

Radio In 1935

By HUGO GERNSBACK

Member American Physical Society

THERE is today a science which may be termed the Science of Prediction. In former years one had to be a prophet to make predictions, whereas in these enlightened days it would appear that even the best historical prophets of antiquity were in reality but good scientists themselves. In other words, these worthy individuals had mastered the science of prediction themselves and by putting two and two together they often achieved remarkable results which, to the superstitious populace, seemed supernatural.

Any good astronomer today can predict with exactitude the solar and lunar eclipses for the year 1935 down to a small fraction of a minute. The mean average temperature for the United States can now be calculated six months ahead, due to recent studies of solar activity.

When it comes to predicting what radio will be in 1935, it is not necessary to make wild an improbable guesses, but by following certain laws and by building upon what has been accomplished for some years back, we can readily arrive at a result that will be fairly accurate.

When the writer compiled his book on the radio telephone, in 1910, the first of its kind to be published anywhere, entitled, "The Wireless Telephone," he made certain statements therein, which he believed sound in view, of the then prevailing wireless art. The preface of this book is printed on this page. The writer was criticized quite a good deal, and called visionary and a dreamer by many at that time; the predictions, nevertheless, not only came true, but proved far too tame, and not visionary

Preface

The present little volume is intended for the experimenter doing research work in wireless telephony and the student who wishes to keep abreast with the youngest branch of the wireless art.

The author realizes that the future use of the wireless telephone will be confined to the low power or battery system, as the present instruments, necessitating 220 and 550 volts for their successful operation, are not desirable nor practical enough for every day use.

The wireless telephone of the future must be as flexible as the wire telephone of today.

Every farmer will be able to operate his wireless telephone, when the sending and receiving instruments will be housed in a box a foot square, without depending on the lighting current for its operation.

The author predicts that in less than 10 years this stage will have been reached as it is bound to come sooner or later.

Quite a little new matter will be found in these pages and while some old matter has necessarily appeared for the sake of completeness of the book, the author trusts that the necessity of reviewing such matter will be apparent.

The author shall feel happy if this little volume will be the cause to advance the new art if ever so little, and he will be pleased to bear honest criticism and suggestions as to the contents of the book.

H. GERNSBACK.

New York.
February, 1910.

A prediction made in 1910 by Mr. Gernsback in the original book, "The Wireless Telephone," which was the first of its kind published anywhere. The predictions shown in this book have already come true.

enough to compete with the events that actually took place later on.

So when the writer sets himself the task of predicting the advance in radio in the year 1935, he no doubt will be ridiculed again. Nevertheless, the statements that follow hereafter are probably entirely too conservative, and with 10 years, far more impossible things will have come about than those mentioned in this article.

MORE STATIONS

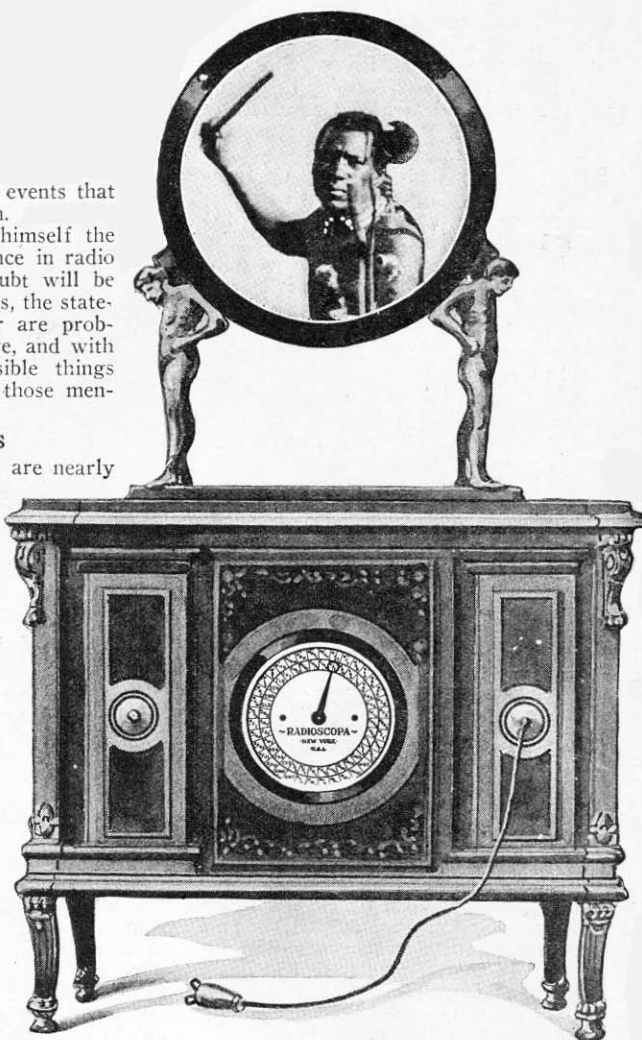
At the present time there are nearly 600 broadcast stations operating in this country, but we have only 150 channels in which to operate them. That means that some of the stations have to share time with others, to give them all a chance to get on the air, while some must be so far removed as not to interfere with the others.

