

CRADLE IN

The author of this article, who has been successful in predicting radio's advances since the days of Guglielmo Marconi, here surpasses

HUGO

SO much has been written about the supposed future of radio that forecasting often becomes a commonplace gesture, and frequently the predictions are no longer taken seriously either by the radio industry or by the public.

I have never taken any particular pride in all the many predictions which I have made in the past (many of which have come true) because, after all, others could have done the same thing if they had thought long enough about the subject, and logically plotted a curve of the future. Such predictions are not as difficult as it might appear, nor are they particularly miraculous either. Any industry, and science in particular, always follows a well-planned path which can be predicted

infancy. As a matter of fact, the entire art remains extremely crude. Perhaps in 100 years or so, radio will really become a great art, which it certainly is not today.

Many problems remain to be solved because most of the instrumentalities which we use in radio today are exceedingly infantile. In other words, I deliberately make the statement that radio still is in the cradle, and the lusty young infant has not as yet started to crawl, let alone walk. To be sure, we have advanced a great deal in the art, but not more so than a six-months-old infant has progressed along the road toward manhood.

While we have made some progress with interference between stations, and those that overlap, much remains to be done. While we think that today's sets, particularly those of the superheterodyne variety, tune sharply, the next two decades will show a complete revolution in this phase alone. Radio will not be satisfactory until the day when there will be no cross-talk between stations themselves, and even no heterodynes from distant stations operating on almost the same frequency.

It is quite likely that our entire ideas as to tuning will be thrown overboard twenty years hence, and that we will use entirely different means to accomplish tuning. The day may come when we will use neither the present type of tuning inductance nor today's type of condenser. Indeed, we may not use inductances or condensers at all in the present accepted sense of the word. While we have made headway in the elimination of man-made, as well as natural, static, we have done so at the expense of power. In other words, we have increased the watts output of our radio stations in the firm belief that by having great enough power, the emitted signal from the station will be sufficiently strong to override and blot out whatever static there is. This is akin to shouting at the top of our voice in order to make a partly deaf man hear us, when it might be much better to otherwise devote our energies to improving a man's hearing, and then converse in a normal tone of voice.

In other words, the power of the broadcast stations has lulled our radio engineers and designers into a mental state wherein many think that the

problem is really solved when, indeed, experience shows that real engineering work has to be done in the radio set itself by means of filters or other devices. The very fact that our radio sets are becoming more sensitive all the



No matter where you may be, you will be reached—

time makes a crying need for noise elimination not only out in space, but within the set itself, because we have not only noises from static but from within the tubes. All of these problems deserve much more attention than they get today.

Our broadcasters are spending untold fortunes on the very best of programs, and the finest music that was ever heard on this planet. So when we listen to a Toscanini concert it is the height of absurdity to have such a program



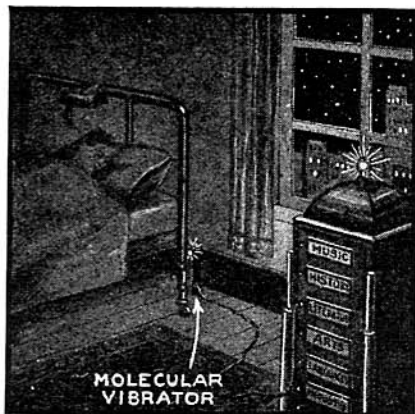
No sound will be heard an inch from the receiver!

with fair accuracy by almost anyone who takes the trouble to do so.

Radio is no different, and what prognostications I have made in the past were always based upon actual needs of the industry; that is the only reason why I have lived to see the fulfillment of many of my predictions.

What I have to say in the following paragraphs follows along the same plan, and while some of the ideas may sound impractical at the present time, remember that many of the other predictions which I made sounded equally foolish and preposterous when I made them.

As I have stated before on many occasions, radio is still in its earliest



Learn while you sleep, in your radio receptor bed!

THE FUTURE

his former achievements by stating along what lines the ramified art of radio will develop in the not-so-distant future of the industry.

