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Early FM Radio

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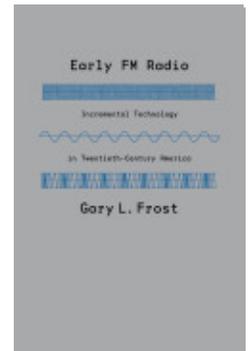
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amplitude modulation (AM). A method of encoding a carrier wave to convey information. The amplitude of the carrier is varied (modulated) according to the amplitude of an audio-frequency wave.

antenna. A metallic apparatus for sending or receiving electromagnetic waves.

arc oscillator. An early continuous wave radio transmitter.

audio. Of or relating to the transmission, reception, or reproduction of sound.

audio amplifier. An electronic device that increases the amplitude of reproduced sound. Audio amplifiers are often subsystems of radio transmitters and receivers.

audion. The first electronic amplifier, a grid triode invented by Lee de Forest in 1906. The audion was the ancestor of the vacuum tube and the transistor.

balanced amplifier. A symmetrically structured amplifier with two branches having identical or nearly identical properties. Often used to subtract or add two signals.

bandwidth. The numerical difference between the upper and lower frequencies of a band of frequencies. The audio bandwidth of an amplitude-modulation system is approximately one-half the width of the radio channel.

binary amplitude modulation. A means for modulating an electromagnetic wave to carry telegraph messages.

breadboard. An experimental prototype of an electric circuit or system, often mounted on a perforated board.

capacitor. See condenser.

carrier (or carrier wave). An electromagnetic wave that can be modulated, as in frequency, amplitude, or phase, to transmit speech, music, images, or other signals.

cascaded amplifiers. A circuit in which the output of an amplifier is connected to the input of a succeeding amplifier.

channel. A specified radio-frequency band for the transmission and reception of electromagnetic signals, as for radio or television signals.

coherer. A device once used to detect electromagnetic waves in a wireless (radio) signaling system.

condenser (or capacitor) (symbol C). A capacitive circuit element that blocks electric current and holds a charge. Often connected to an inductor to form a resonant circuit.

continuous wave. A sinusoidal wave of constant amplitude and frequency.

crystal detector. A rectifying detector used especially in early radio receivers and consisting of a semiconductor crystal in point contact with a fine metal wire.

damped wave. An oscillating wave whose amplitude decays to zero.

detection (also demodulation). The extraction of sound waves from a modulated carrier wave.

detector (also demodulator). A device that extracts sound waves from a modulated radio carrier wave.

- electromagnetic waves.* Energy comprising electrical and magnetic components. Radio waves are electromagnetic waves traveling through space.
- electronic.* Describes devices that are based on the control of electron flow. During the first half of the twentieth century, almost all electronic devices used vacuum tubes.
- facsimile (fax).* To transmit an image by electronic means.
- fading.* Fluctuation in the strength of incoming radio signals, usually due to changing atmospheric conditions.
- fidelity.* The degree to which an electronic system accurately reproduces sound.
- frequency.* The number of cycles of a waveform per second.
- frequency deviation.* In FM, the amount of frequency shift above or below the unmodulated carrier. The frequency deviation is one-half of the frequency swing.
- frequency modulation (FM).* A method of encoding a carrier wave to convey information. The frequency of the carrier is varied according to the amplitude of an audio-frequency wave.
- frequency multiplier.* An electronic device that multiplies the frequency of an input signal, usually by a factor of two or three. In FM, a frequency multiplier is used to multiply the frequency deviation of a modulated carrier wave.
- frequency-shift keying (FSK).* The use of frequency modulation to transmit digital data, usually by Morse code or similar telegraph code messages.
- frequency swing.* In FM, twice the frequency deviation.
- heterodyne.* An electrical or electronic circuit that combines two radio-frequency waves in order to produce a new wave that is either the sum or the difference of the frequencies of the original waves.
- high fidelity ("hi-fi").* The electronic reproduction of sound with minimal distortion and wide frequency response.
- inductance (symbol L).* A circuit element, typically a conducting coil.
- interference.* Degradation of reception on account of electromagnetic noise or undesired signals.
- intermediate frequency (IF).* The fixed frequency of the middle stage (i.e., IF amplifier) of a superheterodyne radio receiver. Most of the overall amplification that takes place in a receiver occurs in the IF amplifier stage.
- kilocycles per second (also kilohertz).* A unit of frequency equal to 1,000 hertz, or 1,000 cps.
- LC circuit.* A resonant circuit composed of an inductive element (*L*) and a capacitive element (*C*), and which is used for tuning.
- megacycles per second (also kilohertz).* A unit of frequency equal to 1,000,000 hertz, or 1,000,000 cps.
- modulation.* The variation of the amplitude, frequency, or phase, of a carrier wave.
- Morse code.* Either of two codes used for transmitting messages in which letters of the alphabet and numbers are represented by various sequences of dots (short marks), dashes (long marks), and spaces. The letter *A*, for example, is represented by the American Morse code with a dot-dash sequence: • — .
- multipath fading.* Fading in reception when the transmitted signal propagates via two

- paths of different lengths. The difference creates a relative shift in phase, thereby causing the otherwise identical signals partially to cancel each other out.
- narrowband*. Responding to or operating at a narrow band of frequencies.
- narrowband FM*. Traditionally refers to FM systems with a channel width of less than 10,000 cps.
- phase modulation*. A method of encoding a carrier wave to convey information. The phase of the carrier is varied according to the amplitude of an audio-frequency wave.
- propagation*. The process by which electromagnetic waves are transmitted through a medium, such as air or free space.
- radiotelephone receiver*. A device that receives incoming modulated radio signals and converts them to sound waves.
- radiotelephone transmitter*. A device that generates and amplifies a carrier wave, modulates it with a sound wave, and radiates the resulting wave with an antenna.
- rectify*. To convert alternating current into direct current.
- resonant circuit*. An electric circuit that is tuned to allow the greatest flow of current at a certain frequency. The most common types of resonant circuits are composed of reactive elements (*LC*) or crystals.
- sideband*. Either of the two bands of frequencies, one just above and one just below a carrier frequency, that result from modulation of a carrier wave.
- slope detector*. A simple detector of frequency-modulation waves, based on the sloped response of an *LC* circuit.
- spark gap*. A device once used to transmit wireless messages.
- spectrum*. The distribution of energy emitted by a radiant source, as by an incandescent body, arranged in order of frequencies.
- static*. Random radio noise caused by atmospheric disturbances or man-made electrical interference.
- superheterodyne*. 1. An electronic version of the heterodyne circuit in which an incoming radio signal is combined with a locally generated continuous wave to produce a standard intermediate frequency. Superheterodyne circuits are used to simplify amplification and tuning. 2. A radio receiver designed with a superheterodyne circuit.
- tube hiss*. The molecular- or quantum-level white noise produced by vacuum tubes.
- tune*. 1. To adjust a transmitter, receiver, or circuit to reject or accept a band of radio waves. 2. To adjust a resonant circuit to oscillate at a single frequency.
- vacuum tube*. An electron tube from which all or most of the gas has been removed. Vacuum tubes are typically used for the electronic amplification or rectification of electric waves.
- wavelength*. The distance between succeeding crests of a sound wave, electrical wave, or radio wave. For radio waves, the wavelength equals the speed of light divided by the frequency.
- wideband*. Responding to or operating at a wide band of frequencies.
- wideband FM*. Traditionally synonymous with Armstrong FM. Something of a misnomer, the adjective “wide” refers to the channel width, 200,000 cps.

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