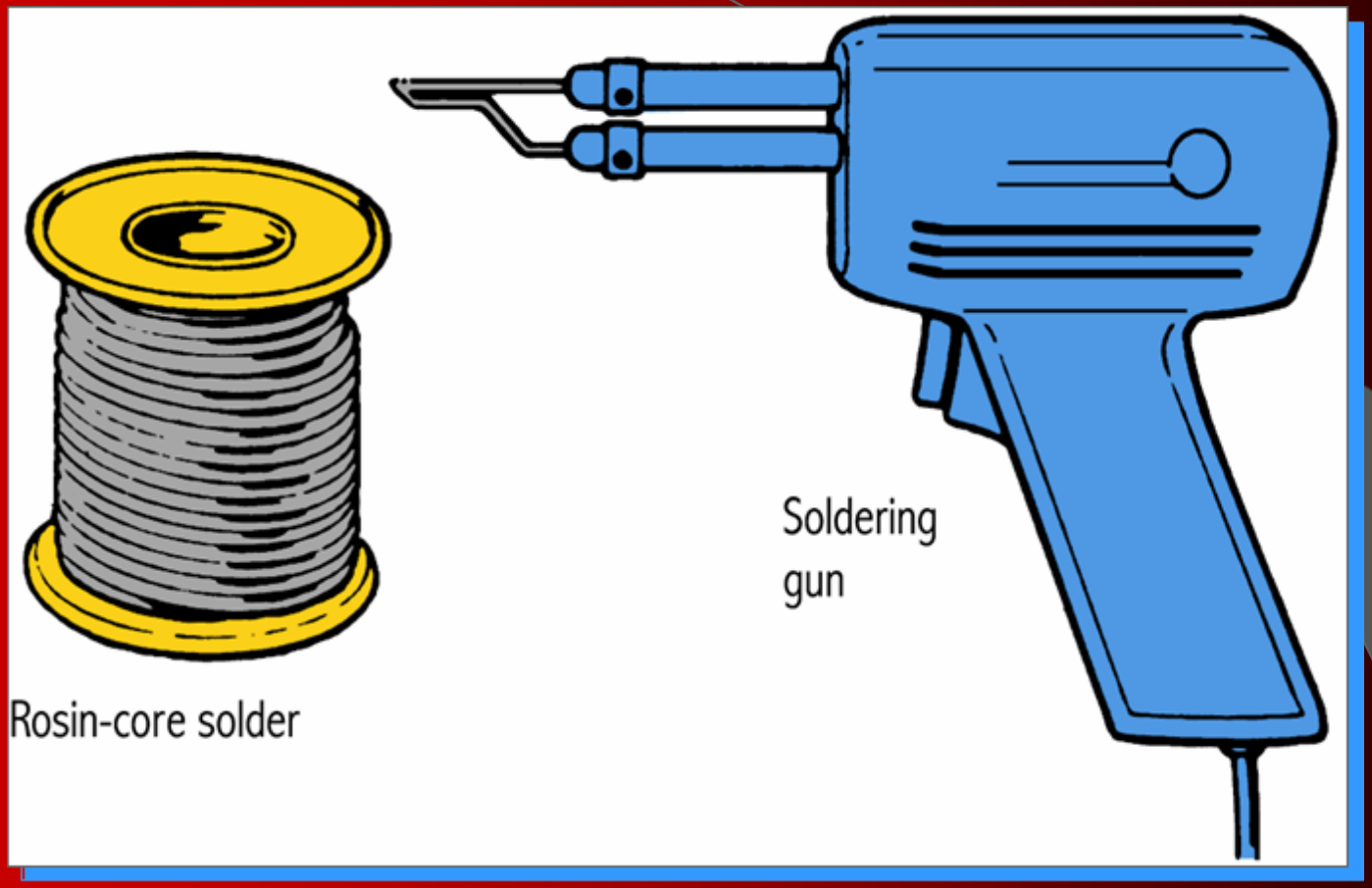


Crimping Pliers



Stripping off a short section of insulation

Soldering



Only use rosin-core solder on electrical repairs!

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