RADIO

THINGS BEGINNERS MUST LEARN FIRST

Explanation of Terms Used in Radio and of Its Basic Principles.

Due to the great interest taken in radio since broadcasting stations have been started, many radio terms are seen and heard that may be unfamiliar to the novice. Some of the most commonly used terms are explained and defined below.

Like light, heat and sound, radio energy is propagated in the form of a wave motion. Every one is familiar with the wave-motion set up on the surface of a still body of water by the dropping of a stone into it.

Every time a point on the surface of the waves goes through a complete set of motions and starts to repeat those motions the wave is said to have gone through a cycle.

The number of complete cycles gone through per second is the frequency.

The human ear is responsive to sound frequencies up to a few thousand cycles per second but is not capable of responding to the higher frequencies encountered in radio. Arbitrarily a frequency of less than 10,000 cycles has been called an audible frequency —one which can be heard—and frequencies above 10,000 cycles, radio or inaudible frequencies—because they cannot be heard by the human ear.

The particular type of wave which propagates radio energy is an electro-magnetic wave. All of us have seen bits of iron and steel attracted by the little toy magnets made up in the form of horseshoes. This attraction of the magnet for the bits of iron and steel showed the existence of a magnetic

Amateur Radio Operators Erecting Aerial on the Roof.

field about the tips of the magnet and this same kind of a field propagates the electro-magnetic force, except that unlike the toy magnet, its power comes off in the form of wavy motions. This electro-magnetic force propagates radio energy in all directions.

The medium that transmits the electro-magnetic waves is the same medium that transmits light—the ether. This medium is supposed to fill all space, even that occupied by fluids and solids. Little is known about its properties.

In radio it is more common to speak of wave length than frequency. The wave length of any wave motion is the distance between any two successive crests in the same direction. The wave length depends upon the frequency. If the frequency is high the wave length is short. On the other hand if the frequency is low the wave length is long. Numerically the wave length is equal to the distance traveled by the wave in one second divided by the frequency. Suppose, for example, that it were desired to know the wave length of an electro-magnetic wave having a frequency of 835,000 cycles. Electro-magnetic waves travel at the same speed as do light waves, that is, 186,000 miles per second. Dividing the 186,000 by 835,000 the wave length would be .223 miles or 396 yards. In radio work it is measured in meters. A meter is equal to approximately 1.1 yards. Converting 396 yards into meters the wave length would be 396 divided by 1.1 or 360 meters. This is the wave length on which KDKA operates. It also means that the electro-magnetic waves sent out from this station have a frequency of 835,000 cycles.

FUNDAMENTAL PRINCIPLES

In a radiophone transmitter there are two requirements that must be fulfilled. First, there must be a source of high-frequency current, say, between 15,000 and 1,500,000 cycles so connected to an antenna and ground system that energy in the form of electro-magnetic waves will be radiated. Second, there must be some method of controlling this high-frequency current or modulating it so that the variations in the amplitude of the high-frequency current will be directly proportional to the voice or music to be transmitted.

The high-frequency current is known as the carrier-wave and its function is to radiate into space in the form of electro-magnetic waves and by its variation in amplitude carry with it the variation in the tone at the transmitting station.

It is the frequency of the carrier-wave that determines the wave-length on which a radiophone station is transmitted. By experiment it has been found that electro-magnetic waves travel at the same velocity that light waves travel, that is, 186,000 miles per second. Wave-length is the distance between any two similar points on two successive waves; for example, the distance from crest to crest of any two successive waves in the same direction, measured in meters, a unit of length equal approximately to one and one-tenth yards. Converting 186,000 miles to meters, the equivalent is 300,000,000 meters. The length of an electro-magnetic wave is equal then to 300,000,000 divided by the frequency. Suppose a station was transmitting on a wave-length of 360 meters. The frequency of the carrier-wave would be approximately 835,000 cycles.

Just as a violinist tunes his instrument, that is, makes a certain string emit a note of higher or lower pitch, or, technically speaking, a sound wave of higher or lower frequency, by adjusting the tension on the string, so may the electrical constants of the antenna circuit of a radiophone transmitter be changed in order to have the station emit a carrier-wave of a different frequency.

If a tuning fork having a natural period corresponding to middle C be placed near a violinist who is playing, the fork will vibrate when the musician plays middle C, but all other times it will remain quiescent. This phenomenon of the tuning fork vibrating whenever the musician plays the corresponding note on the violin is known as mechanical resonance. If a radio receiver be adjusted so that electrically its natural period of vibration will be 835,000 cycles (360 meters wave-length) every time a station transmits on a wave-length of 360 meters, current will be set up in the receiver by electrical resonance. Stations transmitting on any wave-length other than 360 meters will not cause a current to be set up in the receiver.

