

# BROADCASTING TO MILLIONS

## Radio Telephony's Extraordinary Growth—200,000 Stations Installed in Last Three Months

By A. LEONARD SMITH JR.

**A**LTHOUGH radio telephony and its phraseology, broadcasting, aerial antennae and wave lengths, are almost as common topics of conversation today as the Eighteenth Amendment, one-half of 1 per cent., and Mr. Volstead, it is extremely hard, even yet, to write in popular terms or this baby of the sciences and its extraordinarily rapid growth.

We know that great radio corporations have already established plants from which each night are sent broadcast out through the air overhead grand opera, light opera, sermons, market reports, as well as children's bedtime stories. The rendition of this ether program can be heard by any one who fastens a set of radio telephone receivers to his or her ears, or who can get within range of one of the large horns with which some of the radio receiving stations are equipped.

From estimates given by these same corporations we know that there are today approximately 700,000 American homes, schools, churches, halls and office buildings equipped as receiving stations. More than 15,000 stations have been licensed by the United States Government for transmitting wireless messages of one sort or another. Much of the popularity of the whole thing has come in the last two or three months, during which time, it is said, about 200,000 receiving sets have been installed.

Take up the headpiece of a radio receiving set and listen a minute. On a small wave length, using little power, the wireless brings you an amateur's experimental chatter as he plays with his wonderful new toy. With a thousand times the speed of any wind that ever blew it bears the recital of poetry or neighborhood gossip straight to the delighted ears of some other enthusiast, who, when the experiment is over, will, you may be sure, check up with his friend on every point. On a higher wave-length, 360 meters, in fact, come the band concerts, the grand opera arias and all the features of the professional stations' nightly program. Increase the wave length still more, and you get into the realm ruled by the crash of the wireless telegraph spark, hurling its code signals from the great Nauen station near Berlin or from the big British plant in the bleak Welsh hills near Carnarvon to Deal Beach, New Brunswick, Tuckerton or Arlington in this country.

Through it all, to a greater or less degree, runs a continuous humming or buzzing, that sometimes rattles and crackles so loud as to drown out completely whatever signals you listen for.

"What are those noises?" you ask the operator in bewilderment.

He listens a moment. "Its 'Old Man Static,'" he tells you. Then, as you look even more blank, he shrugs his shoulders. "You know as much as I do," he says.

### Noises of Space.

Of course, he refers to static electricity and you are fascinated, though a trifle awestruck, to realize that you are listening to sounds that, surely, were never intended to be heard by a human being. The delicate mechanism of the radio has caught and brought to the ears of us earth dwellers the noises that roar in the space between the worlds. The sounds range from an actual whistle in the region of the Aurora Borealis to a bacon-and-egg-frying sizzle around the Gulf Stream.

Perhaps we shall go further, some day, and comprehend these sneers and chuckles of "Old Man Static." Then, it may be, we shall understand, also, some of the freaks of wireless telephony. For example, not long ago James Miller of Aberdeen, Scotland, was "on the air" one night when there came to his ears through the dark the sound of a distant voice. It seemed to have been borne in on the moonbeams. Miller adjusted his apparatus, "tuned it," to increase the strength of those faint articulations. Then his face grew tense with wonder, for he heard a man in Keyport, N. J., 3,500 miles away, calling to a brother enthusiast somewhere over there in America to "stand by" for a demonstration.

It was Hugh Robinson of Keyport, and his conversation, as well as the records of the phonograph he played for his friend in New Jersey were heard just as clearly and distinctly by the man in Scotland. The same conversation and music were heard that night by a ship 1,000 miles out in the Atlantic and by another vessel in the harbor of Tela, Honduras.

Robinson was using a small set, deriving its power from an ordinary lighting circuit. He purchased it with a guaranteed range of 100 miles. Radio men say that his achievement is just about a record. They can't explain how it happened. Perhaps the atmospheric conditions were just right—"Old Man Static" in an indulgent mood—but it happened, and that's plenty for the average layman who is unable to sit down and work out theories of air currents and "enveloping stratas" of ether.

