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## WHAT RADIO BROADCASTING NEEDS.

I have viewed the last five years of radio broadcasting very much in the light of a big experiment and have endeavored to gain from it sufficient information upon which to base its future possibilities and to obtain an idea of the lines along which this development would proceed. I did this for a rather personal reason in that my future activities in radio are to a great extent dependent upon the direction of growth. I have, therefore, been giving this matter considerable attention and have formed a few opinions which I will give below. I believe this is what you wanted when you requested me to write down for you the practical possibilities of radio and the probable direction of development. I am dividing this into two headings:

- (a) Technical
- (b) Program

TECHNICAL

The average person's conception of radio today is not a true one. Mention radio and he mentally pictures a receiving set, loud speaker and a few other pieces of apparatus, with perhaps the names of a few artists or programs. In reality I feel that radio is a distinct line of development, a branch of alternating current itself, a distinct field and one which will fill a long felt want on the part of the human race to overcome the barriers of distance and space. This radio has already done to a small extent in that it enables programs to be transmitted to distant points.

Radio is a service only a part of which is now being rendered. Just as wires are not telephone service, just so is present day radio not "Radio Service." We have much to accomplish and many features to add before it becomes a necessary service. However, we have before us radio vision - radio control of clocks and other devices, etc.

So much for my dream as to the future possibilities of radio. At present we are concerned with a very congested atmosphere, there being 534 stations licensed, with something like 526 additional applications pending. Obviously, such a condition cannot continue to exist, as there are but 86 wavelengths available at the present time. Unless these stations are reduced in number through elimination and the only businesslike method by which this number can be brought to a reasonable figure is through economic pressure. This latter will mean stiff competition, which will be somewhat expensive but will undoubtedly benefit in the end, and which will show the average station owner who has no ultimate reason outside of advertising for broadcasting that it does not pay him to be in that business. I feel that some day in the

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near future this condition will arise and there will be a wholesale deletion of licenses. In order to be prepared to bring about this competition, or condition, those who have an ultimate reason for being in this field and who intend to remain therein must prepare by entrenching themselves firmly. That means a combination of stations into a powerful group controlling its sources and avenues of program. The Westinghouse Company and its associates are in an excellent position for this purpose in that they are owners of the most powerful and best known stations and are all associated, so that it is but a step to form a real combination in the broadcast field.

At the present stage of development it is obviously impractical for a few stations to cover the entire country. Interconnection seems the logical answer and we have two means of doing this:

- (a) The proven one, which is by wires, and
- (b) The experimental one, or short waves.

The individual stations should have sufficient power to thoroughly cover a reasonable radius about their station and should pay particular attention to quality of transmission. The stations should be so located that they will not overlap very much and care should be taken that the signal strength from the nearest station is sufficient in all parts of the territory to override the average static and interference.

Any combination which intends to engage in interconnection at the present time should depend to a great extent upon wire line interconnection. In the near future there is a possibility of forming a combination of short wave and wire line interconnection with the distant future possibly permitting interstation connection by radio alone.

\* As we have to deal with the present, we must consider the present wire situation. The A.T. & T. Co. has the most efficient system at present. Its trunk lines connecting the principal cities are already prepared for radio program transmission, or can be prepared. In addition, that company has its repeater stations with trained attendants, which will permit the installation of proper repeating and correcting devices for maintaining high quality. In addition they have a sufficiently large plant to permit spare wires and routes in case of emergency. The only other services available at present are Western Union wires, which are either already transposed or can be prepared, along definite routes connecting the principal cities. In view of the patent situation the Western Union cannot operate repeaters but can merely rent the lines. In other words, the Telephone Company can furnish complete service from point of pickup to the station terminals, while the Western Union Company will only furnish the wires suitably prepared, but all pickup equipment, line amplifiers, correction devices, etc. must be furnished and manned by the broadcasting interests.

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The rates for wire line interconnection in the case of the Western Union are definitely fixed by the Interstate Commerce Commission, as the rental charge for wires is filed with that commission. In the case of the Telephone Company, broadcasting not yet being recognized as a definite public service, is not listed on the tariff files of the Commission and the rates at present are whatever the Telephone Company feels like charging.

In summarizing the technical phase of this discussion, I wish to state that the future looks bright for radio, having so many fields and avenues along which to develop. I feel that radio broadcasting will become a more stable proposition when the number of stations is reduced and that it will be along economical lines rather than through legislation that this will be brought about. I feel that the field is waiting for the radio group to set the pace and bring about this competitive condition. I have pointed out the wire situation and the necessity for wire connection and at the present time and probable future conditions of short wave interconnection. I have also shown that the most reliable service can be furnished by the Telephone Company and that the matter of cost will have to be determined by "bargaining." The picture, therefore, of the future system is a network of stations throughout the country, each individually capable of covering its territory with excellent transmission, sufficient signal to override interference, and with a program that cannot be watched by individual or small groups.

#### PROGRAM

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At the present time broadcasting reminds me very much of ordinary vaudeville performances. The microphone is switched on, the announcement is made, giving the name of the singer, the selection and the author, and the artist does his part. This then is repeated very much as the acts appearing on a stage in a vaudeville house. This could really be termed "vaudeville broadcasting," or, as we used to say "variety shows." This has not been satisfactory in that it is a monotonous repetition of selections. The Telephone Company, I notice, has realized the necessity of breaking away from this type of program and is offering what we might term "Hours." KDKA did this simultaneously with the Telephone Company. We now occasionally obtain a program which has a continuous story, or thread, to keep the listeners' interest until the conclusion. This is an improvement but is yet far from being what we feel radio broadcasting should be.

When the average person visits a show he expects to be entertained and to leave with a satisfied feeling. For this purpose the stage director endeavors to draw the attention and mind of the audience and make them feel, or live, with the actors through the show. He has at his command and does use many devices, such as scenery, music and accessories to produce certain effects. He appeals to the brain and heart of the audience through two senses, the eye and the ear, and, in some few instances, the sense of smell, by perfumes, incense, etc. The motion picture director had a more difficult task in that he had but one sense, that is the eye, through which he

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could appeal to the mind of his audience. You will note that the early motion pictures were "one-reelers" and in many ways similar to the radio performances of today. Then came the two-reelers, which might be classed as paralleled by our radio "Hours." Do you remember when between each reel some slides were shown? The pauses now between our selections are in the same class and are becoming as offensive to the ear as those slides were to our eyes in the early days of motion pictures.

Therefore, in order to look for a possible solution to the question "What will be the program of the future?" let us take a page out of the history of the motion pictures. In attending a performance at The Capitol Theatre, New York, you first of all are ushered to a comfortable seat. The show starts generally with an overture played by an excellent orchestra, generally followed by additional music featuring perhaps a ballet and usually a rendition by some talented artist. Without any pauses the program shifts from one piece to the next, and, while the orchestra is still playing the screen is brought into sight, and the machine having already been adjusted, the picture starts without any flickering and we see, perhaps, a news reel, at the conclusion of which, without the slightest hesitation or sudden change, it may fade into a comedy or perhaps the screen disappear and a stage scene may be brought before us. Without the slightest break the next act takes place with perhaps finally the feature picture being brought on and run through to its end without a single break, shifting from one reel to another so that the eye cannot notice it. At the conclusion of such a performance, if all parts of the program are of average worth, one feels satisfied and pleased. All of this has been carefully worked out by stage directors who have vision and who visualize what they want to do and how they want to do it.

Now, let us parallel this with radio. First, we need one person who has the artistic sense and necessary experience to know what can be done and how to do it. In other words, we need a stage director, or "Producer." There must be but one man in authority in a case like this and he must be given a sufficiently free hand in order to be able to put over his thoughts and ideals. Such a man would create a show, appealing to the ear in his case, just as the movie director appeals to the eye. He would run the continuous thread of thought and create plays with the climax at the proper point in order to hold the attention of the listener. We all have experienced the reluctance to break away from a movie in the middle of its performance. The artistic development of presentation for aural reception will have to be worked out very much along the same lines that the presentations for visual reception were worked out. I feel that men can be developed who will be able to take an orchestra, with some additional talent, and work it into a play with an appeal which will satisfy the listener.

You will remember that WGY started rather intensively to have plays written suitable for radio presentation. This was a step in the right direction but they stopped short of their objective. I feel, however, that they had the right conception but not sufficiently far advanced to realize that spoken plays alone do not satisfy.

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It will, of course, be rather an expensive proposition for individual stations to have such a high class directorship and productions, but that is all the more reason why we should encourage this, as through a combination of stations we could finance such productions, thus setting the pace, which, as I explained above, will, in my opinion, economically solve the broadcasting problem. It is through some big effort, some breaking away from what we are accustomed to know that we will regain the leadership in broadcasting and set the pace, which will be too fast for the individual station owner who is interested only in advertising.

I have spoken to theatre people and many program directors, etc., in an effort to gain their ideas and thoughts and I believe that the usual calibre of broadcast program personnel is too low to conceive of anything better than what they are now doing. This is another reason why we should act on this opportunity of doing this more elaborate and finer thing and why I feel that we should get together with our associates and form an organization capable of handling such a proposition.

I believe that when such an organization does exist it will obtain the support and cooperation of music publishers, dramatic leagues, etc., for the reason that the director of a chain of stations covering the country will be more likely to keep from offending the ears of the listeners by repetitions of "By the Waters of Minnetonka," or some other composition that is being played to death. That is one of the big objections that the music people now have, in fact the only real complaint that they can make. In my opinion, an organization handling such a proposition must look for the one man who will undoubtedly become world famous if successful - one who can mould his program to such a point that he can command the attention of the majority of his listeners.

With this, of course, I consider that the advertising value of the stations will rise and the rates must, of course, be such that they will support such an organization. But, because of this high standard, there is no doubt that this will create additional returns for the purchasers of time, so as to make it worth while paying these additional rates. For, after all, it must be remembered that the amount of available time is limited to a few hours a week.

In summing up I feel that all efforts should be directed toward forming an organization capable of handling such a proposition as outlined above. The selling of time is a logical way of financing such a plan but in order to coordinate the work, in order to be able to follow definite policies, the matter of program should be entirely under the control of the Broadcasting Company. I believe that only national broadcasting of the best grade will be the final result during certain hours, with local programs at other times to satisfy any desire the public may have for such local affairs.

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9/29/1920

## Air Concert "Picked Up" By Radio Here

Victrola music, played into the air over a wireless telephone, was "picked up" by listeners on the wireless receiving station which was recently installed here for patrons interested in wireless experiments. The concert was heard Thursday night about 10 o'clock, and continued 20 minutes. Two orchestra numbers, a soprano solo—which rang particularly high and clear through the air—and a juvenile "talking piece" constituted the program.

The music was from a Victrola pulled up close to the transmitter of a wireless telephone in the home of Frank Conrad, Penn and Peebles avenues, Wilkesburg. Mr. Conrad is a wireless enthusiast and "puts on" the wireless concerts periodically for the entertainment of the many people in this district who have wireless sets.

Amateur Wireless Sets, made by the maker of the Set which is in operation in our store, are on sale here \$10.00 up.

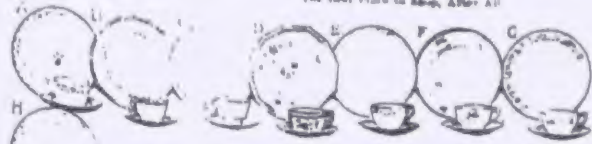
—West Basement.

Evening  
 Story  
 Romance  
 17 PAGES

# The HORNE DAILY NEWS

Published by  
 The Horn News Co.  
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The Best Place to Shop After All



For One Week—Starting Tomorrow  
**13 Open Stock Patterns of  
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The prices quoted below are for complete sets of 100 pieces. Smaller sets and single pieces may be had during this sale at the same reductions.

Set No. 1	Set No. 2	Set No. 3	Set No. 4
100 pieces	100 pieces	100 pieces	100 pieces
Original Price \$100.00	Original Price \$100.00	Original Price \$100.00	Original Price \$100.00
Sale Price \$75.00	Sale Price \$75.00	Sale Price \$75.00	Sale Price \$75.00

## "You did a big thing, when you gave women 'TRUWOOL' Suits"

A compliment is worth a great deal more than a present. You have done for Pittsburg what Herby Trill has done for another way for the American woman to have done it more attractively.

The 'Truwool' Suit was first introduced by the store 1927 and has been the largest item for a suit of all around women's wear at a low price.

It was taken up by a grateful public and has since been taken up with still in women's suits as a whole.

The 'Truwool' Suit is made to stay. The fine fabric has the extra features in line and trimming. The 'Truwool' Suit, in White, Mauve and Juniper. Price as low as \$29.00—only up to \$35.00.

Send for our complete High Clothing Catalog. It is the standard at these figures.

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 100 pieces  
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 100 pieces

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Silk Sale Special  
 100 pieces  
 100 pieces

### Large, Direct Importations of Swiss Curtains for Fall

Large, Direct Importations of Swiss Curtains for Fall  
 100 pieces  
 100 pieces

### The Kiddie-Koop

The Kiddie-Koop  
 100 pieces  
 100 pieces

### Kimonos

Kimonos  
 100 pieces  
 100 pieces

### Women's New Raincoats. Comfortable for Motoring

Women's New Raincoats. Comfortable for Motoring  
 100 pieces  
 100 pieces

### New Satin Raincoats

New Satin Raincoats  
 100 pieces  
 100 pieces

### Madeira Embroidered Pillow Slips

Madeira Embroidered Pillow Slips  
 100 pieces  
 100 pieces

### Folding Chairs

Folding Chairs  
 100 pieces  
 100 pieces

### Air Concert "Picked Up" By Radio Here

Air Concert "Picked Up" By Radio Here  
 100 pieces  
 100 pieces

### The Boys' Haberdashery

The Boys' Haberdashery  
 100 pieces  
 100 pieces

## Women's New Satin Dresses Exceptional Offerings at \$59.50



This group is unusual in three ways—The materials are unusually fine, being the lovely soft Mexican satin and Crepe Madras Satin, which come in the dress dresses. There is an unusual number of models, for street and afternoon. And there is a surprising showing of smart women's models, in slaw up to 44.

