FCC radio exam notes

FCC license prep

EMCOMM = emergency communications

EMCOMM-What if…

- There is a strong earthquake.
- First, you try to call home or your friends.
- They are all trying to reach you, to see if you are ok, “how strong was it?”
- Nothing works…

Why?In any emergency, cel phone companies may have generators that keep the system running for a while, but they are usually overloaded within seconds of any event.

Same for the internet, which may fail as well.

So…

Radios are the best alternate way for you to communicate with others.

With whom?

- Emergency folks to help you out: “my house is damaged, I need help”
- You can help emergency folks out: “my neighbor’s house is damaged, they need help”

If things get really serious, and all communications are out, you could use your radio skills to talk with people all around the world, to relay information (“we are safe”) or to ask for help (“send water and food”)

At HPA, if you are licensed, you can help our emergency folks protect and help your classmates, those in your community, or to let your family and friends know you are ok (or not).

Getting a radio license has two requirements:

1. You have to have a basic understanding of how radios work, how to set them up, and how to keep them running.
2. You have to be able to follow agreed upon rules in radio communications, regulated in our country by the FCC (Federal Communications Commission), which also coordinates with the ITU, (international telecommunications union)

Why do I have to do these?

- The first enables you to communicate
- The second ensures that you and others follow rules, to prevent chaos

Some radio basics to get started with the first one:

Frequencies:

- Line of sight: VHF and UHF (like wifi), short distances, LOS, small antennas and radios
- Longer range: HF (special case: NVIS), longer antennas, more powerful radios

Part I: Radio basics:

All radio uses **electromagnetic** radiation

- electro = electric field
- magnetic = magnetic field
- Light, X-rays, wifi, UHF, VHF, HF
- Electric field+magnetic field

So…

Anything that blocks or reflects E or B (magnetic) waves will reflect or block radio waves

(water, metal, charged particles)

Wavelength:

Velocity = frequency x wavelength

this formula works for ALL waves (sound, earthquakes, radio)

For light, X-rays, wifi and all radio:

Velocity = 3 ee 8 m/s

So?

If you want to create an **antenna** to resonate with any type of radiation, you match the wavelength of the signals to the length of the antenna

Example: 7 mHz is the 40 meter radio band. (megahertz means millions of cycles per second)

3 ee^8/7 ee^6 = 42.8 meters

Antennas:

Antennas are the key to all radio work:

Most antennas are in the form of two parts: a dipole

Think of a battery, one side is plus, one minus

In an antenna, this switches back and forth at the **frequency** of the radio

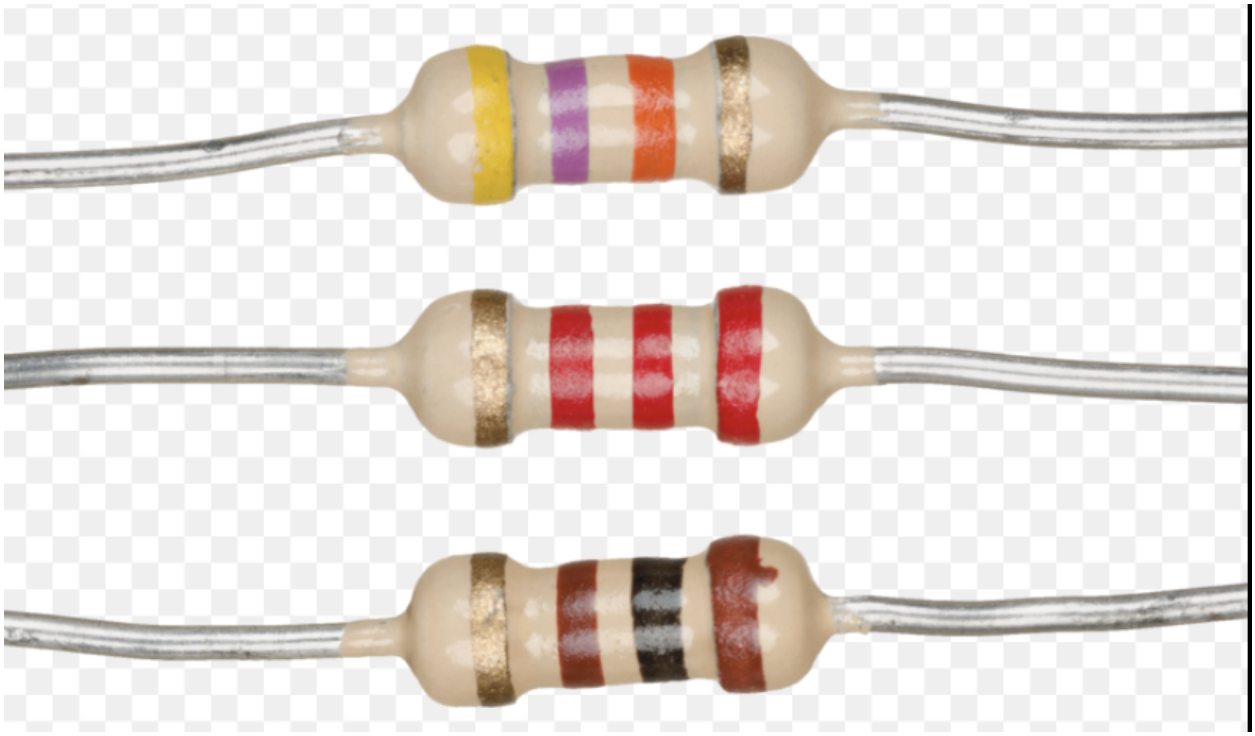
Essential electrical parts:

