

The Future of Broadcasting and Television

Dr. de Forest Discusses the Radio Possibilities

Radio listeners will be interested in the following article on the Future of Broadcasting and Television broadcast recently from station WRNY, New York, in dialogue form between Dr. Lee de Forest and the Editor of the "Radio News." Dr. de Forest is a notable inventor whose opinions carry much weight.



IN the "Home Science University" series of Station WRNY, broadcast on January 11, 1928, Dr. Lee de Forest was interrogated by the editor of "Radio News" on a number of radio subjects. The entire interview is published, verbatim.

Mr. Gernsback: The questions which I am going to ask you to-night, Doctor de Forest, are put to you in such a way as perhaps the man in the street would put them to you, if he had the opportunity, or, may I say, the good fortune to speak to you. I shall try and make the questions as simple as possible; because you appreciate that, perhaps, not all of our listeners are technically inclined, and few can know all the technicalities. The first question is: "What do you consider the greatest step in radio progress for the year 1927?"

Dr. de Forest: Mr. Gernsback, before I answer that and the following questions, I want to say to the radio audience, that my remarks to-night will not be too technical. From the tenor of the questions which are being proposed to me, I am talking in strictly radio technical matters; but I trust that I will use language that those really interested in radio will understand. Now, in answer to your first question, I consider that the most important radio developments in 1927 came under the heads of the rapid elimination of "A" and "B" batteries for radio receiving sets, and the progress in the development of short-wave-length broadcasting. Great progress has also been made during the past year in the simplification and standardisation of tuning devices; so much so that, for all local work, the single-dial control, even though this may operate three or four condensers, gives fine selectivity and adequate volume. The DX fan still wants individual-stage control with vernier condensers; but the great mass of radio listeners, who now overwhelmingly preponderate in and around our larger cities, are rapidly becoming educated to the fact that the very best they can obtain of radio anywhere comes from nearby stations. Therefore the extreme accuracy in tuning each individual R.F. amplification stage, in order to pick up with maximum volume long-distance stations, no longer appeals as it did.

Mr. Gernsback: Thank you, Doctor. Another question: "What are your views on the present broadcast art?"

Dr. de Forest: It is a source of immeasurable gratification to me to observe the very marked increase in the quality of musical programmes now being broadcast, as compared with that of two years, or even one year ago. This is particularly noticeable on Sundays; a lover of good music may then listen to his radio for hours at a time, and hear nothing but music of the highest order. To-day's radio is abundantly making good my prediction of many years

ago, that radio would be instrumental, as no other institution of man's creation possibly could be instrumental, in a rapid development of the public's taste for good music. Countless thousands are now educated to hunt for and genuinely appreciate a type of music, of which five years ago they were entirely ignorant, or under no conceivable condition would trouble themselves to hear.

This cultural influence of radio is cumulative, accelerative. I have no doubt that, five years from now, most of the cheap jazz and mediocre music which the public now enjoys will be as distasteful in the United States as it has always been among the more cultured and music-loving peoples of Europe.

Mr. Gernsback: That probably answers the next question, which I shall put to you, anyhow.

In what directions do you think present broadcasting should or can go? What are your views?

Dr. de Forest: That calls for a somewhat more technical answer. As to the technical developments awaiting us in 1928, I am sure that great strides will be made in the matter of improved quality of reproduction. The better type of console radio with built-in loudspeakers, particularly the higher-priced ones with phonograph combined, will be more and more in demand. And as prosperity becomes more widely distributed, and particularly as the educative influence of radio, above mentioned, works its indirect benefits, more and more will discard their cheap "noise-boxes" in favour of more expensive and properly designed amplifiers and loudspeakers.

Much progress will be made in 1928 in the field of broadcasting with short wavelengths below 50 metres; but it will take more than one year to iron out successfully the intricate difficulties involved in building reliable receivers for operating on such short waves.

It will be a long and slow process of infiltration that short-wave broadcasting must undergo before it can invade, to any large degree, the popularity which the present range of broadcasting channels now enjoys.