The dress dresses at the job are new, smart, and a great deal of good. It comes in Mexican Satin, very light in fabric, though thoroughly well made, and has a collar which will hold firm.

The dress dresses are smart and good looking, long and short, and in a variety of colors and patterns.



New Dressing Dresses at \$25.00  
 The dress dresses at \$25.00 are new, smart, and a great deal of good. It comes in Mexican Satin, very light in fabric, though thoroughly well made, and has a collar which will hold firm.

They are all of a high grade of silk (except broad fabric hand-made) and are made in the most modern way. The colors are soft, fashionably chosen of brown and blue.

### s-lt" Hard Soit rns

s-lt" Hard Soit rns  
 100 pieces  
 100 pieces



# THE ELECTRIC JOURNAL

VOL. XIX

JUNE, 1922

No. 6

## The Field of Radio Broadcasting

Today a new public service has arisen and is exerting a potent influence in our every-day affairs, which is remarkable in two ways;—first, for what it has already accomplished, and second, for the seemingly unlimited possibilities of the future. This is made possible by the radio telephone or radiophone. It is probably a fact that no facility or service has ever received such instant response from the public or has grown so fast in popularity as radio broadcasting. In the simplest terms "radio broadcasting" consists of sending out by radiophone, from a powerful transmitting station, speeches, news, music, church services, results of sporting events—in short, anything with a universal appeal. This information can be received by anyone having a receiving set anywhere within a suitable radius of the transmitting station, as anyone is permitted to operate a receiving set. The apparatus needed for receiving ranges from the simplest crystal detector set for short distance reception to the highly sensitive vacuum tube sets, capable of great amplification, for long distance reception.

The mysterious fascination of broadcasting is undoubtedly one of the greatest attractions in its first appeal to the imagination. It is, however, destined to become something more than a fascinating novelty for, as the possibilities of radio unfold we see before us a wonderful and permanent public service comparable with other modern facilities and conveniences in its ability to make life better and easier. Radio annihilates distance, reducing it to nothing. The element of time scarcely enters into the speed of the transmission and can be entirely disregarded in practice since it is possible for a radio wave to encircle the globe in a small fraction of a second.

It is interesting to trace the progress of radio broadcasting from its inception. In November, 1920, the Westinghouse Electric & Mfg. Company, which is taking an active part in the development of radio communication, broadcasted the election returns from KDKA, its experimental station at East Pittsburgh, Pa. The returns were received by many amateur radio enthusiasts and the demand for further broadcasting was immediate and pronounced. A regular service from 8:30 to 9:30 P.M. was at once instituted, and has since been continued without interruption. This was the first regular public service of this kind inaugurated. Programs consisting of music, news, announcements, etc., are made up in advance and are published in practically all the newspapers within a radius of 200 miles of the

station. Frequently the service is received by radio listeners as far distant as Texas, Kansas, the Dakotas, Canada, Florida and on board ships many hundred miles out on the Atlantic Ocean. Now and then reports come in from such distances as points in the northern part of South America, Cuba, and the State of Washington, and quite recently, even with the static which is prevalent at this season of the year, strains of a concert from KDKA were heard in Iquique, Chile, which is about 1400 miles below the equator and 4200 miles from East Pittsburgh.

After nine months of operation a second broadcasting station was opened under the same auspices at Newark, N. J., followed shortly by one in Springfield, Mass., and later by one in Chicago, Illinois. The last named made the broadcasting of grand opera by the Chicago Grand Opera Company a special feature, with great success. This extension of service was a direct response to the call for such service by the public at large. The number of those listening is difficult to estimate, but it certainly reaches many thousands. Probably at the present time nearly one million people are listening daily to the broadcasting from these four stations, and this number is being added to each day. That this service has a real appeal is evidenced by the thousands of letters received by the Westinghouse Company and by the participants in the programs, and by the further fact that at least three out of four persons are interested in the subject.

As radio broadcasting is developed today it has one feature not possessed by any other service in existence as, except for the comparatively small cost of the initial installation, it is without favor and without price. Everyone can occupy a "free reserved seat" at any and every radio broadcasting performance. This is an important fact not generally recognized. Several companies are now maintaining broadcasting stations. The only financial support they receive for this costly service is the possible profit from the sale of receiving apparatus of their manufacture; but there are hundreds of other manufacturers and dealers who are manufacturing and selling receiving apparatus also who do not support this service in any way whatever and who, because of the service rendered by others, reap large benefits without exertion or expense on their part.

Radio broadcasting has added the human touch with the public, and should obliterate the feeling that large organizations are heartless. It has been of immeasurable benefit to invalids, many of whom attribute their rapid recovery to this added interest to take their

minds off their misfortune. The broadcasting of church services is invaluable to people in inaccessible districts who are not able to take part in other forms of religious services. It is proving to be one of the greatest publicity and beneficent features ever utilized, and is doing more to enlarge the church's sphere of influence than any medium heretofore used. The children also look forward to their bedtime story the same as father looks forward now to his baseball scores.

Where will it end? What are its limitations? Who dares predict? Scientists and inventors are working on relays which will permit one station to pass its message on to another, and we may easily expect to hear in an outlying farm in Maine some great artist singing into a radiophone many thousand miles away. A receiving set in every home, in every hotel room, in every hospital room, in every school room—why not? It is not so much a question of possibility—it is rather a question of "how soon".

In broadcasting, radio has found its greatest usefulness and its most important field of application. It is destined to become a basic public service. The road is a rough one, however, as many of those who have been intimately connected with its development are realizing.

H. P. DAVIS

### The Quantitative Study of Fundamental Principles\*

It has been my experience that the vast majority of graduates from our technical schools have no real grasp of fundamental principles. These principles may have been taught to them, but have gone over their heads, or they have not realized that these were fundamental. The chief reason for this lack of realization, I think, lies in the fact that the students are not trained in the use of such principles. Possibly many of them would not have the grasp even if they were trained in the use of fundamentals, but the general indications that I have found are that they have never been drilled in the use of the fundamental principles.

When I first studied mechanical engineering, the professor at the head of the department, S. W. Robinson, had a tremendous reputation, as a man who knew practically everything. Naturally, I at first held the same opinion. However, as I got to know him better, to my surprise I found that there were a vast number of subjects about which he apparently knew little, but nevertheless, on such subjects he could reach conclusions quickly and reliably. In endeavoring to find the source of this ability, and also how he got at things, I presented to him on suitable occasions a number of special problems on which I had done considerable work and had encountered some difficulty. I found that in nearly all cases, when I first presented such a problem, he knew practically no more about the subject than I did, but that almost invariably, after a little study,

he could solve the difficulty and explain it to me clearly. In analyzing how he did it, I came to the realization that he simply relied upon a few fundamental principles, and that he brought these to bear directly on the solution of the problems I put up to him. In many cases I also had gone over these same fundamental principles, but failed to realize to what extent they could serve as tools for handling difficult work. Gradually, in watching Professor Robinson's work, I came to understand that his real strength did not come from any broad general fund of information, but rather from the fact that he had an apparently limited amount of information of a sort from which he could construct almost anything he wanted. This gave me an entirely new idea of the meaning of education. With him it was a case of having a few general-purpose tools, which he could use in all manner of ways to construct a desired result; whereas, compared with him, many so-called educated men had a vast collection of tools, practically none of which they knew how to use.

A very large percentage of engineers do not realize that mathematics is simply a tool to be used in getting results. The study of mathematics with them is simply mathematics and not the means to an end. It is as if one would show the students some very fine instruments or tools and explain to them the construction of such tools, their fine workmanship, etc., but would never teach them how to use the tools. It is the use of mathematics that is important. Moreover, it is not the difficult mathematics that is required. Algebra, geometry and trigonometry can probably take care of 90 percent of the high grade engineering work. Unfortunately, only a very few engineers can handle algebra, and trigonometry in particular. The fault here apparently lies with their fundamental training. The knowledge of mathematics is cumulative. In other words, each part is built up on the preceding part. If the foundation is worthless, then the superstructure is of little value, no matter how much care has been taken in it. Algebra and trigonometry should be studied until the engineer has a handy working knowledge of them and can use them in all sorts of problems. In other words, these should become almost a form of technical language. With such a foundation he can tackle more advanced mathematics, advanced studies requiring mathematics, with confidence and with a grasp of principles as he goes along, which continually prepares him for still more difficult work. But if the foundation is bad, the further he goes the worse he gets.

Unfortunately this foundation, in many cases, is merely worthless one. In fact, if you would question the students in any freshman class, I think you would find that an extremely small percentage of them have ever used algebra, geometry or trigonometry, outside of class work or the book lessons. Among hundreds of selected college men, who come

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\*Revised by the author from a letter published in the *Journal A. S. T. E.*, Sept. 1921, p. 734.

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...minds on their misfortune. The broadcasting of church services is invaluable to people in inaccessible districts who are not able to take part in other forms of religious services. It is proving to be one of the greatest publicity and beneficent features ever utilized, and is doing more to enlarge the church's sphere of influence than any medium heretofore used. The children also look forward to their bedtime story the same as father looks forward now to his baseball scores.

Where will it end? What are its limitations? Who dares predict? Scientists and inventors are working on relays which will permit one station to pass its message on to another, and we may easily expect to hear in an outlying farm in Maine some great artist singing into a radiophone many thousand miles away. A receiving set in every home, in every hotel room, in every hospital room, in every school room—why not? It is not so much a question of possibility—it is rather a question of "how soon".

In broadcasting, radio has found its greatest usefulness and its most important field of application. It is destined to become a basic public service. The road is a rough one, however, as many of those who have been intimately connected with its development are realizing.

H. P. DAVIS

### The Quantitative Study of Fundamental Principles\*

It has been my experience that the vast majority of graduates from our technical schools have no real grasp of fundamental principles. These principles may have been taught to them, but have gone over their heads, or they have not realized that these were fundamental. The chief reason for this lack of realization, I think, lies in the fact that the students are not trained in the use of such principles. Possibly many of them would not have the grasp even if they were trained in the use of fundamentals, but the general indications that I have found are that they have never been drilled in the use of the fundamental principles.

When I first studied mechanical engineering, the professor at the head of the department, S. W. Robinson, had a tremendous reputation, as a man who knew practically everything. Naturally, I at first held the same opinion. However, as I got to know him better, to my surprise I found that there were a vast number of subjects about which he apparently knew little, but nevertheless, on such subjects he could reach conclusions quickly and reliably. In endeavoring to find the source of this ability, and also how he got at things, I presented to him on suitable occasions a number of special problems on which I had done considerable work and had encountered some difficulty. I found that in nearly all cases, when I first presented such a problem, he knew practically no more about the subject than I did, but that almost invariably, after a little study,

he could solve the difficulty and explain it to me clearly. In analyzing how he did it, I came to the realization that he simply relied upon a few fundamental principles and that he brought these to bear directly on the solution of the problems I put up to him. In other cases I also had gone over these same fundamental principles, but failed to realize to what extent they could serve as tools for handling difficult work. Gradually, in watching Professor Robinson's work, I came to understand that his real strength did not come from a broad general fund of information, but rather from the fact that he had an apparently limited amount of information of a sort from which he could construct almost anything he wanted. This gave me an entirely new idea of the meaning of education. With him it was a case of having a few general-purpose tools, which he could use in all manner of ways to construct a desired result; whereas, compared with him, many so-called educated men had a vast collection of tools, practically none of which they knew how to use.

A very large percentage of engineers do not realize that mathematics is simply a tool to be used in getting results. The study of mathematics with them is simply mathematics and not the means to an end. It is as if one would show the students some very fine instruments or tools and explain to them the construction of such tools, their fine workmanship, etc., but would never teach them how to use the tools. It is the use of mathematics that is important. Moreover, it is not the difficult mathematics that is required. Algebra, geometry and trigonometry can probably take care of 99 percent of the high grade engineering work. Unfortunately, only a very few engineers can handle algebra, and trigonometry in particular. The fault here apparently lies with their fundamental training. The knowledge of mathematics is cumulative. In other words, each part is built up on the preceding part. If the foundation is worthless, then the superstructure is of little value, no matter how much care has been taken in it. Algebra and trigonometry should be studied until the engineer has a handy working knowledge of them and can use them in all sorts of problems. In other words, these should become most a form of technical language. With such a foundation he can tackle more advanced mathematics, advanced studies requiring mathematics, with confidence and with a grasp of principles as he goes along, which continually prepares him for still more difficult work. But if the foundation is bad, the further he goes the worse he gets.

Unfortunately this foundation, in many cases, is utterly worthless one. In fact, if you would show the students in any freshman class, I think you would find that an extremely small percentage of them have ever used algebra, geometry or trigonometry, except on the side of class work or the book lessons. Among hundreds of selected college men, who come

\*Revised by the author from a letter published in the *Journal A. I. E. E.*, Sept. 1921, p. 734.

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November 15, 1920

HOW WESTINGHOUSE ANNOUNCED HARDING'S ELECTION

Our Company succeeded in making many new friends by the efficient manner adopted for announcing the results of the national election.