This is a very unsatisfactory state of affairs, and the writer has pointed out a number of times before that the only solution is to reduce the wave-length for all broadcast stations. It is the writer's firm belief that in 1935 all broadcast stations will operate below 50 meters, possibly below 10 meters. At such low wave-lengths the frequency increases

so rapidly that 10,000 stations can be separated 20 and more kilocycles without interfering with each other. The word "wave-length" will not be used in 1935. Rather, stations will all be known to operate under so many kilocycles, or perhaps, myriacycles (kilo meaning 1,000—myria, 10,000). Operating at 25 meters or below, we could immediately accommodate, even today, thousands of extra broadcast stations, which would not interfere with each other in any way whatsoever. The reasons why it is not done at the present time are various.

LOSSES

Suppose one of our popular broadcast stations were to suddenly drop to 25 meters. No broadcast receiver made today could receive at such a low wave-length, because modern receivers are made to operate on a wave-length between 200 and 600 meters, or thereabouts. The writer makes the prediction that



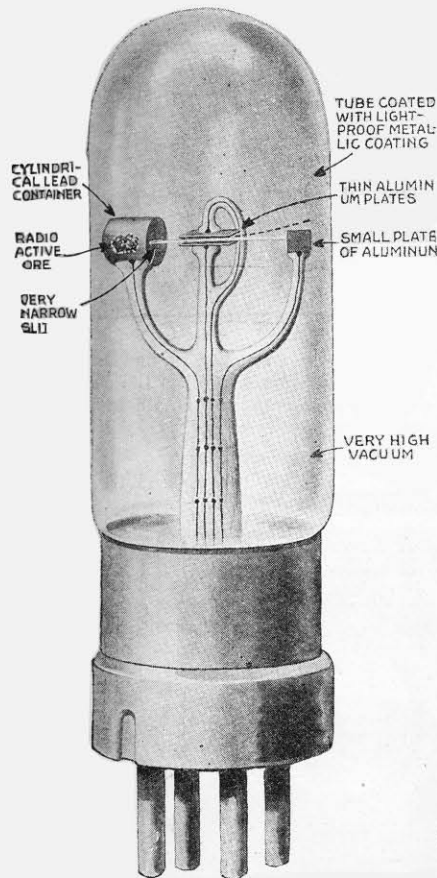
Above is shown the tentative radio set of 1935. Here we have radio television combined with radio broadcast. Instead of using a number of dials as we do today, the user of the future radio set will have a small pear, as shown. Pressing one of the buttons revolves the pointer slowly until you get the station you desire. Releasing the pressure on the button puts the station on the loud speaker and a television apparatus begins to function at the same time. Pressing the other button will bring in foreign stations located on the inside circle, using the same pointer, the operation being identical in all cases. Separate loud speakers can, of course, be used in this set, or the screen itself upon which the television picture shows may become the diaphragm for the loud speaker.

during the next few years the popular broadcast receivers will be those which will be able to tune down lower and lower. Already broadcast stations are beginning to go down in the wave band. Of course, this movement is gradual, as it should be. Such changes take time, which is a good thing, because if the changes were made overnight, all present broadcast receiving sets would be obsolete. By building better receivers to operate at lower and lower wave-lengths, each year will show an improvement over the past one, and soon we shall have nothing but low wave receivers.

At the same time the sensitivity of our sets will keep on increasing, as it has during the past 10 years. The greater amount of losses having been done away with, the efficiency having been increased, it stands to reason that the sensitivity of the set will be increased as well.