GERNSBACK

marred with all sorts of noises which, believe it or not, will no longer be heard in a radio set 25 years hence. It means that new principles and new discoveries will be made to slay the monster—Noise, and I have the firm belief that the time



—through micro-wave broadcasting and pocket sets!

will come when we will really have noise-free radio receivers.

This brings us to the radio set itself. We are now going through a curious cycle of development. When we had no loudspeakers we bemoaned the fact that we had to sit at our sets with headphone receivers clamped on our ears. Then when the loudspeakers finally freed us from the head gear, bedlam was let loose in an otherwise quiet world, and the thing for which we wished so ardently has now become



Your watch-size pocket receiver will be self-powered!

an annoying pest which again threatens radio because not everybody wishes to listen to a radio set going at full blast. As civilization advances our nerves are getting more and more jangled and what we really want is a "silent" radio receiver. In other words, we want a radio set which we can enjoy *personally* without arousing the entire household. Then too, we may wish to listen to programs in bed when we are ill, or otherwise without annoying others in the room. While it may be said that some progress has been made along these lines, still it goes right back to the earphone, which does not solve the problem. Thus we may have a telephone receiver in our pillow and we listen to the music in this manner, although this is old stuff because it was done long before the advent of the loudspeaker.

There are, however, other ways of getting the music and sounds to our inner consciousness without taking advantage of loudspeakers and telephone receivers. There is such a thing known as *molecular vibration*. I can see in the future, furniture such as chairs or beds wired with a special apparatus or instrument which will give off sonorous sounds the instant one touches the chair or the bed merely with the fingertips. The idea here is to recreate sound in the bony structure of the human skeleton in such a manner that no one except the person making contact will hear the sounds. Anyone standing even one foot away from him will hear nothing. The method which I have in mind is not an electromagnetic sound reproducer working on the principle of the *osophone* which I patented years ago, which again is nothing but a special telephone receiver. Rather the method which I have in mind is purely *molecular*. Years ago I witnessed some experiments where I saw an electric motor speak and talk by molecular vibration. There were no diaphragms, no vibrating armatures of any kind, but the sound was produced by means of molecular vibration.

When radio manufacturers adapt this principle, we will be able to enjoy radio as we have never been able to enjoy it before, and at the same time we will not annoy others when they wish quiet.

Many years ago I imagined an instrument which I termed the Hypnobioscope. This fanciful instrument was

supposed to teach the student while he slept. Much to my surprise this idea is already being utilized to teach students the code when asleep, even though they could not learn it when awake. (See article entitled "Predictions and Fulfillments" in this issue.) The time is not far away when this will actually come into universal use, and again by means of the above-mentioned molecular radio sound transmitter. By that time broadcast stations will give special programs at night, and stations will vie with one another to give important instruction, whether it be languages, mathematics or history, during the hours from 12 M. to 5 in the morning.

We will not need to wear head receivers or, in fact, anything at all, yet the radio program "connected" to our beds will be transmitted to our inner consciousness with sufficient volume—but not too much volume—to avoid awakening us. As I pointed out before in connection with the Hypnobioscope, the human mind is unusually recep-



Television spectacles will show 3-dimension images!

tive while it rests, and while one sleeps. Indeed, the "learn while you sleep" method proved itself at the Pensacola Naval Training Station, because students who never could learn the code while awake, found it simple while asleep.

Thus, in the future, you will find that our knowledge will be tremendously increased by the "learn while you sleep" method, via radio. Indeed, it would not surprise me in the least if

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RADIO IN THE FUTURE

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school children would find this a much more pleasant method of doing much of their homework.

The physical size of radio sets, particularly when it comes to portables, is undergoing radical change even now. Already it is no trick for the short-wave enthusiast to build a radio set that will bring programs from other hemispheres, which set can conveniently be placed in one's coat pocket. Future radio is going much further than this.