Perhaps some of us have not noticed the radio aerial on top of the K-Building, but a glance in that direction will show the antenna of our wireless station.

The returns were received by telephone from a Pittsburgh newspaper, and were then sent out by wireless telephone. So rapid was the service obtained by this method that the receiving operators were able to get the returns exceedingly fast. In some cases they were heard even before they were received by special telegraph wires. During the intervals between returns phonograph music was played and those amateurs having loud sounding horns or two-stage amplifiers were able to throw the music over large rooms. Also two banjo artists were present and rendered very good banjo selections.

Not only in Pittsburgh were the returns heard, but in many towns in Ohio, Pennsylvania and West Virginia the messages were heard with equal clearness. Letters are still being received from operators from many miles around thanking us for giving the returns so promptly.

In Vandergrift, Pa., slide bulletins were shown in the street for the benefit of hundreds of people there, the news being shown from ten minutes to a half hour before they were received by means of an auxiliary telegraph wire between Vandergrift and Pittsburgh. In addition, the wireless set was connected by means of a cable with the local telephone exchange, and the wire chief sent the news directly to subscribers who had arranged beforehand for the service, and also gave the results to any one making inquiries.

At Latrobe the messages were utilized in a similar manner, thus enabling large crowds to get the messages early.

At Irwin a large hall was filled to its capacity to hear the results of the election, motion pictures being shown throughout the entire evening.

Not only in the immediate vicinity of Pittsburgh were the returns as sent from the Westinghouse Plant heard, but throughout Ohio and West Virginia they were heard with equal clearness.

Also in Pittsburgh the radio method of sending returns was utilized in two ways. Persons having simple sets did not need to leave their homes to receive the returns, and by means of sets installed in a number of clubs throughout the city, large assemblages were able to have social functions at the same time as receiving the returns. At the Edgewood Club in particular a loud sounding horn was in use, and people could hear all over the large ballroom the voice of the speaker at East Pittsburgh as transmitted through the radio apparatus.

At the same time the wireless telephone was giving this news to radio operators hundreds of men and women were receiving up-to-minute election returns in the auditorium of the cafeteria. As early as 8:30 in the evening announcements were made from several states as to how the election was going. The plan used to inform the people was very unique and thorough. As the returns were received they were thrown on the screen from the motion picture booth.

It was possible to receive the very latest returns through the cooperation of the wireless telephone service.

When returns were not being announced, a splendid entertainment program was in progress, consisting of music by Gill's Orchestra, motion pictures at intervals, vocal solo by Miss Ada France, vocal duet by Misses Ada and Agnes France and vocal solos by Miss Laura Atkin, Miss Anna Chilcote, George E. Kellogg and Fred Ward. Miss Julia Bartletti, pianist for the Community Chorus, accompanied the singers. The master of ceremonies for the occasion was A. S. Duncan.

Mar. 8. 26.

## FREQUENCY CONTROL BY PIEZO CRYSTAL

By

C. W. Horn,  
Supt. Radio Operations

Westinghouse Electric & Mfg. Company

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What an extreme pleasure it would be to the radio listener if he, while looking through the evening paper came across an item in the radio column indicating that such and such a station would broadcast a particular feature in which he was interested — if he could note the station's call letters and frequency and then turn to his receiver and set it at the frequency desired and really hear that station without interference. This is all possible now that we have found a way of utilizing the Piezo crystal for controlling the frequency of a radio transmitter. I feel it to be only a question of time when we will be able to tune to any station within our range and know that it will be on the frequency assigned and also be sure that stations which should be on other frequencies are not off their assignment and interfering. This means that all broadcasting stations will have to have their transmitters controlled by some such device as the Piezo crystal.

This has been accomplished as far as the Westinghouse station KDKA has been concerned and will be in the case of the other Westinghouse stations such as KYW, WBZ and KFKI as soon as

the equipment can be delivered which is now under construction. At KDKA there is in a small holder a piece of quartz ground to the exact dimensions necessary in order that it will oscillate at a frequency of 970 kes., which is the wavelength assigned KDKA. This piece of quartz is mounted in a specially designed holder and connected into a circuit containing a 5 watt oscillating <sup>tube</sup> circuit. The crystal has the property of keeping that circuit oscillating at that one frequency and no other. The small energy in this circuit is then amplified by means of power amplifying tubes until the energy is that desired for transmitting the program. The crystal, therefore, is actually the <sup>brain</sup> principle of the entire transmitter, which serves merely to amplify the product or oscillations of the crystal.

How does the crystal perform its function? The crystal has a natural period of vibration. It is, however, inert until influenced by some external force. In order to do this the crystal is mounted between two plates which act somewhat in the manner of condenser plates. These two plates are connected into an oscillatory circuit, using a vacuum tube in the usual manner. The tube then is caused to oscillate at approximately the frequency of the crystal. As soon as the crystal becomes active or is influenced by the oscillations of the circuit it steps into its own frequency and pulls the circuit into that frequency. Therefore, to get the crystal started, the circuit is caused to oscillate by other means



very close to the crystal frequency. As soon as the crystal becomes active it becomes master of the circuit<sup>s</sup> and keeps it at its own frequency.

It is only a question of time when all stations will be using some such system and the problem of crowding stations closely together will have been solved. It is due to the fact that the Department of Commerce assigned wavelengths 10 kcs. apart as much as anything else that stimulated this development. It is the old story of "Necessity is the mother of invention."

I believe that the future radio station will, upon completion of the installation work of its transmitter equipment, apply for its license to the Department of Commerce and incidentally forward its controlling crystal for measurement. The license will probably not be issued unless the crystal is exactly the frequency at which the station is to operate. This will do away with guess work and will reduce frequency measurements to an exact <sup>fact</sup> science rather than the approximate one it now is. At the present time there are very few wavemeters which do more than give approximate readings. With this fine control of frequency which we shall see within the next few years I believe that we shall have wavemeters, remarkably accurate as compared with the present day equipment.

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EDISON'S ESTIMATE OF RADIO 1921-22

(from Mr. Miller, Mgr., Newark Works, Apr 11 1929)

The Westinghouse Newark Works started one of the earliest broadcasting stations, and, being in need of programs for entertainment, Tommy Cowan was sent to Mr. Thomas A. Edison to ask the use of an Edison phonograph and records. He was received with a burst of profane denunciation of radio and radio broadcasting, which, the "Wizard" said, "was no damn good and would never amount to anything - he knew all about radio from his own experience". After a good deal more boiling over, Cowan finally persuaded Edison to lend him the records, though with a poor grace.

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Prof. \_\_\_\_\_ of Rensselaer Tech. recalls (Apr. 29) that  
in the earliest days of AC. both the GE of and

# RADIO MUSICAL STRIKE AVERTED; CONTRACT SIGNED

## Compromise Plan Accepted by Both Sides.

The threatened strike of radio musicians in all studios affiliated with the Chicago Broadcasters' association, called for midnight last night, was averted late yesterday and a new contract was signed to run to Feb. 1, 1933. James C. Petrillo, president of the Chicago Federation of Musicians, and William S. Hedges, chairman of the broadcasters' executive committee, announced the settlement of all disputed questions. Both said they were pleased with the terms of the new contract.

The major provisions of the new contract are that the minimum studio band will be increased from 10 members to 15 members, that the musicians will work six days a week instead of seven, but will continue to work 35 hours a week, and that no change will be made in the wage scale, the minimum wage remaining at \$90 a week. The contract was the first written agreement ever signed by the union and broadcasters' representatives.

### Ratified by the Union.

The negotiations leading up to the settlement of the strike covered a period from 10 o'clock yesterday morning to 5 o'clock last evening. Before conferring with the union executive board the broadcasters' representative held a series of meetings Wednesday night and Thursday morning at which a compromise program was reached. The program was ratified last night by the union.

The joint statement issued by Hedges and Petrillo follows:

"The strike in the broadcasting stations is off. The settlement between the Chicago Broadcasters' association and the Chicago Federation of Musicians was made upon the basis of six days per week with the same number of hours per week being consumed in six days as were formerly used in seven days. No change is made in the wages. The minimum number of men in class A stations will be increased from ten to fifteen. Everybody is happy that a strike has been averted."

### Original Demands Modified.

The original demands made by the union included the increase in orchestras to 15 members, a six day, thirty hour week with no reduction in pay, and union control of monitor boards. Early in the negotiations Petrillo ceded control of the monitors

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ny at the "whoopee" trial.

## LAYING PATRONS

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# RADIO STATIONS READY TO FIGHT MUSIC STRIKE

## Broadcasters Promise to Continue Programs Despite Move of Union.

Members of the Chicago Broadcasters' Association at a meeting today planned to make final preparations to combat the strike of all radio musicians, which has been ordered to take place at midnight New Year's eve by James C. Petrillo, president of the Chicago Federation of Musicians.

Joseph N. Weber, president of the National Federation of Musicians, was expected to arrive from New York today to confer with officials of the Chicago local. Since Weber has stood by Petrillo's action previously, however, only the slimmest of possibilities existed that the strike could be averted through his intervention.

"The broadcasting stations will continue to function," declared Attorney Joseph B. Fleming, counsel for the broadcasters, "and will give service to the public."

"We will present a unified front and fight it out. The strike has been forced on us and we will not permit it to impair our service."

A demand for a formal contract with the union, heretofore not in force, was to be among the counter-demands of the Broadcasters' Association, another of which is the establishment of an arbitration board. The union has demanded that the stations pay the musicians for seven days, while they work only six.

## GIRL IS SERIOUSLY HURT, BROTHER KILLED, BY AIR

Miss Evelyn Friedland  
Central avenue, 16-y-  
al student.

# Broadcasters Defy Strike Threat of Musicians

The Chicago Broadcasters' Association today presented a united and determined front to the demands of the musicians' union for more pay in lieu of a general strike among radio station musicians.

After a three-hour conference at the Merchandise Mart, the broadcasters announced that radio stations will continue their programs with phonograph records if the musicians walk out, as threatened, at midnight on New Year's Eve.

They countered the demands of James C. Petrillo, president of Chicago Federation of Musicians, with demands that Petrillo deal with the association as a unit and that union rules, deemed arbitrary, unreasonable and unfair, be revised.

Advised of the broadcasters' actions Mr. Petrillo branded them as "silly." He maintained that he would "have nothing to do" with Mr. Fleming.

He also said arrangements had been made to broadcast through radio station WCFL all major orchestras by remote control, in the event the strike was necessary. Thus Chicagoans, he said, would not be deprived of their music.

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# Music Strike in Radio Stations

James C. Petrillo, president of the Chicago Federation of Musicians, ordered a strike of radio bandsmen yesterday. The order, if carried out, would compel 450 musicians to walk out at midnight New Year's eve. It affects all except one station, WCFL, which is owned and operated by the Chicago Federation of Labor. Petrillo stated that Edward Nockels, labor leader and head of WCFL, had acceded to the musicians' demand for a 30 hour week with 35 hours' pay.

The order may also affect featured bands, which broadcast from hotel cafés, cabarets and night clubs. Petrillo said he had summoned leaders of these bands to his office and instructed them to cease playing at midnight Dec. 31 unless the microphones were shut off.

## Indicates Strike May Spread.

Petrillo also made threats that the ban might be extended to include the Chicago studios of the CBS and NBC chains and that the strike may spread throughout the country. Regarding these phases of the threatened strike Petrillo said he had been in conference with Joseph Weber, president of the National Federation of Musicians, in New York.

"If the chains accept our demands in Chicago the musicians will stay on the job," Petrillo said. "If they try to feed programs to the local stations, either from the studios here or elsewhere, the strike will spread."

## Stations Reject Demands.

"Responsibility for a strike, if one is called, rests solely with Mr. Petrillo," said Joseph B. Fleming, attorney for the Broadcasters' association, last night. "The musicians' union demands, among other things, a reduction from 35 to 30 hours a week with no reduction in pay. They also demand union regulation of the monitor control board. This operation belongs to the stations. The demands are unacceptable to the broadcasters."

"We have endeavored to conclude an agreement for 1932 under which musicians would receive the same scale of wages with the same rules and regulations as in 1931. We felt that in these times of business depression the fairness of such a proposal would appeal to members of the union."

"In calling a strike at this time of 450 men who receive an income in excess of \$650,000 a year Mr. Petrillo is assuming a very grave responsibility. We would suggest that he give the matter a sober second thought before he carries his threat into execution."

Daily News  
Dec 30, 1931  
20 \*

# RADIO N WOULD STRIKE OF MUSICIANS QUIET ETHER?

## It Would Be Odd If It Did, but There Are Other Programs.

BY CHARLES J. GILCHREST.  
(Radio Editor, The Daily News.)

Wouldn't it be funny if the musicians did go on strike at midnight tomorrow and the air suddenly became quiet? After all these years of radio broadcasting the good old ether would be lonesome without its customary load of harmony. The fact that Jim Petrillo might call a musicians' strike does not mean the stations would have to sign off. But if you'll tally the number of hours of broadcast for any one station and the number of those hours devoted to music you'll see just how heavy the proportion of music is to anything else on the air. Mr. Petrillo might be able to keep all orchestras in Chicago off the air and might also be able to keep the networks from relaying us dances from other cities. . . . But we still would have the transcription libraries. In the meantime all local stations and the networks are going right ahead with plans for plenty of music well into New Year's dawning.

their administration. It is to their interest to improve the whole banking system, and to inspire confidence in bank depositors. Further, it is the duty as enlightened citizens to co-operate with the legislature in accomplishing that important purpose. 12-29-31 Daily News

## A POOR TIME TO STRIKE.

Any labor leader who orders a strike in such times as the present not only assumes a grave responsibility, but violates the first principles of sound economic policy. Even more reckless is the union official who calls a strike because his demand for a direct or indirect increase in wages refused by the employers of workers he is supposed to represent.