### Rapid Development.

Work on the development of the radio telephone commenced at the beginning of the present century, when a number of scientists started out to make the ether a medium for the voice as it was for the Marconi spark. The job was tackled, at first, principally in college laboratories, although one or two men connected with commercial companies lent their hands and brain to the task. Put as simply as possible, the problem confronting them was to transform the thousand-feet-a-second sound waves into Hertzian waves traveling each second 186,000 miles. Then the Hertzian waves had to be geared down at the receiving end so that the vibration could be detected and comprehended by the human ear.

Radio men agree that it was the invention of the vacuum tube by Dr. Lee De Forest that made wireless telephony possible. This instrument, familiar to all radio enthusiasts, looks not unlike a small electric light bulb. It contains a filament, also like a light bulb, around which is a grid—a spiral or finely woven screen of wire. Outside the filament and the grid, enclosing both, is a small metal cylinder known as the plate. The vacuum tube acts in triple capacity as a detector, generator and amplifier.

If it is true that the vacuum tube made wireless telephony possible, it is just as certain that it was the war that put that science on the map. Under the stress of the nation's need, the toy became the mighty machine, recompensating the universe, as it were, for the years of sickness and sorrow, devastation and death. And it has always been

this way. There never was a war but it added tenfold to the store of knowledge of humanity. It was a spark struck from the stone-headed battle hammer of some pre-historic warrior that gave man the idea of kindling fire, and thus laid the foundations of our civilization.

As soon as we entered the world conflict, our Government sent word to the great electrical companies that it wanted a reliable, effective, radio telephone right away. Immediately hundreds of experts, engineers, physicians and chemists began to eat and drink and dream radio telephony. And they made the telephones according to every Government specification. Say the radio men, we were five years ahead of the enemy in this science during the years of the war.

Then came peace. The companies that had worked so hard and so loyally to help the Government found that their labors were going to bear fruit a hundredfold in the shape of a brand-new means of rapid and interesting communication. The battle ended, man was ready to begin the subjugation of the air.

Has he succeeded? You have only to go out into the night and look up at the sky. Above you in the blue, flying across the face of the moon, are the scudding ether-borne messages; neighborly gossip, "Celeste Aida," by Caruso, reproduced on the phonograph, its liquid notes transmitted far across the sea, perhaps even sounding in the land of the singer's birth. Up there in the starlight night hisses the great transatlantic wireless, dot, dash, dot dot dash, telling of the death of a King or of the marriage of a Princess. Borne on the chill winds there are also the softest of lullabies and the sweetest of thousand-year-old fairy stories told by "The Man in the Moon" to thousands of delighted, though sleepy little children snuggled close by their own firesides.

It is all there in the air above, but you may not hear it with your human ears. You must turn to the magic that has been created to serve you. You must seek the powers that science has harnessed, that eclipse with their magic the slaves of Aladdin's lamp; the powers that enable you to hear the very music of the spheres.

### Cost of Equipment.

To install a wireless receiving station is not a complicated operation. One needs only the price—anywhere from \$25 to \$250 upward. Also, if one lives in a New York apartment, one needs the consent of one's landlord. Landlords, say the radio enthusiasts, are not apt to be susceptible to the romance of the wireless. They generally regard the aerial antennae as an eyesore and a fire menace. Of course, the eyesore business is a matter of taste and, therefore, not debatable, but, so the experts declare, there is absolutely no danger from the wires, correctly installed.

It is a bit more difficult to get a sending set, but not by any means impossible. You must be able to read a few words of the International Communication Code, enough to understand any strident telegraphic orders "to get off the air" from the big wireless at the Brooklyn Navy Yard, which does not condescend to the wave length of the telephone. You will get this command whenever there's a ship sending S. O. S. from far out at sea. Then, it's up to you as an amateur operator, to refrain from transmitting, although you may listen all you please to the hiss and crackle of the dot and dash signal as the huge naval station speeds ships and men to the rescue.

