

## Unit 1.1 Electronic Principles: Units

When dealing with electrical units such as voltage, resistance, current, and power, we use a set of prefixes to denote various orders of magnitude:

- Milli- is the prefix we use to denote 1 one-thousandth of a quantity. A milliampere, for example, is 1 one-thousandth of an ampere, or 0.001 A. Often, the letter m is used instead of the prefix therefore 1 milliampere = 1 mA.
- Micro- is the prefix we use to denote 1 millionth of a quantity. A microvolt, for example, is 1 millionth of a volt, or 0.000001 V. Often you will see the Greek letter mu, or  $\mu$ , to denote the prefix micro-. 1 microvolt is, therefore, 1  $\mu$ V.
- Pico- is the prefix we use to denote 1 trillionth of a quantity. A pico volt is 1 trillionth of a volt, or 0.000001  $\mu$ V.
- Kilo- is the prefix we use to denote 1 thousand of a quantity. A kilovolt, for example, is 1000 volts. Often, the letter k is used instead of the prefix kilo-. 1 kilovolt is, therefore, 1 kV.
- Mega- is the prefix we use to denote 1 million of a quantity. A megahertz, for example, is 1 million Hertz.
- The unit of frequency is the **Hertz**. (T5C05) It is equal to one cycle per second. Often, the letter M is used instead of the prefix mega-. 1 megahertz is, therefore, 1 MHz.

### Here are some examples:

- 1,500 milliamperes is 1.5 amperes. (T5B01)
- Another way to specify a radio signal frequency of 1,500,000 hertz is 1500 kHz. (T5B02)
- One thousand volts are equal to one kilovolt. (T5B03)
- One one-millionth of a volt is equal to one microvolt. (T5B04)
- 0.5 watts is equivalent to 500 milliwatts. (T5B05)
- If an ammeter (a meter that measures current) calibrated in amperes is used to measure a 3000-milliampere current, the reading it would show would be 3 amperes. (T5B06)
- If a frequency readout calibrated in megahertz shows a reading of 3.525 MHz, it would show 3525 kHz if it were calibrated in kilohertz. (T5B07)
- 1 microfarad is 1,000,000 Pico farads. (T5B08) Farad is the unit for capacitance.
- 28.400 MHz is equal to 28,400 kHz. (T5B12)
- If a frequency readout shows a reading of 2425 MHz, the frequency in GHz is 2.425 GHz. (T5B13)

When dealing with ratios—especially power ratios—we often use decibels (dB). The reason for this is that the decibel scale is a logarithmic scale, meaning that we can talk about large ratios with relatively small numbers. At this point, you don't need to know the formula used to calculate the ratio in dB, but keep in mind the following values:

- **3 dB** is the approximate amount of change, measured in decibels (dB), of a power increase from 5 watts to 10 watts. (T5B09) This is a ratio of 2 to 1.
- **6 dB** is the approximate amount of change, measured in decibels (dB), of a power decrease from 12 watts to 3 watts. (T5B10) This is a ratio of 4 to 1.
- **10 dB** is the approximate amount of change, measured in decibels (dB), of a power increase from 20 watts to 200 watts. (T5B11) This is a ratio of 10 to 1.

**QUESTION POOL: (14**

T5C05	T5B01	T5B02	T5B03	T5B04	T5B05	T5B06
T5B07	T5B08	T5B12	T5B13	T5B09	T5B10	T5B11

***"Our city's vast and complex communications system, is indebted to the many trained amateur radio volunteers, who are efficient and dependable and lend a much needed hand in times of crisis or disaster. They are an invaluable part of our city's communication network..."***

**The Hon. Rudolph Giuliani**  
Mayor of New York City (1994-2001)