

Technician License Course

Chapter 3

Lesson Plan Module 4 – Electricity



Fundamentals of Electricity

- Radios are powered by electricity and radio signals are a form of electrical energy.
- A basic understanding of how we control electricity allows you to better install and operate your radio.



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Fundamentals of Electricity

- Electrical charge can be positive or negative.
 - Opposite charges attract each other
- Electrical current is the flow of *electrons*.
 - Electrons are negatively-charged atomic particles, usually surrounding an atom's positively-charged nucleus of protons (positive) and neutrons (neutral – no charge)
 - Electrons move in response to an *electromotive force* and can move independently of atoms



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Basic Electrical Concepts

- Current: the movement of electrons, measured in *amperes* (A) by an *ammeter*, and represented by *I* in formulas
- Voltage: the amount of electromotive force (emf), also called *electrical potential*, measured in *volts* (V) by a *voltmeter*, represented by *E* or *V* in formulas



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Basic Electrical Concepts

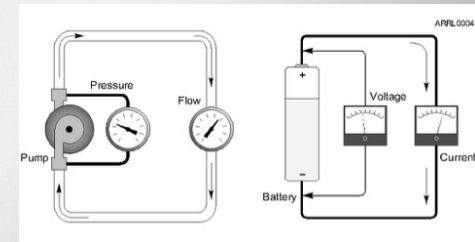
- Resistance: the opposition to the movement of electrons, measured in *ohms* (Ω) by an *ohmmeter* and represented by R in formulas.
- Resistance is like friction and turns electrical energy into heat when current flows.
- *Conductors* permit current flow (low resistance) and *insulators* block current flow (high resistance).



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Basic Electrical Concepts

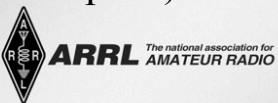
- The flow of water through a pipe is a good analogy to understand the three characteristics of electricity and how they are related.



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Basic Electrical Concepts

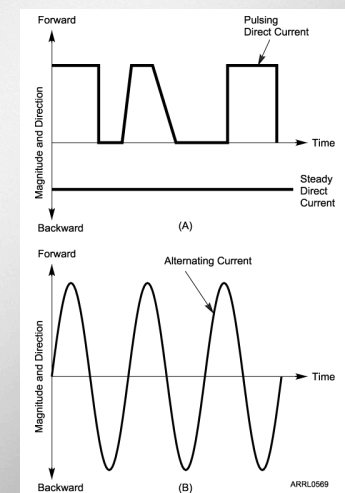
- Voltage from a *source* of electrical energy causes current to flow.
- Resistance is a material's opposition to the flow of current.
- Voltage, current and resistance affect each other. For example, higher voltage (bigger push) causes more current (more flow).



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The Two Kinds of Current

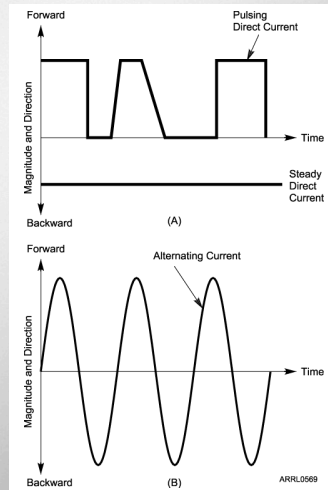
- Current that flows in only one direction, is called direct current (dc).
 - Batteries are a common source of dc.
- Current that flows in one direction then in the opposite direction is called alternating current (ac).
 - Household current is ac



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The Two Kinds of Current

- AC current reverses direction on a regular basis
 - Each process of reversing is a *cycle*.
 - The number of cycles per second is *frequency*, measured in hertz (Hz).
- 1 Hz = 1 cycle per second



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The Electric Circuit: An Electronic Roadmap

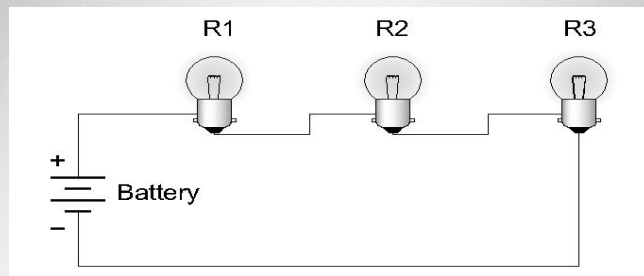
- For current to flow, there must be a path from one side of the energy source to the other side of the source – this path is called a *circuit*.
 - There must be a pipe (conductive path) through which the water (current) can flow.
- There are two types of electric circuits.
 - Series and parallel



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Series Circuits

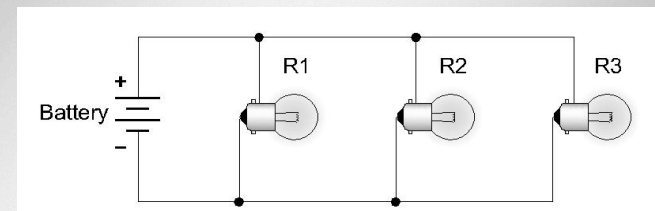
- Series circuits provide one and only one path for current flow.



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Parallel Circuits

- Parallel circuits provide multiple paths for current flow.



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