Battery: chemical source of electrical flow, plus goes to minus, measured in Volts



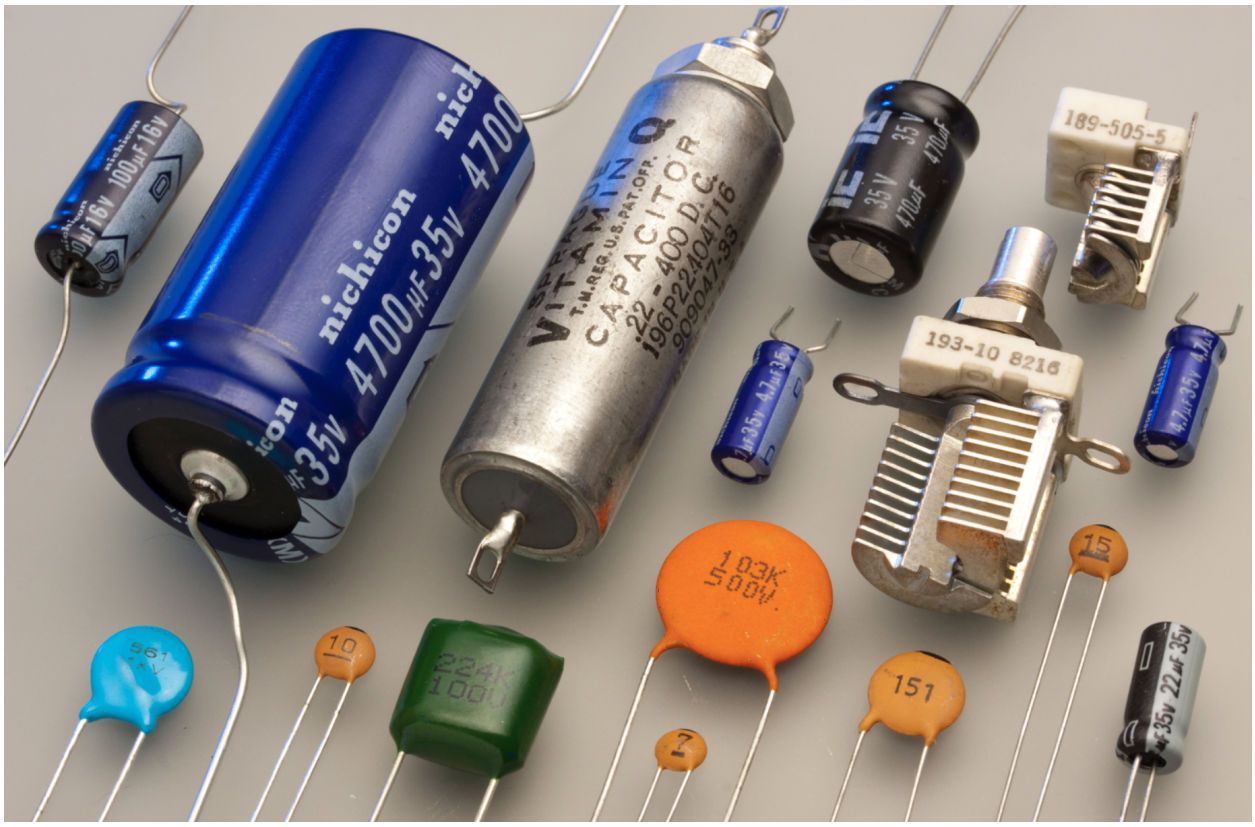
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Resistor: converts electrical current into heat, like a toaster, measured in Ohms