The portion of a radio receiver that changes the wave-length at which it is electrically resonant is called a tuner. Suppose that "A" station transmits on a wave-length of 200 meters and "B" on a wave-length of 360 meters. By adjusting the tuner until the constants of the receiver make it electrically resonant to a 200-meter wave or a 360-meter wave, either of the two stations can be picked up; but both stations cannot be picked up simultaneously. This is the reason that more than one transmitter can be operating at one time and yet only one can be heard on a receiver without interference from the others.

The other necessary part of a radio receiver is the detector. The function of this portion of the receiver is to utilize the small currents in the tuner that are set up by a transmitting station and make them audible through the medium of a telephone receiver. If the telephone receiver were connected directly to the tuner the high-frequency current would not operate the diaphragm of the receiver and even if the diaphragm were set in motion it would be too fast a motion to be picked up by the human ear.

In a simple receiver the detector usually consists of two pieces of mineral in contact or a piece of mineral in contact with a metallic spring. Either combination is known as a crystal detector. A detector of this type is nothing more than a rectifier; that is, when an alternating current is applied at the terminals the current is allowed to flow only in one direction.

How One Editor Uses Radio.

The editor of a paper in an isolated town in the northwest is using the radio in a most ingenious and effective way. An amateur radio friend in a big city 50 miles away buys the latest editions of the city papers as soon as they are off the press, reads the best news into his transmitter, and a typist in the country office copies the news as it comes in over the office receiver. The editor, through this ingenious plan, is always "First With the Latest" in his home town.

For further information write Fred Long, Roxboro.

JEWEL BOX BURGLAR PROOF

Valuables May Be Accounted Safe When Placed Within This Up-to-Date Receptacle.

Among the newest things that inventors have given us in the last few months is a box that comes as near to being burglar proof as it is possible to imagine. It looks like an ordinary steel box with a keyhole in its side. But just lift it or move it and a loud alarm bell begins to ring inside it. This bell keeps on ringing for five hours and it cannot be stopped without unlocking the box.

A burglar might carry off the box, but its alarm would keep on ringing and would give him away before he could get it to a place of safety. If he touches it, even stumbles against it, the alarm will arouse the household, for the slightest movement suffices to set it ringing. This is also true of the dishonest servant.

The owner can, however, open and close the box at will, as he has the key. And the only way in which he can be robbed is by some thief stealing the key before tampering with the box.

This safe is arranged inside with trays for small articles, money and jewelry and with space under them for securities, such as bonds and mortgages. The whole is made of seamless steel, nickel-plated, with a piano hinge and strong double lock. There are no duplicate keys, nor is there a master key that will open it.

IMPORTING HOUSES NEW FAD

English Residences Centuries Old Are Actually Lived In by Wealthy New York Residents.

Several houses complete in every detail, dating from the Sixteenth century, have recently been imported from England. Lovers of the antique may enjoy the unique experience of living in the actual rooms which were built and decorated three centuries or more ago, and be within convenient commuting distance of New York. Such homes are naturally expensive, for the original cost is not only considerable, but the cost of transportation, the tariff and the expense of rebuilding are naturally great.

An English firm makes a specialty of selling these houses and keeps a number of them on hand in their show place near London for inspection. When an old house is to be torn down to make room for some improvement, the building is bought in, usually for a nominal sum. After being carefully taken apart it is rebuilt in the show place near London, ready for the inspection of purchasers. If it is bought by an American, for instance, the house is once more taken down and packed with care for shipment. This work is done by experts, so that the parts, especially the woodwork, will not be injured. The English builders usually come to America to set up the house exactly as it originally stood in England. In some instances these old houses have been surrounded with English gardens, reproducing the original setting in England of centuries past.

Camps for Motorists.

Here is the latest idea in camps for motorists, says the Popular Mechanics Magazine: An Oakland (Cal.) concern is spending no less than $80,000 in erecting bungalettes on an eight-acre tract to be let to motoring tourists by the night or for any longer period up to fifteen years" (as the management jokingly announces), which is the length of the lease on the land. These simple residences are designed to take the place of tents, and while their furnishings are meager compared with regular houses, they offer considerably more in the way of conveniences that is commonly offered by an ordinary tent. These bungalettes are of two types, some with one room and some with two rooms. They are built entirely of wood, and are equipped with sinks, running water, electric lights, two-burner gas plates, etc.