Mr. Gernsback: Dr. de Forest, you probably read a few days ago, that Harry Lauder said he would never broadcast. He said the present reception is not at all what it should be. I don't know whether you read that in the newspapers. That brings the question:

"Wherein does the present-day radio set fail, if it does fail?"

Dr. de Forest: I had not read that article; but it exactly fits with a statement made to me at luncheon to-day with a friend who recently met ten of the Players at the Players Club. He said he talked with them about radio, and found that only one of the ten owned a radio set; five of the ten had owned

radio sets, but, with their ears so well trained to fine enunciation and fine music, they discarded the sets; and the other four were not interested in radio.

Many present-day radio sets are deficient in the quality of their audio amplifiers, and particularly in the loudspeakers employed. The radio-frequency and detector systems have attained a high state of refinement, but too little attention has been paid up to date to the audio-frequency-amplifier end of the receiver. Too little iron is used in most of the transformers; too few amplifiers employ push-pull circuits; and there is too little inclination to employ expensive power tubes in the last stages; with the result that we frequently have distortion due to saturation in the transformers, or overloaded tubes somewhere along the line.

Mr. Gernsback: That partly answers my next question, which I will put to you if you have something more to say about it, and that is:

"What is lacking to make present-day sets more perfect?"

Dr. de Forest: I think the greatest need in that direction is better audio-frequency amplification, and, particularly, better loudspeakers. I do not consider any of the cones now on the market come anywhere near the perfect loudspeaker. Cones invariably favour some frequencies at the expense of others, and most of the cones, while over-emphasising the bass, put a mask of "paper rattle" over the higher frequencies. Although more expensive, more clumsy, and demanding more space, and altogether less artistic, there are certain types of non-metallic horns, now on the market which, with proper loudspeaker units, give far better reproduction than any 18-inch cone. I strongly advocate a radio set built into a large console cabinet with sufficient room to take in one of the larger exponential horns. I know of one or two such combinations of radio and phonograph in one cabinet now being developed, though not yet on the market, which give incomparably better sound reproduction than anything with which the radio public is familiar.

Mr. Gernsback:

Dr. de Forest, are you convinced that the present-day alternating-current set is a step in the right direction?

Dr. de Forest: As to the technical developments awaiting us in 1928, very rapid progress has been made by a number of leading manufacturers in the solving of the problem of applying raw A.C. to the filaments of the valves, and several first-class sets are now on the market using these valves, thereby being made entirely independent of "A," "B," and "C" batteries. There is no question that the trend of the industry is entirely in this direction, and that, during the ensuing twelve months, we will see the storage battery eliminated,

except for the cheaper class of sets. This will be a development which every user of radio must heartily appreciate. The storage battery has from the start been a very serious nuisance in the home, and will shortly be quite superfluous wherever electric current, A.C. or D.C., is available. The better type of console radio with built-in speakers, particularly the higher-priced ones with phonograph combined, will be more and more in demand. And as prosperity becomes more widely distributed, and particularly as the educative influence of radio works its insinuating benefits, more and more will the radio public favour the more expensive and properly-designed amplifiers and loudspeakers.

Mr. Gernsback:

For the next question, Dr. de Forest, the new so-called "screen-grid" valve makes it possible to use much less current than the old-type valve. Do you think multi-valve sets with little battery consumption a possibility, and that battery-operated sets might yet prevail in the future?

Dr. de Forest: Notwithstanding the greater current economy which the double-grid valves permit, I do not think that multi-valve sets for battery consumption will ever again be popular. I think the day of general use of the storage battery and the dry battery is rapidly drawing to an end. The great convenience and sense of satisfaction in knowing that you are not dependent upon a battery which may give out in the midst of a particularly desired programme, will outweigh any other considerations just as soon as the socket-power units and the A.C. valves are a little further perfected.

Mr. Gernsback:

What are your views on television, in view of the past experiments by Baird, of London, and by the research engineers of the American Telegraph and Telephone Corporation? Do you believe television attachments to radio sets a matter of the near future? If so, how soon?