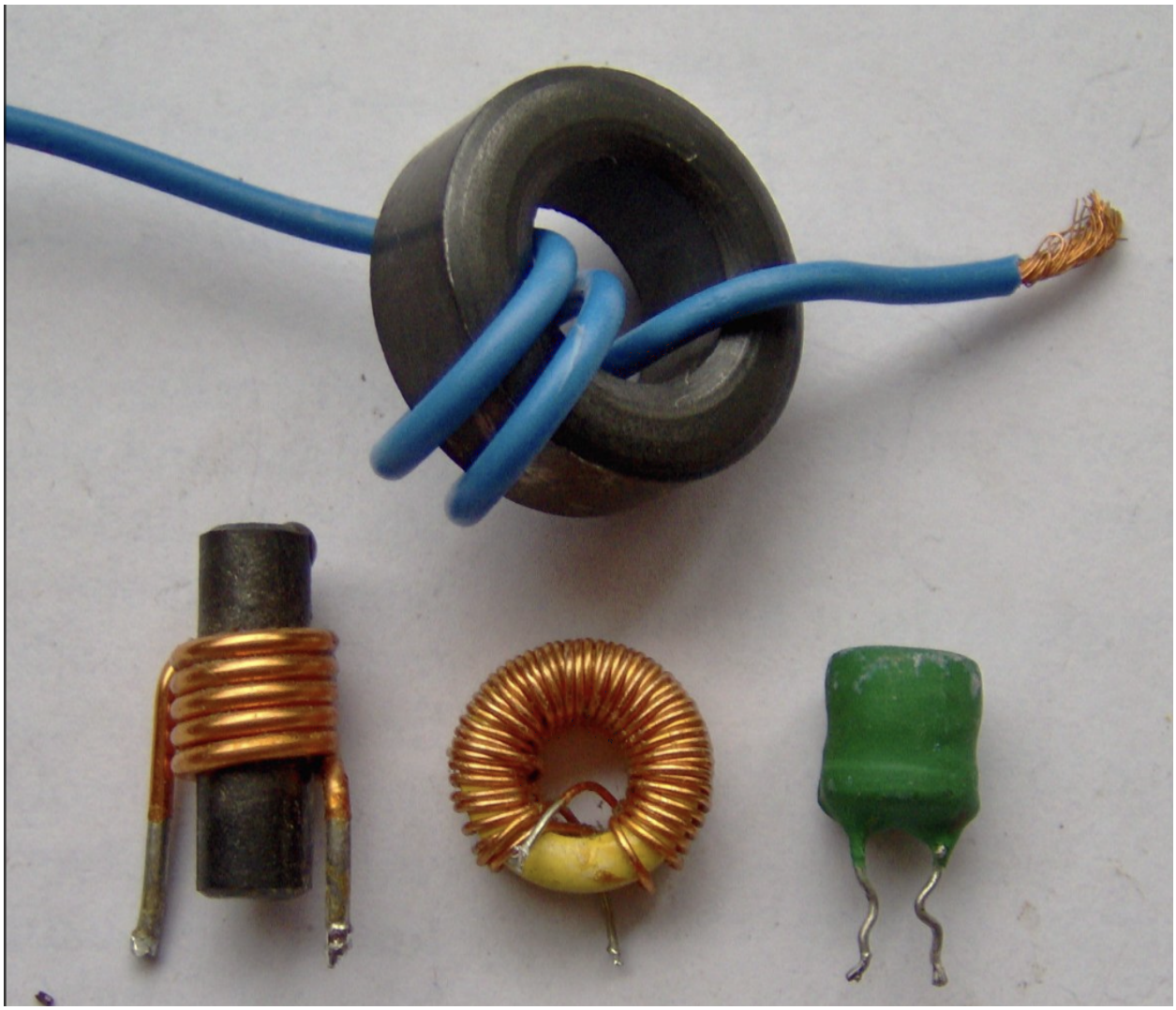
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Capacitor: stores electrical flow as electrical charges, measured in Farads



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Inductor/coil: stores electrical flow as magnetic fields, measured in Henrys



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Switch: opens or closes a circuit, denoted by size, and polarity, like DPST (double pole, single throw)