While the writer believes in the present cycle of super power, he does not believe that it will prevail in 1935, for the following simple reasons:

When Marconi first started sending across the Atlantic Ocean, it took 50 kilowatts or 67 horsepower to accomplish the feat. Most of this energy was wasted, and only a very small fraction arrived at the other side of



The theoretical cold vacuum tube of the future. Some experiments by a number of scientists have been made along these lines, and it is now thought possible that within the next ten years we shall have a tube that will not require an "A" battery at all, the electrons of the tube being supplied, not by a hot filament as at present, but by a radio-active substance, or perhaps in some other similar way to obtain the same result. No such tube has, of course, as yet been produced, the above illustration representing the artist's conception of the tube.

the ocean. Here we had wireless receiving instruments with fearful losses and the small amount of energy that came in was barely audible. On the other hand, the amateurs of today are sending messages across the ocean regularly with an energy of 10 watts, which is exactly two-hundredths of one per cent. of the energy that it took Marconi to do the same thing 24 years ago. In other words, with the energy inherent in a few small batteries that can be easily put into a small suitcase, and which can be readily carried about, it is now possible to transmit radio intelligence across the Atlantic ocean. Again, if conditions are right, and the transmission and reception are efficient, there is no need for super power. In 1935 a 10-watt station will be heard around the entire world. Under such conditions, with ultra-sensitive apparatus, the super power system would create havoc with receiving apparatus within a distance of a few miles, and for that reason it probably will not be used at that time.

TELEVISION

In 1935 we shall have radio television. It will be possible to see, as well as to hear, by radio. An explorer will take along with him a portable radio station and he will be able to give a lecture right on the spot in the jungle in darkest Africa or up in the unexplored regions—if such there be at that time—of the Amazon. He will explain everything he sees, and his projector will also be tuned at every angle so that the listeners 10,000 or 12,000 miles away will be able to see at the same time. This television apparatus, by the way, is almost within our grasp now, thanks to the wonderful work done by C. Francis Jenkins, of Wash-

ington, D. C., and Edouard Belin, of Paris, France. The actual transmission over short distances has already been accomplished, and it remains only to put on the finishing touches

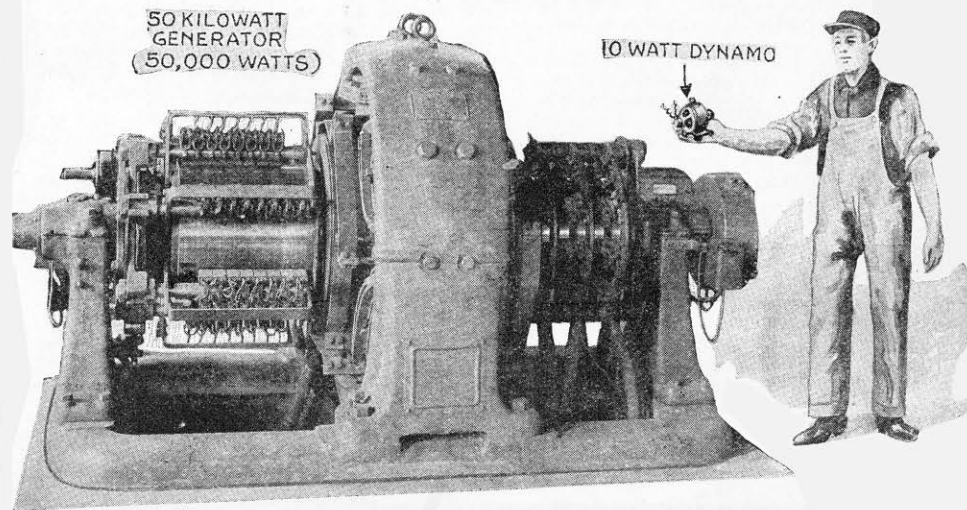
TUBES

What tubes shall we use in 1935? The development of the vacuum tube since 1906 has been slow but steady. Since DeForest invented the Audion, much improvement has been made. We are still using the same tube with a number of refinements. At the present time all tubes are run by batteries, or, if operated from the 110-volt house-lighting current, an intermediate circuit is used to step down the current to the right voltage. Within the next few years we shall have a 110-volt tube, which will operate directly from the electric lighting mains, without any resistances whatever. This will be a great step forward, but to the writer's mind this is not the final solution. Engineers are working towards a further goal, and that is a cold electronic tube; in other words, namely, no more heated filaments and no more "A" batteries. It is already possible to make an electrolytic "tube" such as was invented in Germany recently, where a colloidal liquid was used, and there is, of course, no heat in this. The electronic action is between plates and grids.