Dr. de Forest: I am quite naturally interested, and have inspected the work in television which has been carried on in this country, particularly that by the American Telegraph and Telephone Corporation. I must pay the highest possible tribute to the ingenuity and patient research which has made possible the system employed by the American Telegraph and Telephone Corporation. It is little less than a scientific miracle. Nevertheless, I know my views on television have been somewhat disappointing to those who wish to believe that in the next few years everyone can have a moving-picture show at home, broadcast direct from his favourite theatre. Frankly, I cannot foresee such a millennium for the radio fan. Until some radically new discovery has been made in physics, some

new principle or operation of which we to-day have no clear conception, television apparatus must continue to be extremely intricate, delicate, requiring the constant and most careful attention of highly-skilled experts, and be built and operated at very great cost. Until such a new discovery, therefore, I think we must limit our television expectations to an occasional demonstration under the auspices of one of the few great electrical engineering and manufacturing corporations. Television in the popular mind means radio broadcasts of distant scenes as they transpire.

I have little patience with some of those whose names are associated with the history of this new development, who seem willing to impose on the gullibility which the public evinces whenever the word "television" is used. A few years ago it was impossible to get anyone to believe in wireless telegraphy, and later in the possibilities of the wireless telephone. Of recent years, however, the progress in popular science has been so phenomenal that general gullibility, or willingness to accept any prediction along the lines of invention, takes the place of the scepticism which formerly made the work of pioneers so difficult.

Mr. Gernsback: According to your thoughts, doctor, I presume what you mean by a new development in physics would be a television apparatus without revolving parts, such as that we have at the present time?

Dr. de Forest: Yes, I think that such a development will eventually be made, but it will be the result of some discovery as radical and as unexpected as was the invention of the X-ray by Roentgen; and not until we have another Roentgen or Michelson, who produces or makes a new discovery as radical as the X-ray was at the time he made it, may we bring into existence the television which we all would so gladly welcome.

Mr. Gernsback: I think you are a little too modest, doctor, when you mention as an example the X-ray. Why didn't you say the vacuum tube? You are the one who invented that unexpected wonder. Let me ask you the next question.

What, to your mind, while we are talking of vacuum tubes, is the ideal vacuum tube of the future? What should be its outstanding point?

Dr. de Forest: I think the ideal vacuum tube of the future should operate without batteries, it should be small, ruggedly-built, absolutely free of all tube noise, and non-microphonic. It goes without saying, that it should be operated without overloading, and with absolute freedom of alternating-current or direct-current noises. I think that such a vacuum tube will be produced within the next two or three years.

INTERNATIONAL BROADCASTS

ENGLAND AND U.S.A.

To demonstrate the ease with which the English programmes are being received in America via short wave relay, Dr. Goldsmith, chief broadcast engineer of the U.S.A. National Broadcasting Co., placed his telephone receiver near the loudspeaker in his laboratory recently, and music broadcast in London at an 8 p.m. (3 p.m. New York time) entertainment was heard over the telephone in "The New York Times" office. The station transmitting was 6SW, Chelmsford, England, operating on twenty-four metres.

"International rebroadcasting between United States and English stations has been resolved to a definite experimental project which has received official approval and a definite appropriation of funds to carry out the work," said Dr. Goldsmith. "We will pursue the problems involved until they are satisfactorily solved."

"Among the problems to be studied are antenna design—both directional and multiple—suitable receiving sets and fading compensators which will equal-

ise the output of the sets and place on the land wires to the point of distribution in New York a constant amount of energy."

Special apparatus for the receiving station at Riverhead, L.I., is being completed at the Van Cortlandt Park laboratories of the Radio Corporation of America. The short wave transmitters in Pittsburgh and Schenectady, owned and operated respectively by the Westinghouse Electric and Manufacturing Company and the General Electric Company, will broadcast the United States programmes to British listeners, via short wave receiving station at an efficient point of interception in the British Isles.

YANKS HEAR ANTIPODES

MORE FAVOURED THAN WE.

A broadcast listener writes to the Sydney "Wireless Weekly":—"I'm not a doubting 'Thomas' and I realise that most of us radio fans cannot help exaggerating to a certain extent, but I wonder if any of your readers can explain why so many American fans are able to receive Australian stations on the broadcast bands, whilst we cannot receive their stations, even on sets manufactured in that country? Rather curious, isn't it? Even more so since America would suffer more from interference than this country, owing to the great number of stations in America, and also to the towering masses of iron-work, the number of electrical installations, and one thing and another."

