

RESONANCE

In a circuit with both capacitive and inductive reactance, at some frequency the two types of reactance will be equal. At that frequency, the effects of the capacitor and inductor cancel. The ac current and voltage are brought exactly back in step with each other—a condition called *resonance*. The frequency at which resonance occurs is the *resonant frequency*.

When a circuit is *resonant*, opposition to the flow of current, ac or dc, is as if only resistance was present—no reactance. At resonance, impedance is said to be *purely resistive*. Depending on how the circuit components are connected, the cancellation of capacitive and inductive reactance at resonance can result in very high or very low impedance to ac signals.

If a resonant circuit is used to optimize a circuit's performance, that is a *tuned circuit*. If variable capacitors or inductors are used, the resonant frequency of the circuit can be varied. By placing tuned circuits at the right point in a circuit, they can be used to block or pass ac signals.

Signals that have a frequency greater than 20,000 Hz (or 20 kHz) are *radio frequency* or RF signals. The range of frequencies of RF signals is called the *radio spectrum*. It starts at 20 kHz and continues through several hundred GHz, a thousand million times higher in frequency! Signals below 20 kHz are *audio frequency* or AF signals.

For convenience, the radio spectrum of **Figure 2-20** is divided into ranges of frequencies that have similar characteristics as shown in **Table 2-3**. Frequencies above 1 GHz are

Table 2-3
RF Spectrum Ranges

Range Name	Abbreviation	Frequency Range
Very Low Frequency	VLF	3 kHz - 30 kHz
Low Frequency	LF	30 kHz - 300 kHz
Medium Frequency	MF	300 kHz - 3 MHz
High Frequency	HF	3 MHz - 30 MHz
Very High Frequency	VHF	30 MHz - 300 MHz
Ultra High Frequency	UHF	300 MHz - 3 GHz
Super High Frequency	SHF	3 GHz - 30 GHz
Extremely High Frequency	EHF	30 GHz - 300 GHz

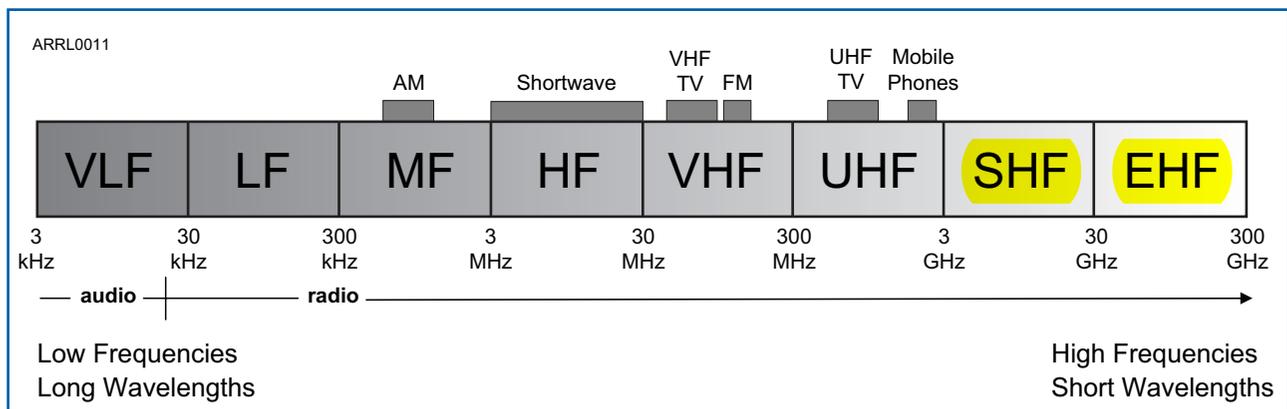


Figure 2-20—The radio spectrum extends over a very wide range of frequencies. The drawing shows the frequency ranges used by broadcast and mobile phones. Amateurs can use small frequency bands in the HF and higher frequency regions of the spectrum.