Spring Beauties.

One of the commonest varieties of flowers found after the snow has melted away is the Spring Beauty. The little blossoms are a very delicate pink. Each petal is lined with hair lines of deep pink. Some naturalists claim that these hair lines of deep pink are honey guides for insects, lines that point the way to the tiny sac of honey to be found in the center of the flower.

Although the stalk of the Spring Beauty is very slender, it is quite sturdy enough to support the two slim green leaves, in the base of which is held the flower, and a cluster of diminutive buds, each on a stem no larger than a fine thread.

An Unwelcome Dance.

Lady Constance Stewart Richardson, whose bizarre dancing made her known in America, was married recently in oriental dress. There is a story about her and the duchess of Marlborough.

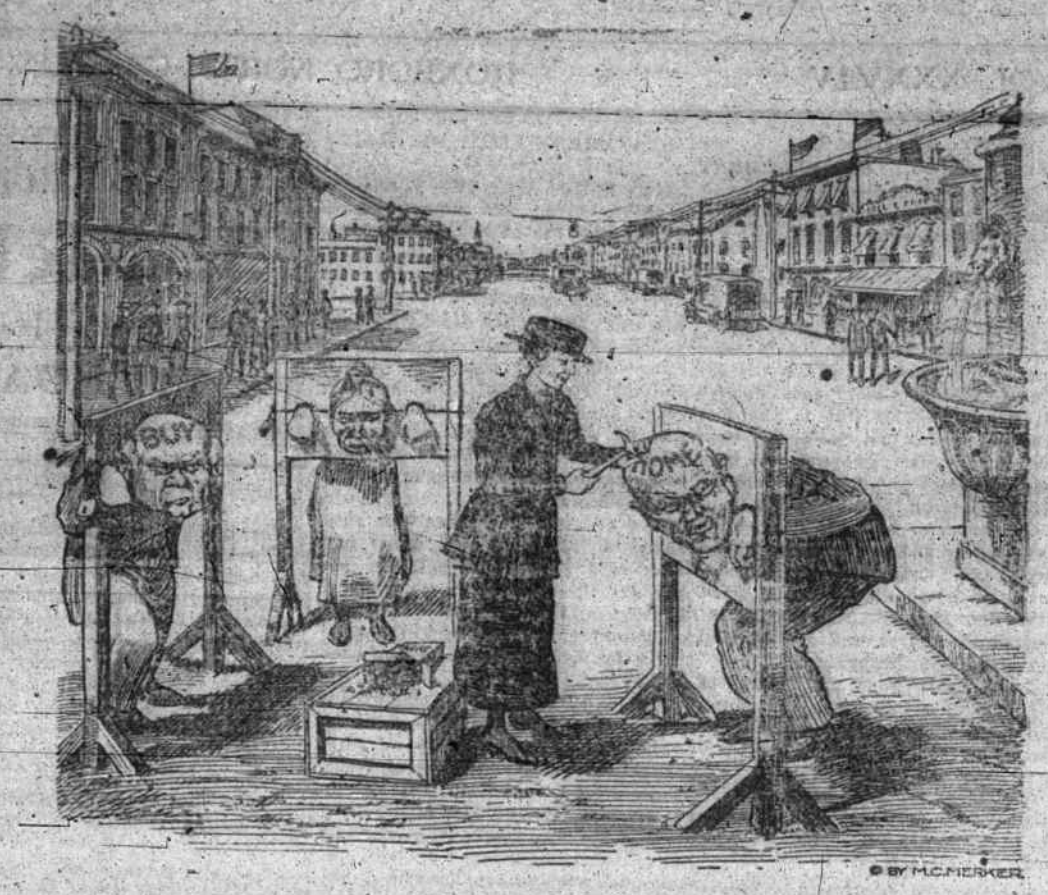
Once, at a charity concert at one of the great houses of London her host whispered to the duchess:

"We're to have an extra number. I'm Lady Constance has consented to do her barefoot Persian dance."

"Oh, dear," the duchess cried. "I knew, when I spilled the salt at dinner that something dreadful would happen before the night was over.

Jud Tunkins.

Jud Tunkins says there is always a little something to be thankful for. Since fruit has gotten to be so expensive, there aren't nearly as many orange peels thrown on the sidewalk.



PEGGY: LET THOSE WHO DESERVE PUNISHMENT BEAR IT PATIENTLY. IT COMES SLOWLY BUT IS VERY EFFECTIVE.

BETTER

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