Radio tubes are continually being improved. They are also getting smaller and smaller. We already have radio tubes with a diameter no larger than the little finger. The day is not far distant when an efficient radio tube will have shrunk to the size of a rubber eraser at the end of a lead pencil. The future tube will probably be "cold"; that is, instead of having a glowing filament, electrons will be supplied by some chemical or other means. That means, of course, that the power which we require of a radio set will be infinitesimal. I foresee the time when the pocket set will not require any batteries at all; whatever electricity is required in order to operate the set will be supplied by a tiny electric generator housed in a case no larger than your watch. Indeed, the generator will be driven by means of a large watchspring, and will run for a considerable period. At present there is already manufactured a small flashlight, hand-operated by means of a tiny dynamo, but the bulb consumes a comparatively large amount of power.

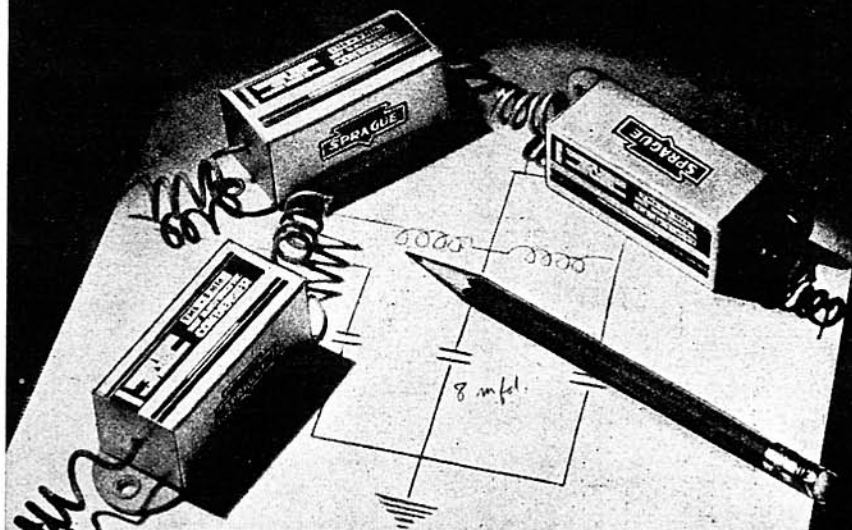
So the watchspring-driven electric generator becomes a certainty in the not too distant future. In fact, the entire radio set will be small enough so that the watchspring generator, molecular speaker and whatever tubes are necessary will go easily into the vest pocket. Indeed, the set will be small enough so that it can be concealed in the hand. You will say, as a toy this might be interesting, but what practical use is there for sets of such type? The answer to this is that as civilization progresses, instant communication is of paramount importance. Twenty years ago you probably would have laughed at the idea of car-radio, but in the future no one will wish to be without his vest-pocket set because after all, we are not always within reach of the more efficient, large radio sets. We may be in the street, we may be on a train, we may be in a theatre, in a restaurant or any of hundreds of other places, and may wish to be in touch with the outside world.

By that time, of course, the radio set will not only be equipped for broadcasting but for personal messages as well. Physicians, contractors, business men, and others find it necessary to be in touch with their offices many hours of the day. Special broadcast stations will be erected whereby special messages to certain individuals will be broadcast. This is particularly important for physicians. Such broadcast

stations probably will operate at special frequencies. In other words, this will be a glorified paging system, but not limited to the confines of a hotel; it will be possible to page individuals within a radius of 100 miles.

By this time every radio set, whether pocket or otherwise, will be television equipped, but this is no longer news. You may ask, how will I be able to see a television program by means of a vest-pocket set? The answer to this is found in another prediction, not as yet realized, which I made in the October, 1936, issue of *Short Wave Craft*. This has to do with an instrument which I term television "spectacles." In other words, you wear a pair of "spectacles" which have a twin television receiver

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built right on the eye-glass frame. This means, of course, that the television images received are small, but they need not be large, because they are right up close to your eye; indeed they will be sharper in this manner. Therefore, all you require is to put on "television eyeglasses" and you will see and hear at the same time, because the frame of the television set on the bony part of your nose will also, by molecular vibration, transmit the sound to your ear-drums in a most realistic fashion.

And let no one think that this exhausts the list of future radio developments. As I have said many times before, the really big radio inventions are still in the future.