The average American wage worker is moral certain to be moderate and sensible in a dispute over pay or conditions of employment. But to often union officials, through arrogance or bad temper, take positions which their followers would not support if they had freedom of choice.

The position of members of the radio orchestra and bands in Chicago, whom James C. Petrillo president of the local federation of musicians, has ordered to walk out at midnight on New Year's eve, is distinctly a case in point. The strike was called because the radio stations would not comply with a demand for reduction of the musicians' hours from thirty-five to thirty a week—without corresponding reduction in wages—and would not grant the demand for union regulation of the monitor control board. Neither of those demands was justifiable, and to strike as a means of enforcing them would be an act of sheer folly. The general public would resent the strike, as would the great majority of sober-minded union workers.

To carry out the strike threat would mean willful and inexcusable jeopardizing of the welfare of 450 men who, collectively, earn \$650,000 a year.

Before executing his ill-timed and unwarranted threat, Mr. Petrillo should take steps to ascertain the wishes of the men he professes to serve. If he did, he would rescind the strike order.

Chicago I only  
THROUGH THE COURTESY OF THE

# Chicago Federation of Musicians

The people of Chicago will continue to hear their favorite bands by tuning in after midnight Thursday on Station WCFL, the Voice of Labor.

These BANDS ARE AS FOLLOWS:

Frank Westphal and His Orchestra      Rex Maupin and His Orchestra  
Joe Gallicchio and His Orchestra      Mark Fisher and His Orchestra  
Gaston DuMoulin and His Orchestra      Ted DuMoulin and His Orchestra  
Avis McDonald and His Orchestra

The foregoing are Studio Bands which will now be transferred to one station—

—WCFL—

.....

The following are bands which are now appearing in the various hotels, cafes, etc., in the Chicago district. They will appear in person on WCFL Station.

The exact time of each Band's appearance will be given later.

Don Pedro's Orchestra	Art Kassel's Orchestra
Maurie Sherman's Orchestra	Henri Gendron's Orchestra
Paul Specht's Orchestra	Ted Weems' Orchestra
Louis Panico's Orchestra	Irving Sewitt's Orchestra
Verne Buck's Orchestra	Jimmie Garrigan's Orchestra
Ted Cook's Orchestra	Clyde McCoy's Orchestra
Irving Aaronson's Orchestra	Joe Rudolph's Orchestra
Bernie Cummins' Orchestra	Herb Buteau's Orchestra
Corrie Lynch's Orchestra	Tweet Hogan's Orchestra
Ben Bernie's Orchestra	Ralph Ginsburg's Orchestra
Paul Whiteman's Orchestra	Jack Russell's Orchestra
Herbie Kay's Orchestra	Wayne King's Orchestra

(On his return to Chicago)

Wachman 11 day Dec. 30 - 1931

Westinghouse  
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**THE  
RADIO CORPORATION  
OF AMERICA**

**THREE HISTORICAL VIEWS**

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**PART I The Years to 1938 BY JOHN C. WARNER**

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**PART II The Years 1938-1958 BY ELMER W. ENGSTROM**

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**PART III The Years 1958-1962 BY ELMER W. ENGSTROM**

A collection of three articles about RCA.  
Part I was written in 1938, Part II in 1958, and Part III in 1963.

# INTRODUCTION

The Radio Corporation of America today is one of the largest and most broadly based enterprises devoted entirely to electronics. In achieving this position, it has pioneered in the development of an art and industry which has compressed within a brief span of years a degree of business growth and technical progress that seldom is achieved in less than a century.

The history of RCA, related in the articles that follow, is pre-eminently an account of dynamic industrial growth. Among the forces responsible for this achievement have been the leadership and vision of David Sarnoff, Chairman of the Board and Chief Executive Officer of RCA, and the outstanding array of research, engineering, production, and marketing talents which have thrived in the technical and business environment which he and his colleagues have done so much to foster and maintain through the years.

A succession of milestones in the advance of electronics has resulted from this combination of leadership and talent. Among them are the establishment of network broadcasting, the successful combination of the radio and the phonograph, the practical development of television in black-and-white and color, and fundamental concepts providing a foundation for today's electronic information-handling technology. The common denominator throughout this series of achievements has been a dynamic program of scientific research whose energetic support by RCA's management through the decades represents yet another example of industrial pioneering.

The first of these articles was written more than 25 years ago. It was prepared and delivered as one lecture of a series in an indoctrination course for RCA employees. So rapid has been the evolution of both RCA and the electronics industry that many of the events described read like ancient history. Even the trade names familiar to a large public in the 1920's have vanished almost beyond recollection today. Very few will recall, for example, the Graphanola, a popular phonograph produced by the Columbia Talking Machine Company around 1922. When this article was written in 1938, television was still a daring experiment, the ultra-high frequencies were in their infancy, and the vast area of solid-state electronics was yet to be opened for exploitation. Yet even then, the dynamic characters of both RCA and the industry were clearly visible, revealing great growth potential in any direction that might be chosen.

The author, John Chester Warner, was himself an intimate part of the scene which he describes. He was Vice President of the Radiotron Division, RCA

Manufacturing Company—and in the same year in which the article was written he met a tragic and untimely death in an automobile accident at the age of 42. Through the 1920's, Warner had been associated closely with receiving tube research at the General Electric Company in Schenectady. In 1932, following the separation of RCA from the General Electric and Westinghouse companies, he was appointed Manager of research and development at the RCA Radiotron Company in Harrison, N.J. He was named Vice President of Radiotron in 1934, a year before the organization became the Radiotron Division of the new RCA Manufacturing Company.

The author of the subsequent articles is uniquely qualified to chronicle the further development of RCA. Elmer William Engstrom, now President of the Radio Corporation of America, has advanced through progressively more important executive assignments during his 33 years with the company and has directed most of RCA's principal research and engineering programs through the past three decades. A native of Minnesota, Dr. Engstrom was associated with the Radio Engineering Department of the General Electric Company through the 1920's. In 1930, when the radio engineering and manufacturing activities of G.E. were transferred to RCA, he continued as Division Engineer in charge of Photophone sound motion picture apparatus, development and design for the RCA Manufacturing Company at Camden, N.J.

During the 1930's, Dr. Engstrom directed the research and development program which transformed television from a series of experiments into a practical service, and was largely responsible for the pioneering application to this task of the concept that is now known as systems engineering. In 1942, he became Director of General Research and subsequently Director of Research at the newly organized RCA Laboratories in Princeton, N.J., where he led an outstanding program of RCA wartime research extending across the spectrum of military electronics. Elevated to a Vice Presidency in 1945, he entered upon a series of increasingly responsible executive assignments extending to all of the technical activities of the corporation. In October, 1955, he was appointed Senior Executive Vice President of RCA, and he was elected President of the corporation on December 1, 1961.

Dr. Engstrom is recognized today as one of the nation's outstanding business and technical executives, combining, in the words of Chairman David Sarnoff, "an unusual blend of business, administrative, and scientific abilities." His account of RCA's career since 1938, in the pages that follow, thus presents a story of growth and progress for which he, too, bears a large share of responsibility.

THE EDITORS

# RADIO CORPORATION OF AMERICA

## PART I—THE YEARS TO 1938

\*By J. C. WARNER

Vice President (1934-1938), Radiotron Division,  
RCA Manufacturing Company, Inc.

\*Article written in 1938

### RADIO—A NEW COMMUNICATIONS SERVICE

At the close of the war the only company in a position to handle commercial transatlantic radio communications was the Marconi Wireless Telegraph Company of America, although the stations which it had operated before the war were in the hands of the Government who had taken over all such stations for wartime purposes. This company was an offshoot of the British Marconi Co. and was largely owned by English interests.

At this time the best known means of long distance transmission was the Alexanderson high frequency alternator, the patents on which were owned by the General Electric Company. Negotiations between General Electric and the American Marconi Company, which had started several years previous, but had been interrupted by the war were resumed in 1919 for the purpose of transferring patent rights as well as alternators to the Marconi Company which was anxious to expand its transatlantic services.

Certain high officials of the Government learned of these negotiations and were unwilling to see a growing communications service under foreign control, particularly since the transatlantic cables were in the hands of foreign, though friendly, nations. Consequently they suggested to the General Electric Company that negotiations be suspended until after discussion with the Navy Department. This was in April 1919 and it is interesting to note that the letter to the General Electric Company was written by Mr. Franklin D. Roosevelt, then Acting Secretary of the Navy.

### FORMATION OF RCA

As a result of conferences with the Navy a plan was developed for forming a new American company to take

over the assets of the American Marconi Company. So, on October 17, 1919, the Radio Corporation of America was incorporated, and on November 20, 1919 the entire business of the Marconi Company was taken over.

GE held a substantial interest in the new company, and immediate arrangements were made between RCA and GE to cross-license each other to use the radio patents of the GE Company and the patents RCA had just acquired from Marconi. Work was started at once on new high power alternator stations in California, Massachusetts and Hawaii.

But another patent deadlock soon appeared particularly with respect to vacuum tubes. The possibilities of long distance shortwave communications were unknown at this time. In fact, wavelengths under 200 meters were relegated to the supposedly unimportant use of amateurs. But, tube transmitters were needed for medium power services and, of course, tube receivers were essential.

Strong patents on vacuum tubes were held by both GE and the Western Electric Company, but neither could make effective use of its own patents without infringement of the other's. Again the Navy lent a hand and persuaded the GE Company and AT&T Company to come to an understanding "For the good of the public." This was in January 1920.

### TRANSOCEANIC SERVICE BEGINS

In February 1920, the stations which had been taken over from the Marconi Company by the Government during the war were turned back to the new RCA, and a foreign communications service were inaugurated. One of the principal stations was in New Brunswick, N. J., and the long-wave antenna there has no doubt been seen by a great many of you. During that year,

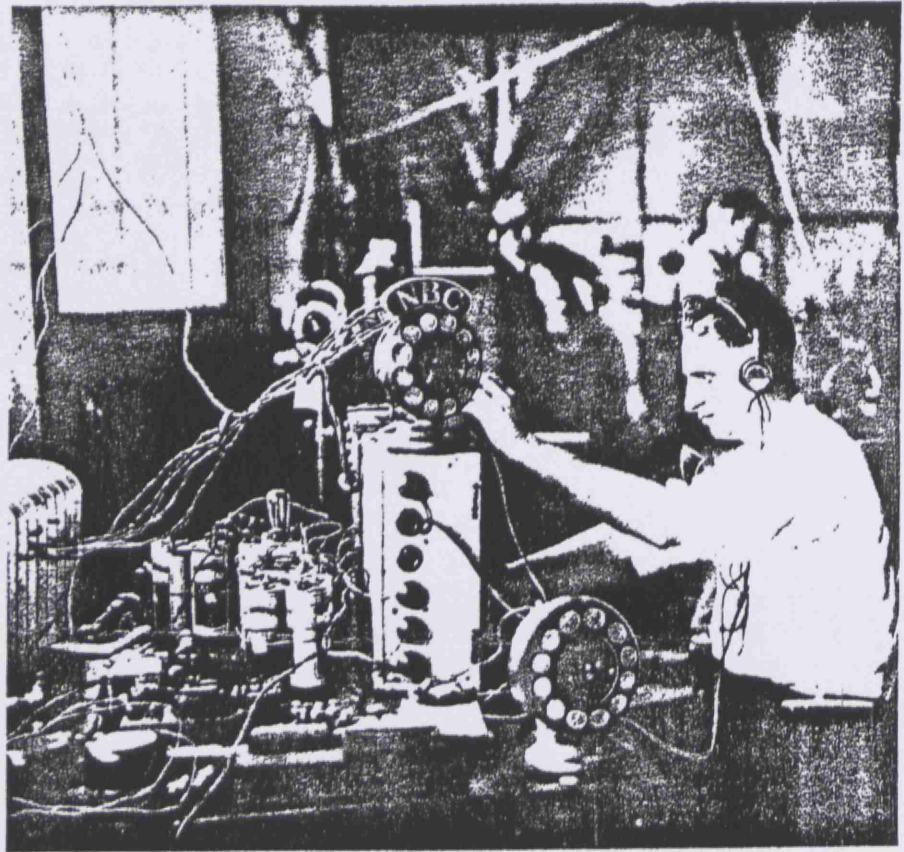
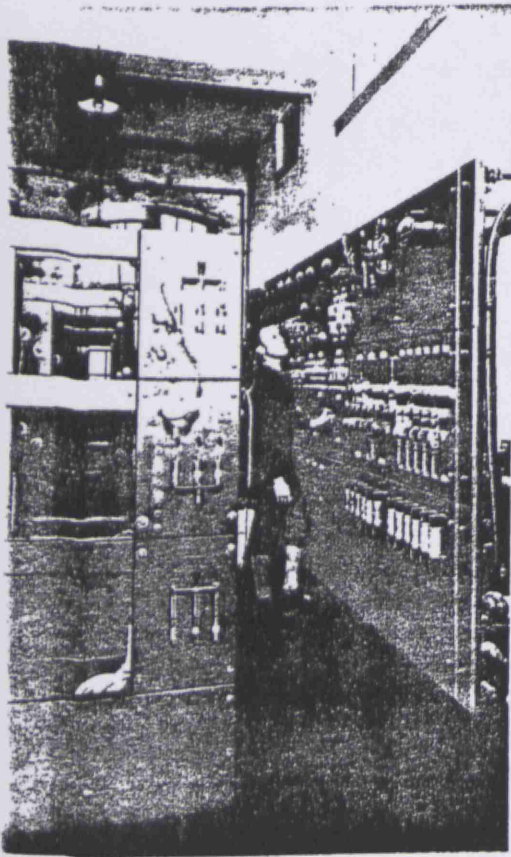


J. C. Warner

IT WOULD BE misleading for me to imply that anything approaching a complete history of the Radio Corporation of America could be covered in the brief time which we can spend together. While the company is only a little over 18 years old several volumes would be required to do a really thorough job. However, I shall try to review some of the high points in the history of the company, and to cite the progressive changes in organization and their relation to the progress of the company in radio and allied fields.