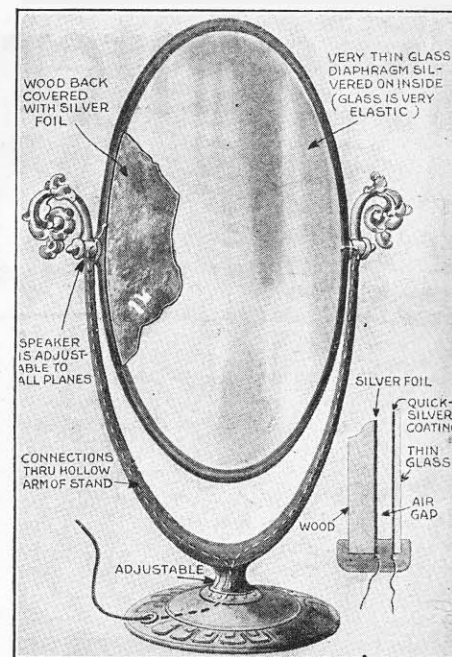
A "cold" tube will probably be used by 1935, this tube containing certain gases which may become luminous under the action of the current. These tubes will probably be used on either batteries or 110-volt current, but there will be no heating current, and such tubes, therefore, will be most economical. Even if five or six such tubes should be used, the consumption of current would be so small that it would not even be registered on the house current meter.

CONTROLS

The control of the radio receiving outfit of 1935 will be simplicity itself. We are getting away from too many controls, knobs and other handles, which long before 1935 will be obsolete. It was the writer, by the way, who, in an editorial in the February, 1923, issue of RADIO NEWS, was the first to advocate single control sets. It will have been noted that a few of these made themselves noticeable late in 1924, while 1925 will surely witness the advent of a great many single control sets, which seem to gain greater and greater favor with the public. The outfit shown on our cover illustration, as will be noted, has a single control, with a remote control added. At the present time it is necessary to jump up whenever you wish to tune in another station or whenever an adjustment has to be made. This ties down the listener to the set, which is



When Marconi, 24 years ago, sent his first message across the ocean, it required 50,000 watts. The radio amateur today accomplishes the same results in a much better way by using 10 watts only; in other words, the merest fraction of the power necessary to accomplish the same thing 24 years ago. The chances are that in 1935 no broadcast station will require more than 10 watts in order to supply entertainment to listeners within a radius of several hundred miles.



It has always been Mr. Gernsback's contention that the present loud speaker with a small diaphragm, operated on the telephone principle, is all wrong. Pictured above is theory of an electrostatic loud speaker whereby a large surface is made to vibrate on the electrostatic principle. Mr. Gernsback has himself been working on a speaker of this kind for some time and has obtained fair results. The loud speaker of 1935, in our opinion, will have a large vibrating surface instead of the small 2½ to 3 inch surface in use today.

Radio in 1935

(Continued from page 2051)

LOUD SPEAKERS

As long as telephone receivers were good enough to listen-in to radio, some little headway was made in making receivers more sensitive for faint sounds, but suddenly the public demanded loud speakers. Up to that time not a great amount of original research work along these lines had been done. So our good old friends, the telephone receivers, were pressed into service, to fill a duty for which they were not at all suited. Filling one's ear with music by means of a small telephone receiver is one thing, and filling a room full of music from the same sort of a receiver is a totally different problem. Naturally, our present-day loud speakers, which have as their basis the telephone receiver principle, are all faulty and have helped, more than anything else, to bring radio into disfavor, due to their squawking and unnatural nasal sounds. In other words, the loud speaker today is the weakest part of a radio receiving set. The few loud speakers made which do not work on telephone receiver principles are, as a rule, much superior, but even the present-day loud speakers are not what we shall use in 1935. As a matter of fact, the writer predicts with certainty that anything that has a small iron diaphragm, as have 90 per cent. of the loud speakers today, will not be used in 1935.

Imagine what happens to the small iron disc, measuring 2½ inches in diameter, when called upon to reproduce transmitted sounds from a 50-piece orchestra. This little diaphragm has to be drum, violin, saxophone, oboe, flute, trombone, cello, cornet and piano all at the same time. Manifestly, it is impossible to get the one diaphragm to vibrate in such a fashion as to produce not only all the tone values, but all of the overtones simultaneously. As a matter of fact, it never happens. All we do get is an "average" of these sounds. Hence the distortion, and squawky reproduction.

The loud speaker of 1935 will not have a diaphragm at all. On our front cover the writer has pictured a talking, gaseous lamp, the sounds emanating from the glass walls of the luminous body of the lamp. This is not a wild prediction either, because it can be done this very minute. In RADIO NEWS

(Continued on page 2186)