At present, no amateur may send on more than a 200 meter wave length, nor is he permitted to develop more than one kilowatt of power. He is the lowest in the scale, and if he is anywhere in their neighborhood, he can no more interrupt the 360-meter wave length broadcasting concert or the 1,000 to 2,500 meter wave length transatlantic wireless than the buzzing of a mosquito can drown out the roar of a subway express train.

Sometimes the amateur tries to get just a little more power out of his instrument. It's natural, just as it's natural for the owner of a new automobile to "give 'er a little gas." When he yields to temptation, the amateur is apt, like his brother in the motor car, to attract the heavy notice of the traffic officer of his own particular thoroughfare. In this case it is the radio inspector of the district. There is one of these inspectors in the Custom House of each of the following cities: Boston, New York, Savannah, Baltimore, New Or-

leans, San Francisco, Seattle, Cleveland and Chicago. He has a radio telephone and by adjusting his instruments can tell accurately whether anybody in his district is "exceeding the speed limit." The "exceeder" gets a quick call down. If he disregards it he loses his license to use the air for any other purpose than to breathe.

### Some Accomplishments.

Here are a few things that this infant science has accomplished to date. Everything mentioned is a matter of record:

A man in Glenbrook, Conn., using an ordinary amateur's outfit, one kilowatt power, guaranteed range 100 miles, sent his voice and the music of a phonograph on the winds of the world 2,500 miles to British Guiana.

Sunday service has been transmitted several times by wireless to homes distant several miles from the church.

The steamship Gloucester, ninety miles off the Port of New York, talked with various stations of the Western Electric Company across the American continent, and its signals and words and music were heard in the Catalina Islands, off the coast of California.

Talks between stations in England and Holland, and in Germany and Spain have been fairly common.

Conversation has been held between the Gare du Nord in Paris and French railroad trains.

Students of Union College, Schenectady, equipped a baby carriage with a radio telephone and trundled it along a road—they declare there was a baby in it—to the tune of lullabies played several miles away.

Both the Democratic and Republican candidates for Mayor of New York used the wireless telephone last Fall to make a political speech.

A woman out in Indiana heard a sermon preached into the transmitter of a radio telephone in Newark, by her son, a clergyman of that city.

Music sent several hundred miles by wireless was so clear on a vessel at sea that a dance was held.

Of course, the question that comes into everybody's mind as he reads all this, is, "When are we going to be able to talk to Europe?" Already commercial companies have accomplished that feat, not once but many times. Several years ago, the Western Electric carried on a series of experiments from the station at Deal Beach, N. J., when it talked to Paris and to Honolulu at the same time.

However, the ordinary man, not possessing a couple of hundred foot steel towers, several thousand feet of copper wire and a hundred thousand watts or so of electric energy, can't talk to Europe over the wireless yet, unless he happens to make a freak test like that of Robinson of Keyport. Machinery hasn't been constructed that will force "Old Man Static" to "get off the wire." At that, though, there is a rumor that everybody in the radio game seems to have heard, but which hasn't been confirmed, to the effect that a certain big New York corporation has plans all completed for a great plant to be erected this year or next that will make conversations with London, Paris or Berlin just as feasible as talking to St. Louis or Chicago.

With all the things a radio telephone has done or can do or is going to do, there are some things it cannot do, and they should be listed here. In the first place, it can't give you any privacy. The world's information is yours if you have a radio telephone, and also whatever information you intrust to the air belongs to the whole world. Then, two transmitting sets of anywhere near the same power cannot operate together in the same neighborhood. The ether lanes seem to congest very easily. Third, no means have yet been found of counteracting the effect of high buildings on the passage of the vibrations carrying wireless messages. The best receiving set in the world is helpless when it is placed low down near a skyscraper that towers between it and the sources of whatever signals it is supposed to receive. This is what has forced them to give up for the present the idea of equipping policemen with miniature radio telephones. And, lastly, there's our old friend, "Static."

Even with these handicaps, the newest science is making giant strides of progress. The men working at it are working with the very fundamental laws of nature. And not the least fascinating part of their work is the glimpse it gives them, now and then, into realms that were never before dreamed of in any man's philosophy.