It has often been said that "the story of the Radio Corporation of America outlines the larger story of the radio era," i.e. the era of radio broadcasting. Peculiarly enough the company was not organized with radio broadcasting in mind, although it is significant that the man whose name is so closely associated with the history of RCA and who has for many years been its active head, had clearly visualized the possibilities of radio broadcasting service and even "electric tuning" long before broadcasting made its first appearance. I refer, of course, to Mr. David Sarnoff.





Two scenes of early communications and broadcasting activities.

foreign service was established with England, Germany, France, Norway, Japan and Hawaii.

In July 1920 an agreement was reached between RCA, GE, and AT&T which permitted RCA to proceed with the use of all radio patents of these companies.

#### BEGINNING OF BROADCASTING

During the first year of the RCA attention was directed almost exclusively on communications, but in 1921 the first rumblings of what soon was to become a broadcasting boom began to be heard. A number of experimenters had been playing with the idea of transmitting phonograph music over somewhat crude telephone transmitters.

#### WESTINGHOUSE JOINS RADIO GROUP

Westinghouse had done a certain amount of radio experimentation in its laboratories, and shortly after the formation of RCA began to consider going into the radio field. A subsidiary company was set up known as The International Radio Telegraph Company which had acquired a large

group of Fessenden patents from the old National Electric Signaling Company. Consideration was given to going into the communications business, but difficulties were encountered in that the important European stations were all tied in with the stations of the Marconi Co. now held by RCA.

To strengthen their position Westinghouse acquired a group of Armstrong and Pupin patents, among which was the Armstrong "feed-back" patent later to become quite famous. Finally, in 1921, a cross-license agreement was made between RCA, GE and Westinghouse, and Westinghouse now became a member of the radio group.

#### BROADCASTING BEGINS

Meanwhile, strenuous efforts were being made to get broadcasting started. The pioneer licensed station of the United States, and of the world, was KDKA, of the Westinghouse Company, in Pittsburgh, licensed by the Department of Commerce on October 27, 1920. This station broadcast election returns in November of that year. RCA first entered this field on July 2, 1921, when a one-day broad-

cast was made from a temporary station at Hoboken, N. J., on the occasion of the Dempsey-Carpentier fight. Soon after, RCA opened station WDY at Roselle Park, N. J., which continued for some months, when it was shut down on account of interference with station WJZ of the Westinghouse Company in nearby Newark. RCA then went in as halfpartner with Westinghouse in the management of WJZ. Broadcasting was really on its way.

#### WIRELESS SPECIALTY COMPANY

Another corporate element entered the picture in 1921, the Wireless Specialty Apparatus Company. This was a Massachusetts concern largely occupied in making apparatus for the Tropical Radio Company, which in turn was a subsidiary of the United Fruit Company, and which operated coast and ship service for the large United Fruit fleet. GE bought into Wireless Specialty, and again made license arrangements which cleared up a few more of the patent obstacles to RCA's progress.

### A FORMATIVE PERIOD

These first two years cover what might be called the formative period of RCA. It was a period during which all of the important American companies which could play a part in the development of the radio field of that time were brought into a workable relationship.

It was a fortunate coincidence that the end of this two year period came just at the threshold of the development of the new broadcasting industry. In fact it is a fair statement that without the removal of the many previous obstacles, broadcasting itself would never have developed on a national scale in such a short time.

### RCA ENTERS MERCHANDISING FIELD

Just prior to the start of broadcasting RCA had given thought to furnishing apparatus to radio amateurs both for reception and transmission. As broadcasting appeared, the line of amateur apparatus was expanded as quickly as possible to include home broadcast receiving equipment, and RCA now entered the merchandising field with GE and Westinghouse as manufacturers

son with the present. For that reason I shall digress for a few moments to describe some of the things which were offered for sale. The catalogue was entitled "Radio Enters the Home," and since in this period every man had to be his own serviceman all the accessories imaginable were included as well as many parts for the experimenter to make his own set.

The cheapest receiver listed was a steel box containing a single-circuit tuner and crystal. This sold for \$25.50 with headphones, antenna equipment and "full instructions." More elaborate crystal sets were available at \$32.50 and \$47.50. The cheapest tube set was the one-tube "Aeriola Senior" made by Westinghouse—it used a WD-11 tube in a regenerative circuit and sold for \$75.90 with batteries and antenna, and for \$65.00 without the accessories. This was a very popular set in its day and it is quite likely that a few of them are still in use.

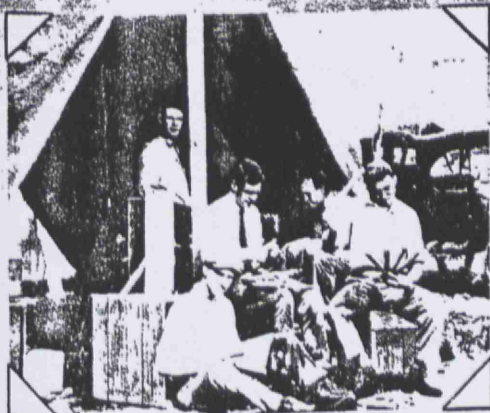
GE supplied a set made in steel boxes. The two units comprised a tuning system in one box and a three-tube

were four ballast tubes to avoid use of a filament rheostat. No emphasis was placed on the number of tubes since the practice of stressing this had not yet appeared. This set sold for \$401 with all accessories.

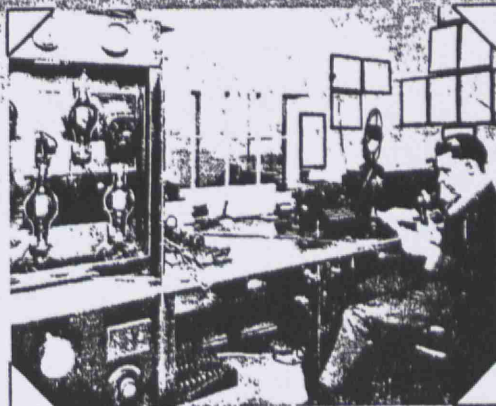
The only load-speaker shown was similar to a brass automobile horn with a telephone receiver on the end—which sold for \$30.00. It is interesting to note that a phonograph attachment was available at \$18.00 which consisted of a telephone receiver element to be attached to the tone arm of the phonograph so as to get the equivalent of a loadspeaker. There were two models—one for Victrolas and the other for Graphonolas.

### FIRST RADIO TUBES

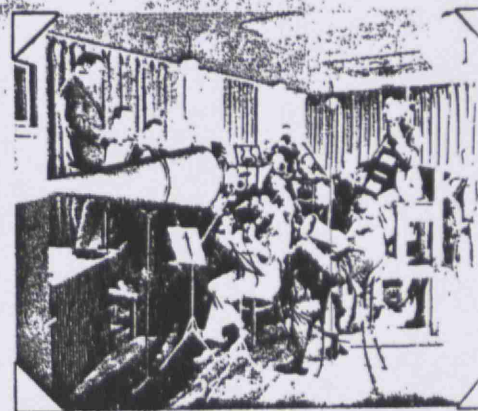
At this time RCA sold four types of receiving tubes. Two were made by Westinghouse and two by GE. The Westinghouse tubes were designed and manufactured in East Pittsburgh and the GE tubes were designed in their Research Laboratory at Schenectady and manufactured in two of the GE lamp factories, one at Nela Park,



First RCA laboratory (1919) was located at Riverhead, Long Island.



Broadcast stations in the formative years were crude by present standards.



Early recording sessions were waxed without electronic processing methods.

(Wireless Specialty also furnished a small amount of apparatus for a time). As later developed, this arrangement had many disadvantages but remember that at the time it was probably the only way in which the RCA could get started. It was, so to speak, a condition of RCA's birth.

In 1922, RCA got out a catalogue of radio equipment which well illustrates the conditions of that day in compari-

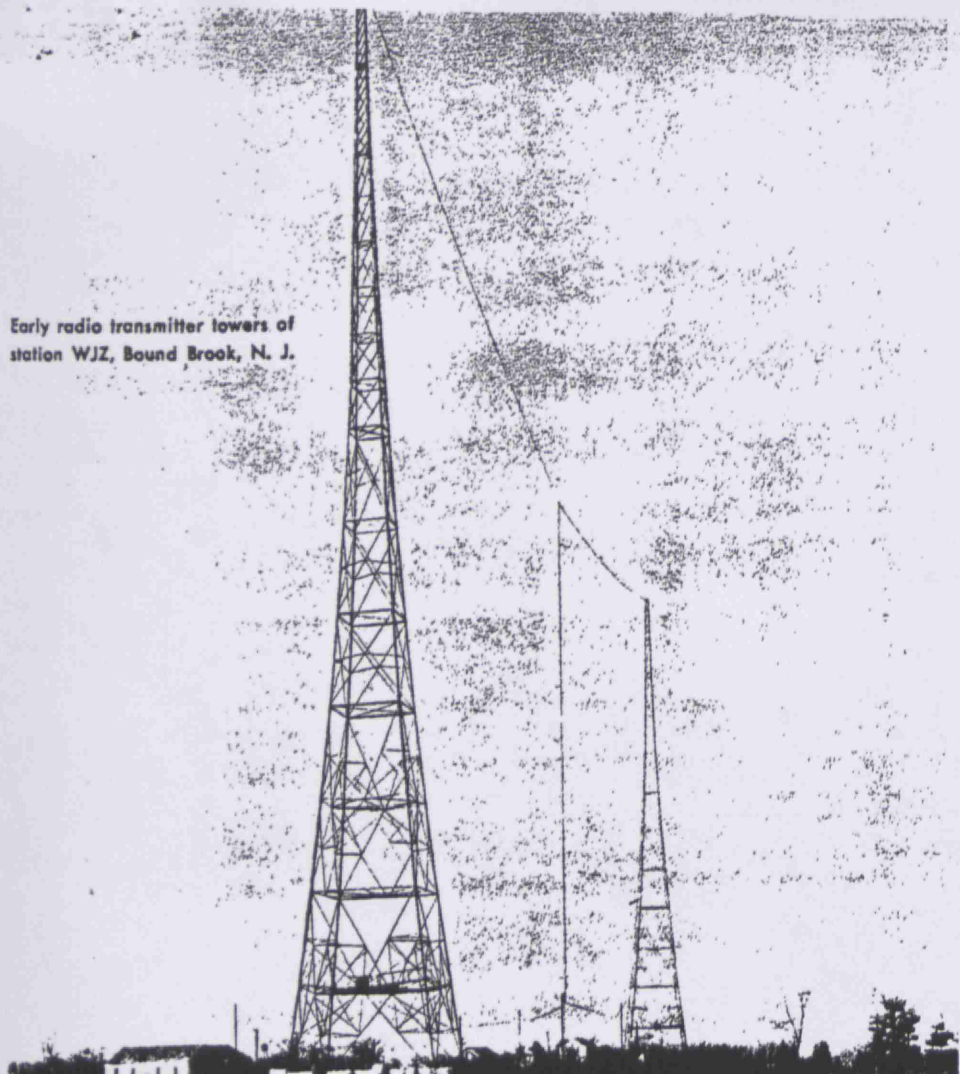
son with the present. For that reason I shall digress for a few moments to describe some of the things which were offered for sale. The catalogue was entitled "Radio Enters the Home," and since in this period every man had to be his own serviceman all the accessories imaginable were included as well as many parts for the experimenter to make his own set.

The most elaborate set was the "Aeriola Grand" made by Westinghouse. This had four tubes, a regenerative detector and, in addition, there

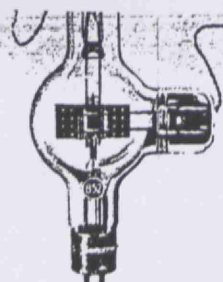
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Early radio transmitter towers of station WJZ, Bound Brook, N. J.



WD-11 Detector Amplifier—1920



852 Transmitting triode—1927

scale he entered into an arrangement with RCA in 1920 which gave him the right to sell tubes under his own name. They were the same as RCA tubes but had different type numbers.

#### RCA PROGRESSES IN ALL FIELDS

The years 1923, 1924 and 1925 brought numerous advances in the RCA fields. To mention only a few—in 1923 two broadcasting stations were opened by RCA in New York and one in Washington. In 1925 the first WJZ transmitter was installed at Bound Brook, N. J. Short-waves came into use for long distance communications, first to supplement the high power long-wave transmitters, and later to take over practically all of the long distance service. Trans-oceanic communications were extended to additional European and South American countries. The first superheterodyne receiver was brought out in 1924. In 1925 a receiver was sold with accessories permitting it to be operated from alternating current. In the same year the electrodynamic loud speaker was brought out. Apparatus was developed for recording and reproducing records electrically. Improvements were made in tubes greatly reducing the power consumption.

