

# Radio and Signals Fundamentals Chapter 2

## Electrical Units

**Hertz** is the unit of **frequency**

**Capacitance** is the ability to store energy in an **electric field**

**Farad** is the basic unit of **capacitance**

**Inductance** is the ability to store energy in a **magnetic field**

The **Henry** is the basic unit of **inductance**

**RF** is the abbreviation that refers to **radio frequency** signals of all types

**Radio waves** is **electromagnetic waves** that travel through space

## Math Units

<b>MEGA</b> =	1,000,000	Million
<b>KILO</b> =	1,000	Thousand
<b>MILLI</b> =	0.001	1/1,000
<b>MICRO</b> =	0.000,001	1/1,000,000
<b>PICO</b> =	0.000,000,000,001	1/1,000,000,000,000

**Electromagnetic waves** carry radio signals

Radio waves travel at the **speed of light**.

**Electric and magnetic fields** are the two components of a **radio wave**.

**Velocity** of a radio wave as it travels through free space is **300,000,000 Meters per second**

**Frequency** is the number of **times per second** that an alternating current reverses direction

**Hertz** is the unit of **Frequency > Hz**

**Megahertz** is 1,000,000 Hz > **MHz**

**HF** > 3 MHz to 30 MHz

**VHF** > 30 MHz to 300 MHz

**UHF** > 300 MHz to 3000 MHz

**Wavelength** is the **distance** a radio wave travels during **one cycle**

**Wavelength is the inverse of frequency**

When the wavelength gets shorter the frequency increases

Higher in frequency the shorter the distance between each wave.

**Wavelength (Meters) = Freq (MHz) ÷ 300** > The formula for **converting frequency to wavelength** in meters is the wavelength in meters equals 300 divided by frequency in megahertz

**Frequency bands are the approximate Wavelength of the band: 2 meters; 20 meters; 40 meters, etc**

## FM Modulation & Deviation

What determines the amount of **deviation** of an FM signal >>> **amplitude of the modulating signal**

When the **deviation** of an FM transmitter is increased? >>> Its **signal occupies more bandwidth**

Your transmissions are causing **splatter or interference** on nearby frequencies?

Check your transmitter for **off-frequency operation or spurious emissions**

Action if your station's transmission unintentionally **interferes with another station?**

Properly **identify** your transmission and **move to a different frequency**

**SSB** > Single Sideband is a form of Amplitude Modulated (AM) Signal

Most often used for weak signal VHF and UHF

The UPPER sideband is normally used for 10M, VHF and UHF SSB

SSB has a **narrower (3 KHz)** bandwidth than **FM**

**FM** > Frequency Modulation

Commonly used for VHF and UHF voice (phone) repeaters

Commonly used for VHF packet

FM has a **5 to 15 KHz** bandwidth

**CW** > Send Continuous Wave using; a Straight Key, an Electronic Keyer and a Computer Keyboards

Morse Code is used for CW

CW has the **narrowest** bandwidth (**150 Hz**)

**Fast Scan Images** > Uses **NTSC** format (like analog TVs), **6 MHz** bandwidth is used in the **70 cm** band