The explanation is simple. When it is midnight in California it is only 6 o'clock in the evening in Queensland, N.S.W., Victoria and Tasmania, and as few stations continue broadcasting after midnight in America the Australians have very little chance of obtaining darkness for reception of the Yanks. The American fan, however, by sitting up till the early hours of the morning, can obtain darkness for reception of the Australian and New Zealand stations, which are then in full swing.

AN INTERFERING STATION

ACTION IN AMERICA.

The New Zealand Government will be well advised to continue to refuse permits for more than one powerful broadcast station in or near any centre. In the United States the clashing of stations has caused no end of trouble. Governor Moore, of New Jersey, was recently advised by the Government Radio Commission:—

"The station WAAM, at Newark, is in a residence section where it has been causing much interference with other stations. If this were a new station, the Commission would not permit it to have power of more than 100 watts in its present location, but is authorising it to continue at 250 watts until the station can move out-of-town, as I believe it is now planning to do."

THE FOUR R'S OF EDUCATION

READING, 'RITING, 'RITHMETIC, AND NOW RADIO.

Atlanta, Ga., U.S.A., is one of the first cities to equip its public schools with radio.

The fourth R has been added to the time-honoured three R's of education by the introduction of radio into public schools. And this fourth R is proving to be an adjunct in every sense of the word to the already existing methods of modern instruction. In certain parts of America, particularly in Atlanta, Ga., lectures in English, drama, art, debating, history, and the sciences, are being broadcast specially for the schools as a daily part of the classroom work, while talks and recitals are serving both as inspirational and cultural supplements to these programmes.

In Atlanta seventy-two public schools have been equipped with radio sets and amplifiers. With this equipment 50,000 students are enabled to listen-in daily to educational and cultural programmes broadcast from station WSB. Furthermore, each of the schools is allotted a certain number of days during the year to provide the programme, thus offering the op-

portunity for all the students, as well as the instructors, to participate in appearing before the microphone, as well as listening-in to the others. And the value of radio as a means of lending new interest in instruction, developing self-assertion on the part of students, and stimulating healthful competition amongst the various school units, has already proved itself to the Atlanta school authorities.

EARLY INVENTORS

The dream of an American inventor eighty years ago will be realised if the Federal Radio Commission grants permission to the Radio Corporation of America to erect a station at Rocky Point, New York, for facsimile transmission of pictures, messages, and documents.

In 1848 Alexander Bain, the first man to experiment with facsimile transmission, worked out a crude system of reproducing pictures in code for sending by telegraph.

He received the first United States patent for picture transmission, but his system proved unworkable, although it contained the fundamentals of present-day methods.

Like all forms of communication, the transmission of facsimiles has reached the stage of commercial application only after a long period of development and research.

In May, 1891, N. S. Amstutz, of Valparaiso, Ind., sent a picture over telegraph wires for a distance of twenty-five miles. This is said to be the first successful transmission.

Professor Arthur Korn, of Berlin, made further improvements, and in 1906 transmitted pictures over several hundred miles of telephone wires.

In 1908 he sent pictures by radio. The pictures were converted into a regular code message and transmitted as such. The World War forced the abandonment of plans for transatlantic picture transmission, and it was not until 1923 that various laboratories in the United States again undertook the development of long-distance sending of photos.

The first picture sent across the Atlantic by radio was in June, 1923, by Professor Korn. The transmitter was located at Rome, and the receiver at Bar Harbor, Maine.

Other transoceanic transmissions followed. It is said that more than 2,000,000 dollars a year is being spent in the United States in research work along these lines. Nearly 300 patents covering the art have been issued.

WHEN winding coils on formers it is a good idea to insulate them with paraffin wax. This is done by melting a quantity of good paraffin wax (enough to well cover the former), and leave the former in it for about half an hour, during which time it should be baked in the oven. On removing, scrape the superfluous wax off.



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