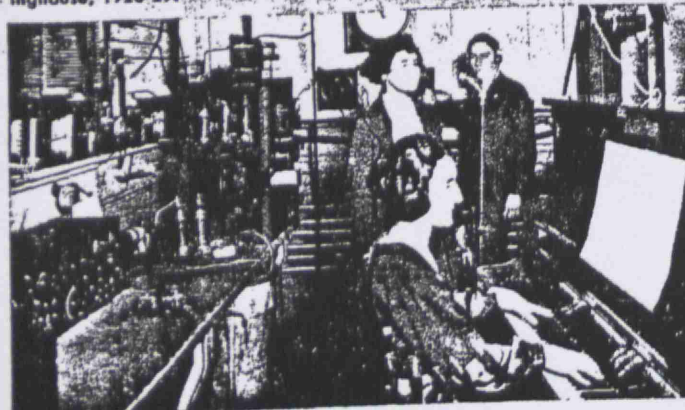
In 1925, RCA furnished certain components to the Victor Talking Machine Company which were built into a radio-phonograph combination employing a single speaker. This is significant as the first step in very important later developments.

#### RCA ONLY A SELLING AGENCY

Remember, that during this period and for several years after, in the merchandising field RCA itself was only a selling agency. The manufacturing was done entirely by the electric companies. Receivers were made at Schenectady by GE and at East Pittsburgh by Westinghouse. Receiving tubes were engineered at East Pittsburgh and Schenectady, and were made in GE lamp factories at Cleve-



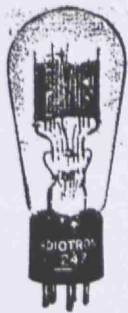
Lester J. Wolf, currently in DEP Radar Projects at the Moorestown plant, is shown with a developmental quartz crystal frequency standard at Westinghouse, 1928-29.



Original studio and operating room, station WBZ, Springfield, Mass., in 1921. Horace R. Dyson, Staff Engineer in DEP Technical Administration, is in the background.



UX-222 Sharp-Cutoff Tetrode—1927



247 Power Pentode 1931

land, Harrison, and later at Newark—also in Westinghouse factories, at East Pittsburgh, Bloomfield, N. J., and later at Indianapolis (in what is now our Indianapolis Plant).

It must already be evident that the problems of coordination began to be tremendous. RCA first utilized the electrical laboratory of the City College of New York, which was in charge of Dr. Alfred N. Goldsmith, to test new models of apparatus. This was quickly outgrown and the Technical and Test Department of RCA was established in its own building at the edge of Van Cortlandt Park in New York. Here samples of apparatus were submitted independently by GE and Westinghouse, tested and reported back to the manufacturing companies, with approval or suggested changes.

It soon became necessary for RCA to have the same apparatus regardless of which company made it. In the case of tubes it was particularly essential to have uniform designs from all factories so they could be interchangeable in any receiver. Of course, this was long before the time tubes were shipped in sets.

#### EFFORTS ON COORDINATION

In an attempt to accomplish this necessary coordination, "design" or "standardization" committees were set up separately for receivers and tubes, comprising representatives of GE and Westinghouse. The tube committee which started in 1924 perhaps best serves to illustrate the unwieldiness of such an arrangement, which I will describe in some detail.

This committee was known as the Radiotron Standardization Committee. It was made up of representatives from East Pittsburgh, Cleveland, Schenectady, Bloomfield, and Harrison—two and sometimes three from each. It met once a month around the circle and attempted to arrive at agreements on tube designs, ratings, characteristics, and even some production problems. It had no direct rep-

resentation from the receiver divisions so the coordination with them was supposedly handled by the East Pittsburgh and Schenectady tube representatives, and the ideas and needs of the receiver engineers carried to the tube meetings. The main committee carried with it a train of sub-committees and coordination groups intended to handle specific technical items. Needless to say this kind of an arrangement was in many ways unsatisfactory, yet it is difficult to visualize any better method under the then existing company relationships.

The "Design" committee on receivers operated in much the same way as the tube committee, but with some advantage in having only two groups involved. It finally became necessary to set up an additional receiver coordination committee which included RCA representation. One of their first subjects of discussion in 1927 was the "Radiola 16," and another model which became the "Radiola 17," which was the first real a-c receiver using a-c tubes.

The loss of time inherent in the inter-company committee method of coordination was a major handicap to progress in engineering, manufacturing, and sales, but it remained until new major changes in organization came to pass, as we shall see later.

#### FORMATION OF NATIONAL BROADCASTING COMPANY

Going back to 1924, the AT&T was actively developing the use of wire lines for furnishing programs to broadcast stations and they set up WEAf as the source of these programs. In 1926 RCA and its associates took steps to integrate a complete broadcasting service and formed the National Broadcasting Company. This was a recognition by RCA officials that this new service had the possibilities of an important industry and that a specialized organization was necessary to develop programs, to install new stations and to maintain a satisfactory continuous service to their own as well as other stations.

The new company acquired station WEAf from the AT&T, and also took over the stations owned by RCA and thereby created the real beginning of the network broadcasting industry.

#### RCA LICENSES OTHER RADIO COMPANIES

In 1927, a major step was taken in a new direction, the licensing of other manufacturers under RCA patents. It was inevitable that the demand for broadcast receivers would lead other companies into the business, and a large number had by this time become established. The granting of licenses to these companies strengthened their position, but at the same time gave RCA a rightful return for its huge investment in patents obtained through the research and engineering of the radio group and also by purchases from other inventors.

At first the superheterodyne patents were not included in the licenses. Also it was not until two years later that tube licenses were granted, although a number of lamp and other manufacturers were actively making tubes.

#### RADIOMARINE COMPANY FORMED

Late in 1927, the ship-to-shore telegraph business of the RCA, which had been growing steadily, was segregated into a new subsidiary company—the Radiomarine Corporation of America.

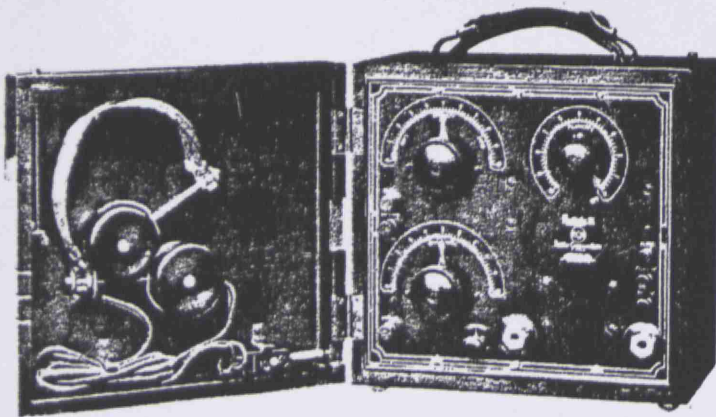
#### RCA PHOTOPHONE ORGANIZED

In 1928 a new offshoot of the radio business appeared. For several years work had been going on in the GE laboratories to perfect a system of recording sound on film. This was now ready for commercial exploitation in the motion picture industry and RCA Photophone Company was organized to handle this business.

#### RCA PURCHASES VICTOR COMPANY

1929 was a year of far-reaching changes in the organization of the RCA group which constituted the first major step towards integration of the company into a self-contained, self-controlled radio business.

I have mentioned already some of the handicaps inherent in the arrangements whereby RCA did the selling while the other companies manufactured. This method was wholly inadequate to meet the quick moves of the independent competitor. Furthermore, the electric companies naturally wanted to make a profit and so did RCA. This seriously handicapped the coordination of sales and production which is so essential to the success of an entire operation. RCA needed its own manufacturing facilities.



The "Radiola II", an early radio marketed by RCA at the start of the '20's. The word "Radiola" was coined by Dr. Alfred N. Goldsmith in a note to General Sarnoff supporting his concept of a "Radio Music Box" for home entertainment.

The Victor Talking Machine Company at Camden had been seriously affected by the growth of radio and had not been particularly successful in its attempts to enter the radio field. In order to obtain manufacturing facilities RCA purchased the Victor Company including the manufacturing plant, what was left of the phonograph business, and the Victor dog trademark. Arrangements were also made whereby RCA took over tube manufacturing from GE and Westinghouse. RCA acquired the entire Edison Lamp Works property of the GE at Harrison, and also the Westinghouse factory at Indianapolis, and at the end of the year the RCA Victor Company and the RCA Radiotron Company were organized.

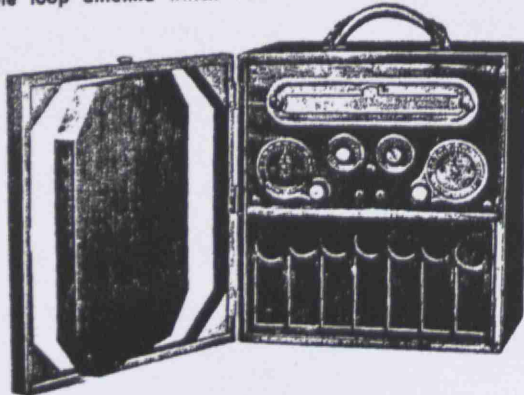
#### RCA COMMUNICATIONS FORMED

In this same year the RCA Communications Company was formed to take over all of the business in trans-oceanic communications.

#### CONSOLIDATED RESEARCH, ENGINEERING, MANUFACTURING AND SALES

In 1930 RCA completed the consolidation in the RCA Victor and Radiotron companies of all facilities of research, engineering, manufacturing, and sales

The "Radiola 26", an early superheterodyne portable receiver. The lid contained a rotatable loop antenna which was also dial-tuned for maximum sensitivity.



of RCA products which now for the first time included phonographs and records. Somewhat later, in 1932, the Photophone business also was taken over by the RCA Victor Company.

Licenses were now being granted to tube manufacturers and the superheterodyne patents were included in the set licenses. Agreements had also been made with a number of foreign radio manufacturers giving RCA rights under their patents and in some cases access to their laboratories.

#### CUNNINGHAM COMPANY BOUGHT

In 1931 the E. T. Cunningham Company was taken over by RCA and consolidated with the RCA Radiotron Company, giving RCA rights to the use of the Cunningham brand and bringing Mr. Cunningham into the RCA organization.

#### ELECTRIC COMPANIES WITHDRAW

The second and final step toward an independent RCA took place in 1932. In 1930 the Government had brought suit against RCA attacking certain exclusive features of the inter-company agreements, and as the result of a consent decree all the stock interest of GE and Westinghouse in RCA was disposed of by those companies. AT&T

had disposed of its stock interest in RCA some years before. Modified cross-license patent agreements were entered into with the approval of the Attorney General and the sanction of the Court. RCA now became a completely self-contained organization with wholly owned subsidiary companies operating a broadcasting business, a communications business, a marine radio business, a radio school, and a manufacturing and merchandising business.

#### DE FOREST COMPANY PURCHASED

In 1934 the tube business was augmented by the purchase of certain patents from the defunct De Forest Radio Company. This brought about the beginning of transmitting tube manufacturing by RCA Radiotron.

#### RCA VICTOR AND RCA RADIOTRON MERGE

In 1935, the manufacturing and merchandising business was further consolidated by the merger of the RCA Radiotron and RCA Victor Companies which now became the RCA Mfg. Co.

#### IMPORTANCE OF DIVERSIFICATION

Before concluding I want to emphasize one phase of the history of RCA which so far I have mentioned only indirectly, yet which stands out with clearness and significance in the whole course of the 18 years of RCA's life. I refer to product diversification. A study of the history of RCA is well worth while if it does no more than demonstrate the value of diversification, and its paramount importance to us in looking toward the future.

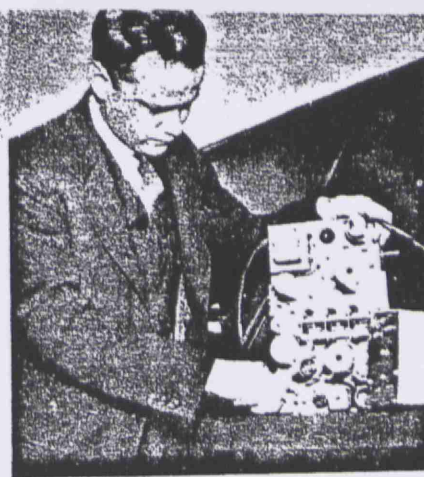
The corporate history is a sort of family tree in which certain elements contributed at the start, but which were later separated from the new growth. I shall use another horticultural analogy to illustrate product diversification.

Certain varieties of trees are responsive to wide differences of training. Two plants may sprout from the ground exactly alike, side by side. One of them may be trained to grow perfectly straight with a central trunk and beautiful symmetry. The other may be trained into a large bush-like growth with many branches.

Two companies may also start in



John B. Coleman inspecting a transmitter in Camden, ca. 1936. Mr. Coleman is presently Manager of BMEWS project.



Dr. Elmer W. Engstrom working on a radio receiver in a Camden research laboratory in 1934



Clarence A. Gunther is shown making receiver tests in a Camden laboratory, ca. 1935. Mr. Gunther is now Chief Defense Engineer, DEP

the same way from small beginnings. One may be concerned with a single product or a narrow field while the other grows many branches, large and small. We may have a great admiration for the tall straight tree, but if a storm comes along and breaks off the top it may be years before it recovers its original form. The same storm has little effect on the other tree. It may pass over without harm or even if a few branches are broken they may be trimmed off without showing.

The one-product company may do admirably in times of prosperity and we may envy its simple operation. But if it meets with changing conditions or times of depression the "one product" may no longer be in demand and the company has nowhere to turn.

Suppose that back in 1921 RCA had said "No, we aren't interested in radio entertainment, we are in the commercial communications business." Again

suppose RCA had looked at talking pictures and said "No, we aren't interested, we are in the radio business." Again, after acquiring the Victor Company suppose RCA Victor had said "We will let the phonograph business die. It doesn't amount to much and we want to sell radio receivers." There are several obvious answers to these suppositions, but the uppermost in our minds probably is that if these things had happened most of us wouldn't have our jobs.

