Chelmsford Amateur Radio Society

Foundation Course
(3) Technical Basics

Introduction

- **Important to appreciate and understand basic electric and rf symbols, units and concepts**
- **You don't need to be a circuit designer/builder!**
  - that comes from experience and as you progress through the Intermediate and Advanced Courses
- **For Foundation it important to understand:-**
  - Conductors and Insulators
  - Volts, Current, Power and Resistance
  - Frequencies and Wavelengths
  - Basic symbols/diagrams

Conductors & Insulators

- **Conducts permit the flow of electric current**
  - Examples: Copper, Brass etc
- **Metallic Conductors permit electrons to flow easily**
- **Beware of poor/oxidised connections (eg on Aluminium, Steel)**
- **Insulators don't permit electron flow and exhibit high resistance.**
  - Examples: Plastics, wood, rubber, glass, ceramics
- **Note that water is a conductor (esp. when impure), and that wet insulators can therefore conduct on their surface**
  - This can be a risk for outdoor/portable equipment

Electrical Units

Quantity	Unit	Symbol
Voltage, V	Volt	V
Current, I	Amp	A
Resistance, R	Ohm	Ω
Power, P	Watt	W
Frequency, f	Hertz	Hz
Wavelength, λ	Metre	m

Note-1: Resistance is the opposition to current flow

Note-2: Voltage is sometimes referred to as Potential Difference

Unit Prefixes

Factor	Prefix	Symbol
millionths	micro	□ or u
thousandths	milli	m
thousands	kilo	k
millions	Mega	M

Examples:

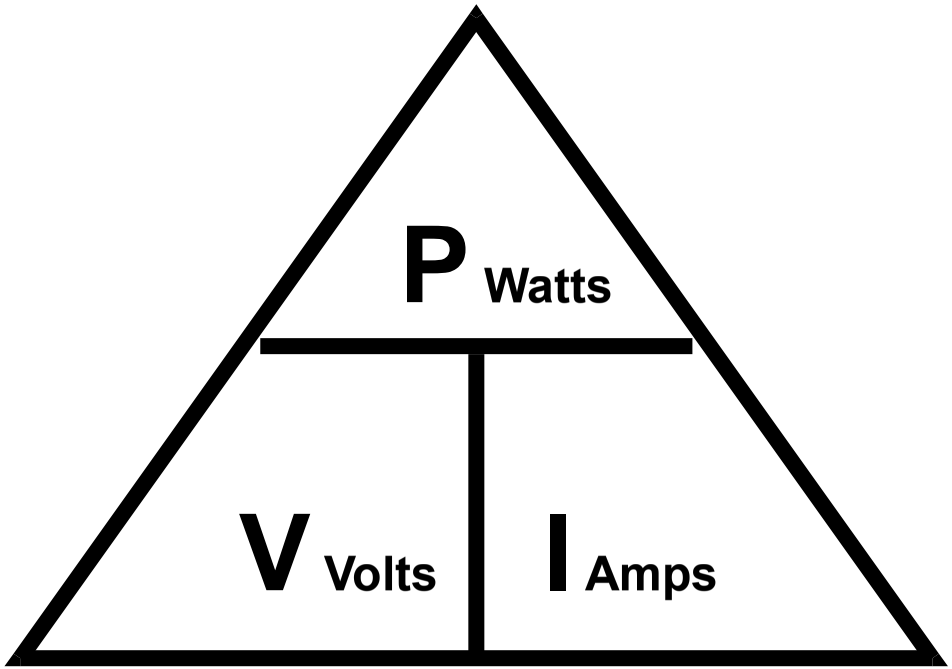
4.7k□=□4700□

1500mA = 1.5A

0.6MHz = 600kHz

500mW = 0.5W

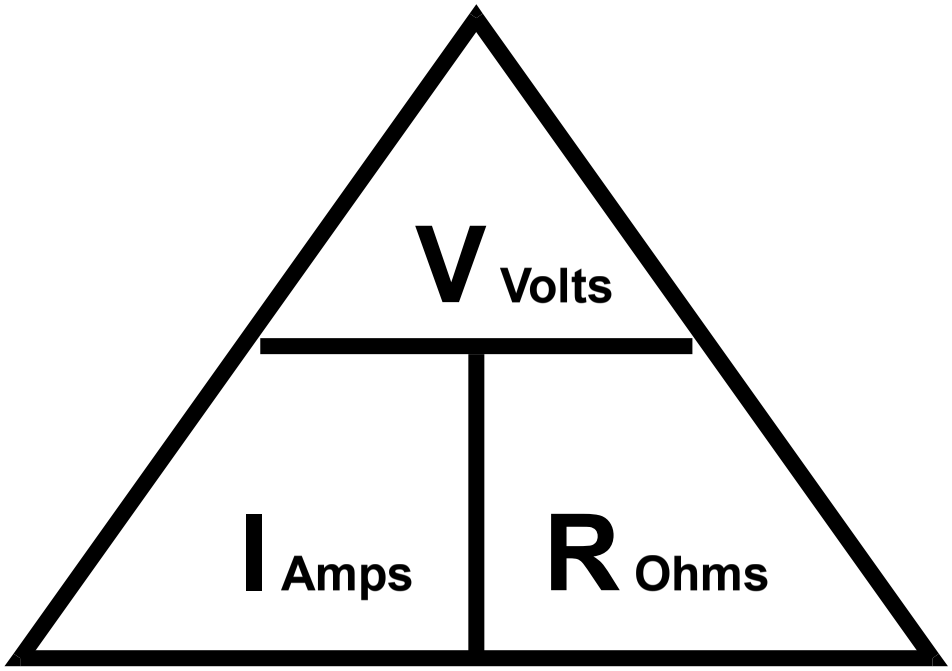
Power



Relates Power, P Voltage, V Current, I

P=VxI V=P/I I=P/V

Ohms Law

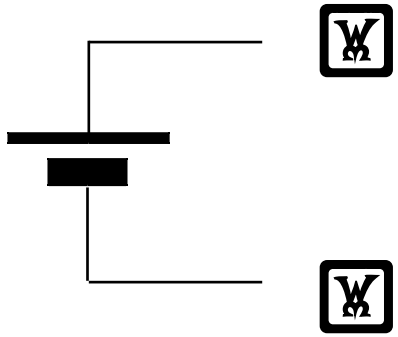


Relates Voltage, V Current, I Resistance, R

V=IxR I=V/R R=V/I

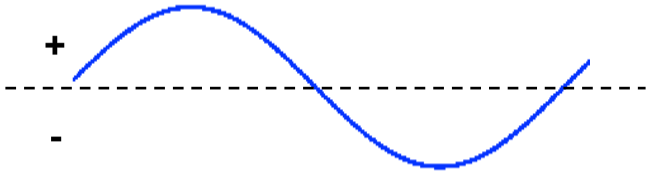
DC & AC Power

DC - Direct Current



- Cells/Batteries provide a source of DC power
- Direct Current flows in a single direction

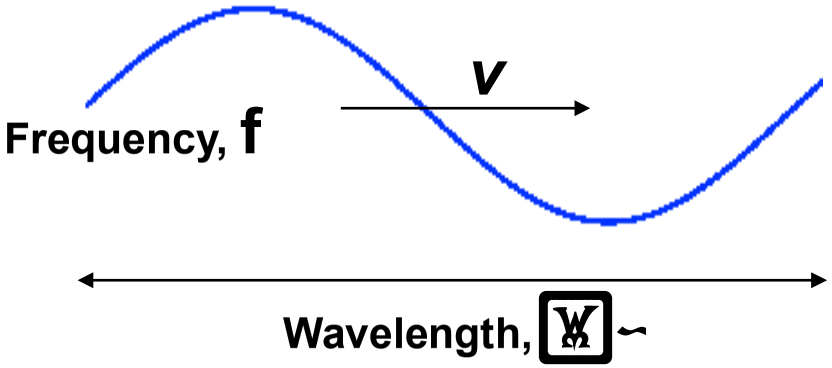
AC - Alternating Current

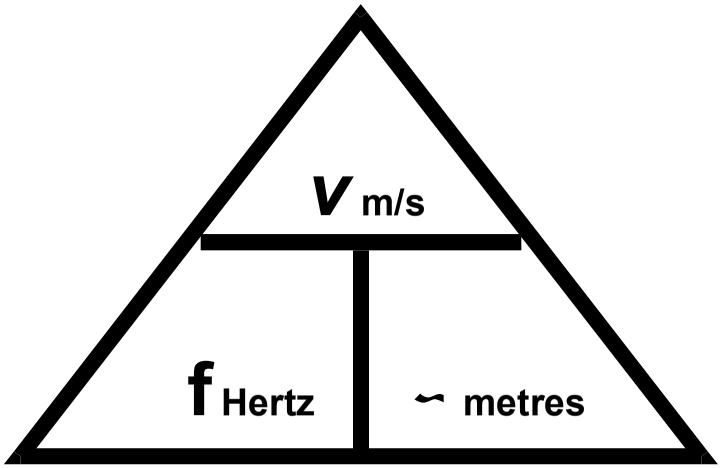


- AC is easier to generate and transform
- Mains is 50Hz AC. Radio Frequencies (RF) use High Frequency AC
- Simple items such as Filament Light Bulbs work with AC and DC, but many electronic components are sensitive to the direction of current

Frequency & Wavelength

- In air the velocity, *v* of radio waves is a constant (~3x10^{8}m/s)
- So if the frequency increases, the wavelength decreases, and vice versa, determined by: $v = f \times \lambda$
- A 1MHz to 1000MHz conversion chart, and frequency allocation table is available





Circuit Symbols

- Also need to recognise symbols for Switches, Earths, Crystals etc, etc