#### PUBLIC SERVICE IS PARAMOUNT

The strength of a company is in a large measure proportional to its service to the public. The RCA has grown as it has extended its fields of public service. It will continue to grow just so long as it utilizes its variety of resources to give the public new or better services, or new or better products.

It should never be forgotten that a

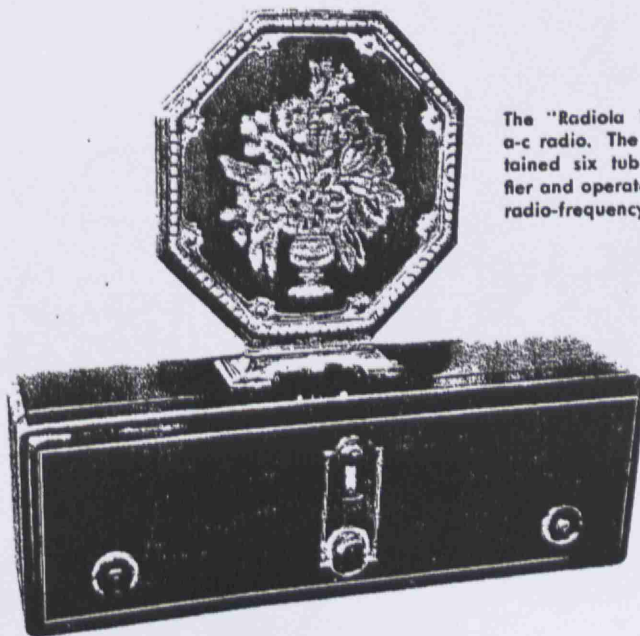
by-product often becomes a main product. Again, the limitations of a product or service today may turn into advantages of tomorrow. The often alleged lack of secrecy in radio communication was once talked of as a handicap, but broadcasting, as its name implies, made good use of this so called handicap.

#### RESEARCH INSURES PROGRESS

Research has played a major part in the evolution of the RCA and must continue to do so. I use the term not alone in a technical sense but broadly—research in sales methods, in advertising, in relations with the public, in better understanding and organization of our personnel, as well as in engineering and manufacturing of our products.

Research provides the new food which the tree needs when the old is exhausted or no longer suitable. The tree must grow or it will die and a company must go ahead or back. It never stands still. RCA has made good use of its resources to expand its fields of activity. But it is a safe prediction that if we live up to our opportunities we will some day look back at 1938 and see that we have now only started to scratch the surface. Facsimile is barely started. Television is still ahead of us. Commercial Sound applications are getting under way. A multitude of ultra-high frequency applications are certain. And outside the field of entertainment fields the field of electronic devices is in its early infancy.

I hope that this brief story of the RCA has served to show something of how far we have come but more important, how much farther we can go in the future.



The "Radiola 17"—the first a-c radio. The receiver contained six tubes plus rectifier and operated on a tuned radio-frequency principle

...school children who rush to the radio every Wednesday night to tune in on the Gang Buster program do not know that Westinghouse's baggy-trousered, self-effacing Frank Conrad is the man who is generally credited with making radio broadcasting a commercial possibility in the U. S.

#### The ubiquitous Mr. Conrad

Invention is seldom a single man's show, but in Westinghouse is one man who has to his credit some 200 patents: He is Frank Conrad, who can never quite remember the year in which he invented anything. This gray, physically unimpressive person never finished the seventh grade. Yet he has been known to predict the performance of a proposed electrical device even before he has worked out the underlying problem mathematically. He picked up his physics and mathematics for himself; capable of anything that is susceptible of scientific information, he is at the moment amusing himself by studying the more abstruse aspects of horticulture.

The round, clocklike watt-hour meter that ticks off the kilowatts in most houses today was one of Conrad's earliest developments, patented when he was twenty-six. This displaced the old square meter which worked poorly and was expensive to make. At 31, Conrad worked out the idea of the pantograph trolley, which is used on electric railroads. The pantograph, which consists of a jointed, self-adjusting steel framework supporting a current-collecting crossbar set at right angles to the so-called catenary overhead wire, is superior to the old fashioned trolley pole in two ways: it won't jump the wire under high speeds and it can collect far more current than the trolley-pole wheel. Moreover, it allows the overhead wire to sway from side to side. Conrad invented the pantograph long before there were electric trains; he did it to please George Westinghouse, who wanted a substitute for the old trolley-pole used on street-cars. Once it was invented it could not be sold, so it hung around uselessly in Westinghouse's attic. But when the railroads began

electrifying in areas where the traffic peaks were congested, the pantograph was hauled out, dusted off, and put into a business that seemed to be specially made for it.

The most recent Conrad invention is an automobile dashboard electric clock. (The patent stands in his own name because Westinghouse did not wish to make this particular type of clock.) But Conrad's most extraordinary feat goes back to a \$5 bet he made that his \$10 watch--his "biscuit"--would keep better time than a friend's expensive importation. That was more than 20 years ago. Just for a gag he secretly substituted \$65 worth of new jewel-movement machinery for the old works. But even this costly Machiavellianism didn't satisfy him. To get the most accurate time reports he set up a wireless in the laboratory over his garage to receive the Arlington time signals from Washington. This started his mind to working on radio, which amused him. He talked across space with sick radio amateurs in hospitals, and played phonograph music to cheer them up. When he ran out of records he invited the boys and girls of his neighborhood to come to his garage and supply vocal programs. A Pittsburgh store started to sell receiving sets to pick up these programs, and this gave Conrad an idea. At that time the best minds in radio were trying to devise a secret, personal method of wireless conversation to compete with the telephone. Avid amateurs, however, were busy picking up all wave lengths. Working on the theory that secrecy was impossible, Conrad proposed that Westinghouse manufacture radio receiving sets and also provide a regular amusement program to go along with them. Westinghouse's Vice President in charge of engineering, H. P. Davis, was impressed with the notion, and the result was KDKA--the first licensed commercial broadcasting station, which put Westinghouse on radio's ground floor.

Later on, Conrad proved to skeptical scientists, including marconi, that short-wave transmission, which was generally considered useless, could be made the basis of long-distance radio broadcasting. In the early twenties Westinghouse pooled its radio patents, including some of Conrads with G.E. and R.C.A. But when the government brought suit, both Westinghouse and G.E. withdrew from the arrangement with



R.C.A., ultimately disposing of their R.C.A. stock, principally by paying it out in the form of dividends to their stockholders.

WESTINGHOUSE  
ELECTRIC & MANUFACTURING COMPANY

FROM Miscellaneous Eng. Dept.

DATE October 16, 1935

SUBJECT WESTINGHOUSE ACHIEVEMENTS

Mr. H. W. Cope,  
Assistant to Vice President

As one of the Westinghouse achievements, the following notes on our early broadcasting may be of service to you in compiling your list of achievements.

The status of radio before the World War was that of a medium of communication restricted all most exclusively to ship service with a few high power land stations for long distance communication. All this communication was carried out by means of telegraph code, telephone apparatus not being available in spite of the fact that as early as 1907 Professor Fessenden had demonstrated the possibilities of radio-telephone communication. However the lack of satisfactory equipment prevented any commercial utilization of Professor Fessenden's developments. The urgent need for communication during the World War greatly stimulated the development of radio devices, the principal item of which was the vacuum tube. This vacuum tube made possible a commercial form of radio-telephone equipment. During the War, the Westinghouse Company undertook to develop and produce certain radio devices for the Army and Navy and the close of the activity left the Company with a considerable amount of manufacturing facilities for which they attempted to develop some commercial outlet. As a possibility in this direction, an attempt was made to produce apparatus suited to point-to-point communication - that is between a given transmitter and receiver, and the first step in this direction was to equip several of our own Works with transmitting and receiving apparatus which would permit interchange of company business.

The writer who was very much interested in this work had, previous to this, constructed at his home a transmitting set which was operated under a license from the Department of Commerce, permitting him to carry on experimental work. To operate a transmitting station it has always been necessary to obtain a government license and such license specifies the particular purpose for which the transmitter is to be used. The possible purposes were divided up into several headings, namely amateur stations which were stations to be used for non-commercial purposes and which were restricted in wave length and power. Experimental stations which were assumed to be used in the development of radio art. Commercial stations which were to be used for transmitting of commercial messages. At that time there was no provision for licensing of stations to be used for broadcasting, that is transmitting messages which were to be picked up by many listeners. In applying for a license for a particular class of service it is, of course, necessary for the applicant to show that he can efficiently perform the service corresponding to the class of license he is applying for. In the case of an experimental station, it was necessary to demonstrate to the Department of Commerce that the applicant was possessed of the necessary facilities to carry on development work, and in the case of my own license, it was indicated that this work was to be carried out in the interests of the Westinghouse Company and that their resources were

available. A license of this type permitted the writer to operate his station as a broadcast station, that is to transmit material which would be of interest to many listeners as it was in the nature of a development of this kind of service. As you know, there was a ban placed on the operation of any radio equipment during the War period. This ban, as far as receiving was concerned, was lifted in November 1919. The general ban on transmitters was not lifted until some time later, although in view of the fact that the writer possessed a permit to operate during the War period, he was able to transmit as soon as the receiving ban was lifted and to meet the requests of many outside listeners a regular schedule was established for transmitting every Saturday night, and later on this was extended to include a Wednesday night program as well. This schedule was carried out with a certain amount of regularity during the whole of 1920, and the general interest which it aroused was instrumental in convincing our executives, particularly Mr. H. P. Davis that there was a big field in broadcasting, although the possibilities of this field were very much depreciated by both the General Electric Company and Radio Corporation whose interests were largely in the development of a commercial point-to-point message service.

When the Company decided to seriously enter the broadcasting field it was apparent that a good time to make a start would be at the time of some event which was of national interest and as the Presidential election occurred that year this was selected as a very suitable beginning date. Accordingly provisions were made for broadcasting the results of the election of November 1920. At the time of this first broadcast from the Company's plant there of course was no provision in the licensing requirements of the Department of Commerce to license regular broadcasting stations; accordingly, it was necessary to carry these first broadcasts on under an experimental permit. This experimental permit was extended for several months, at the end of which time a formal broadcasting license was issued, and up until the time when broadcasting as a radio activity was included in the Department of Commerce licensing condition there, of course, were no formal broadcast stations, and it is the writer's recollection that K.D.K.A. did not receive the first broadcasting license, but that it was assigned to one of the other Company stations. However, as a date of beginning a broadcasting service, the writer's station 8XK can establish November 1919, as such a date. This was carried on experimentally during the most of 1920 by 8XK and during the end of 1920 and part of 1921 by K.D.K.A. in an experimental way until a formal broadcasting license was issued.

I assume you will not make any comparisons with other stations but for your own information the following is as near as the writer can remember the history of the station now operated by the Detroit News.

This station is the outgrowth of an amateur station operated in Detroit by two amateur operators and first licensed as an amateur station in August 1920. Like the writer's station 8XK it was operated with more or less regularity during the balance of 1920 and for some period of 1921. A formal broadcast license under the call W.W.J. was finally issued to the Detroit News some time in 1921, but at a later period than that of several of the Westinghouse stations. The Detroit News' claim of priority is based on a comparison of the date for the issuing of the amateur license in Detroit to that of K.D.K.A.'s first broadcast in November 1920. However, this date should actually compare with the writer's first regular broadcast in November 1919.

It is, of course, a matter of record at the Radio Department in Washington as to just when the various licenses were issued, and in your final write-up of the Westinghouse achievements it would probably be well to add these dates which, although the writer has not available at this time, can be readily obtained.

Another achievement of the Westinghouse organization was the demonstration of the possibilities of the so called short radio waves as a medium for long distance transmission. In the early days of radio, the laws governing the propagation of radio waves were determined largely from experiments made on the then existing long wave government stations, and over the range of wave lengths investigated it was found that transmission conditioning improved steadily with an increase in wave length, and it was assumed that this law would hold good even over ranges of wave lengths not then investigated. Quite elaborate mathematical formulae were developed which allowed fairly accurate determinations of power required for given distance of transmission for the wave lengths then contemplated. These formulae indicated that for wave lengths below 200 or 300 meters the transmission would be comparatively unsatisfactory and for this reason there was assigned to the use of amateur stations wave lengths of 200 meters and under. That is, all amateur stations were restricted to use a wave length of not over 200 meters. During the early part of 1921 some experimental work carried out by the writer indicated to him that the previous accepted laws did not hold true on wave lengths below 100 meters and he accordingly setup some transmitting equipment here at Pittsburgh and to permit of tests being carried on at a distance he furnished equipment to some experimenters located in other cities, notably Boston. Tests carried on with the Boston station indicated a very great improvement in transmission when the wave lengths were reduced to that of the order of 60 meters or under. Accordingly a transmitter was setup here at East Pittsburgh which was operated at 60 meters and which was supplied the same program as that supplied to the regular transmitter of W.D.K.A. The operation of this transmitter resulted in the accumulation of data over a wide area and which demonstrated the uses of the short wave lengths and medium of long distance transmission, and the result of these tests finally influenced the Radio Corporation to practically abandon their long wave stations and install short wave stations which, at the present time, carry practically all of their long distance message service. In addition to this, the Telephone Company have put in short wave transmitters which permit telephone communication with practically the whole world.

An interesting incident in this connection is the fact that the Telephone Company about 192\_ in endeavoring to stage a demonstration of long distance telephony built up a transmitter consisting of several hundred of the receiving tubes then available and demonstrated the reception of telephone signals in Europe. The wave length selected was that of the Naval Station at Arlington, namely 2500 meters. In the light of our experimentation with the short waves it would have been possible for the Telephone Company to have carried out this demonstration on one of the short wave lengths with four or five of the receiving tubes as a transmitter, rather than the several hundred, and the Telephone Company actually referred to this experiment as proof that radio was not a feasible method of long distance telephone transmission.

Mr. H. W. Cope

-4-

October 16, 1935

I of course assume that in your writeup, the conditions leading up to some of these achievements would not be included but this is given for your information in order that you may make up a more effective story.

F. Conrad  
Asst. Chief Engineer

# The History of Broadcasting in the United States

*By* H. P. DAVIS, Vice-President

Westinghouse Electric & Manufacturing Co.



An address delivered before the Graduate School of  
Business Administration, Harvard University,  
April 21, 1928

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The advances made by civilization have been very largely in proportion to the development of communication. Starting with mouth to mouth and eye to eye contact, progressively through the ages there has been a gradual evolution of mass communication, until, in our present day, it is exemplified and developed in many ways.

## Mass Communication

It is hard even for one who has seen in his lifetime the awakening of this mighty colossus—*asleep since the beginning of time*—to realize the amazing achievements and developments of the twentieth century in mass communication. To you, of the present generation, the perspective is less clear, therefore not so intimate, and is looked upon more in a matter of fact way. Yet no longer than 61 years ago a prominent Boston newspaper published the following article:

"A man about 46 years of age, giving the name of Joshua Coppersmith, has been arrested in New York for attempting to extort funds from ignorant and superstitious people by exhibiting a device which he says will convey the human voice any distance over metallic wires so that it will be heard by the listener at the other end. He calls the instrument a 'telephone' which is obviously intended to imitate the word 'telegraph' and win the confidence of those who know of the success of the latter instrument without understanding the principles on which it is based.

"Well-informed people know that it is impossible to transmit the human voice over wires as may be done with dots and dashes and signals of the Morse Code, and that, were it possible to do so, the thing would be of no practical value. The authorities who apprehended this criminal are to be congratulated and it is hoped that his punishment will be prompt and fitting, that it may serve as an example to other conscienceless schemers who enrich themselves at the expense of their fellow creatures."

The youngest but the most promising addition to these facilities for mass communication is radio broadcasting.

### Experiments Prior to World War

Attempts had been made, and some successful results had been accomplished, prior to the World War, in adapting telephonic principles to radio communications. Reginald Fessenden, probably the first to attempt this, transmitted a program Christmas Eve 1906. Later, Mr. Lee DeForrest did the same in the development of his apparatus. No real service, however, was attempted or introduced of a character similar to that now known as radio broadcasting. The war bringing an end to independent development work, attention was concentrated on such applications of radio as would be helpful in military operations, and the various Governments engaged in the conflict enlisted the aid of all the large electrical companies that had facilities available.

The Westinghouse Electric & Manufacturing Company, having extensive research, engineering and manufacturing facilities of a nature suitable for this branch of electric science, was requested by the British Government, shortly after the outbreak of the war, to undertake certain special work in radio. Considerable study on the part of Westinghouse engineers was devoted to this, but no special progress was made of a permanent character, as our own Government began an attempt to develop such facilities, foreseeing the possibility of needing them later.

This activity took form in several fields. One, however, was the development of radio transmitting and receiving apparatus, both telegraphic and telephonic. In order to carry out this work it was necessary to have transmitting and receiving stations, and by special license from our Government, the Westinghouse Electric & Manufacturing Company was permitted to build and operate such facilities for experimental purposes.

Two stations were designed, equipped and operated during the war. One was located near its plant at East Pittsburgh, Pennsylvania, and the other at the home of Dr. Frank Conrad in the Pittsburgh residential district, a distance of four or five miles separating the two stations. The calls of these stations were—2WM and 2WE.

Your speaker was in charge of the Westinghouse Company's war activities. Dr. Conrad was then serving as one of his assistants and among other things was especially assigned to radio work. Dr. Conrad's work was very closely coordinated with that of the United States Signal Corps.

Dr. Conrad became very much engrossed in this work, and in characteristic manner began to do research, developing new ideas and making important advances in the art. As a result, a considerable amount of money was invested in this equipment and a large staff of experts organized.

With the end of the war, the Company found itself with this investment and organization on its hands, and the re-establishment of patent restrictions, most of which were adversely held, placed the Company in a position of considerable difficulty in continuing this work. The progress that had been made during the war period, however, encouraged it to continue. Seeking a way to establish itself in the industry, negotiations were undertaken, and finally successfully concluded, whereby a controlling interest was purchased in the International Radio Telegraph Company which owned many important fundamental radio patents.

The International Radio Telegraph Company owned and operated several ship-to-shore radio stations, and was a pioneer in this field. The operation and development of this service immediately became a part of Westinghouse activities.

### Seek to Develop Radio Service

A large sum of money having been expended for the control of the International Radio Telegraph Company emphasized in our minds the necessity for developing our new acquisition into a service which would broaden, popularize and commercialize radio to a greater extent than existed at that time, in order to earn some return on this investment as well as to keep the radio organization together.

In seeking a revenue-returning service, the thought occurred to broadcast a news service regularly from our ship-to-shore stations to the ships. This thought was followed up but nothing was accomplished because of the negative reaction obtained from those organizations whom we desired to furnish this news material service. However, the thought of accomplishing something which would realize the service referred to, still persisted in our minds.

During this period Dr. Conrad had continued his experiments with the station at his home and had greatly improved his radio telephone transmitter. Following the date on which Government restrictions were removed from radio stations, Dr. Conrad quite regularly had operated this radio telephone transmitter to send out interesting programs of one kind or another, and to such an extent that people with receiving sets became sufficiently interested to listen to his station.



The program material available to him was largely phonograph records, although there were some talks, baseball and football scores. The station, whose call letters had been changed, was then designated as 8XX and was known as one of the best amateur stations in the country.

### Effect of Newspaper Ad

We were watching this activity very closely. In the early part of the following year the thought came which led to the initiation of a regular broadcast service. An advertisement of a local department store in a Pittsburgh newspaper, calling attention to a stock of radio receivers which could be used to receive the programs sent out by Dr. Conrad, caused the thought to come to me that the efforts that were then being made to develop radio telephony as a confidential means of communication were wrong, and that instead its field was really one of wide publicity; in fact the only means of instantaneous collective communication ever devised. Right in our grasp, therefore, we had that service which we had been thinking about and endeavoring to formulate.

Here was an idea of limitless opportunity if it could be "put across". A little study of this thought developed great possibilities. It was felt that here was something that would make a new public service of a kind certain to create epochal changes in the then accepted everyday affairs, quite as vital as had the introduction of the telephone and telegraph, or the application of electricity to lighting and to power.

We became convinced that we had in our hands, in this idea, the instrument that would prove to be the greatest and most direct mass communicational and mass educational means that had ever appeared. The natural fascination of its mystery, coupled with its ability to annihilate distance, would attract, interest and open many avenues to bring ease and happiness into human lives. It was obviously a form of service of universal application, that could be rendered without favor and without price.

### Decided to Start Station

Resulting from this idea was the decision to install a broadcasting station at East Pittsburgh and to initiate this service. This decision was made early in 1920, although it was not until fall that the equipment was ready for operation. In the interim, we held many interesting and now really historical conferences to plan our undertaking.

Dr. Frank Conrad, Assistant Chief Engineer; Mr. J. C. McQuiston, General Advertising Manager; Mr. S. M. Kintner, Manager of Research Department; Mr. O. S. Schairer,

Manager Patent Department; Mr. L. W. Chubb, Manager R Engineering Department, and Mr. M. C. Rypinski, Sales Department—all of the Westinghouse Electric & Manufacturing Company—participated in these conferences, and it was their experience, advice, constant faith and loyal efforts in the undertaking and the development that followed that carried the project to success.

### Cooperation of Press

One of the earliest decisions was the necessity of building and obtaining necessary public interest in our efforts through cooperation of the daily press. It happened that we were fortunately situated to accomplish this. Mr. A. E. Braun, directing head of the Pittsburgh Post, a morning paper, and Pittsburgh Sun, an evening paper, was an officer in the International Radio Telegraph Company, and the cooperation of these papers and his hearty support were immediately forthcoming. This, with Mr. McQuiston's acquaintanceship and contacts through other press channels, and his work with Mr. Braun, added much to building up the public interest which led to the final great success of the venture.

### Main Objectives

The main objectives which we laid down as basic have guided our radio broadcasting ever since, and were—

1. To work, hand in hand, with the press, recognizing that only by published programs could the public fully appreciate broadcasting service.
2. To provide a type of program that would be of interest and benefit to the greatest number, touching the lives of young and old, men and women, in various stages and conditions of life.
3. To avoid monotony by introducing variety in our speeches, etc.
4. To have distinctive features so timed as to assure coming on at regular periods every evening; in other words, as a railroad does by its time-table.
5. To be continuous. That is, operate every day of the year. KDKA has operated without a break in schedule since the opening of the station.

In our discussion the subject of the first program was a matter of very careful deliberation. We wanted to do something unique—we wanted to make it spectacular; we wanted it to attract attention.

## First Program Spectacular

It happened that 1920 was the presidential election year, and the happy thought occurred to us to open our station on the night of the election returns and to broadcast this news. Through the cooperation of Mr. Braun our plans matured with the decision to open on November 2, 1920—which we did—and the result was the historical broadcast by KDKA of the Harding election. The election returns were gathered in the office of the Pittsburgh Post, in Pittsburgh, and from there telephoned to East Pittsburgh where they were relayed by another operator and broadcast by this new service.

A broadcasting station is a rather useless enterprise unless there is someone to listen to it. Here was an innovation, and even though advertised, few then, other than possibly some of the amateurs who had receiving sets, could listen to us. To meet this situation we had a number of simple receiving outfits manufactured. These we distributed among friends and to several of the officers of the Company. Thus was the first broadcast audience drafted.

## Broadcasting Begins

As a matter of historical record and sequence in the origin and progress of radio broadcasting as a public service, the following chronicle of events is important:

After a period of testing and experimental operation, the Westinghouse Electric & Manufacturing Company on November 2, 1920, at East Pittsburgh, Pa., put into operation the first broadcasting station in the world, now known as KDKA, and transmitted as its first program the returns of the Harding presidential election. Following this, a daily program from 8:30 to 9:30 P. M. was immediately instituted. The daily schedule of the station has been continued without interruption up to the present time.

After nine months of continuous operation of Station KDKA, the Westinghouse Company opened WBZ at Springfield, Mass., in September, 1921; followed on October 12, 1921 by WJZ at Newark, N. J., and on November 11, 1921, by KYW at Chicago, Illinois.

It was not until the summer of the next year that any other stations of prominence were placed into operation, and very few then, as it was a considerable time later that the great rush for wavelengths took place and the confusion introduced that now exists in the broadcasting wavebands.

Our first broadcasting was from a rough box affair upon the roof of one of the taller buildings at the plant, which still stands

there although no longer in use, and the development of the broadcasting studio is an interesting story.

## Broadcast Westinghouse Band

In the first few months of operation of KDKA, program material was drawn largely from phonograph records. It was recognized almost immediately by us, however, that no great interest or progress in broadcasting service would be possible if material differing from this type of entertainment were not available. The Westinghouse employes have always had a number of musical organizations, among them a very good band. We decided to broadcast this. Later, we organized the KDKA Little Symphony Orchestra.

Our phonograph was operated in the room in which the transmitter was located, and the announcer and others who had taken part in the program up to this time also had been using this room. With larger aggregations of talent, however, it was necessary to seek bigger quarters, so one of the auditoriums at East Pittsburgh was put into use. We immediately had difficulty in obtaining fidelity in the broadcast, due, apparently, to room resonance. To correct this, we thought of placing the band in the open air and to transmit from out-of-doors. When this was done the result was a marked improvement. As a result of this, we saw at once that if we wished to accomplish good sound reproduction, specially designed rooms would be required to broadcast from—but how, was not clearly apparent and in addition the expense incident to it was a serious problem.

As the warmer weather was approaching, we decided to broadcast our artists from this open air studio which, as before stated, was on the roof of one of the taller buildings at the plant. For protection we erected a tent. This proved good, and everything went along satisfactorily during the summer and early fall, until one night a high wind blew the tent away—and so our first studio passed out and into history.

## Move Studio Indoors

Necessity has always been the mother of invention, and having managed to keep our service going for nearly a year we could not think of discontinuing it because we had no studio—but we saw that we would have to go indoors. We, therefore, decided to try the tent inside. Part of the top floor of this high building was cleared and the tent "pitched" on this floor. We were pleased to find that it worked as effectively as it had out-of-doors. Thus was the first indoor broadcasting studio developed.

The subject of a specially constructed studio, however, was again revived and designs prepared for it. Taking the lesson of the tent to heart, we draped the whole interior of the new studio with the cheapest material we had available—burlap. We had now all the elements of the present studio.

The principles that were originated by our experience have governed the design of the present-day studios, but the lowly burlap has changed its name to the more dignified name of monk's cloth. Other materials, however, have been developed in this intervening period, and the walls, ceilings and floors of studios are now built of materials which are non-resonant in character so that the use of monk's cloth is required less than formerly.

One cannot but be impressed with what radio has accomplished in a few short years when one compares this first tent studio with the wonderful studios and equipment of the National Broadcasting Company.

### The Amateurs Rebel

KDKA had in the beginning a power of only 100 watts, but this was, of course, more powerful than the transmitting sets used by amateurs in those days. The amateurs, until our advent, had the field to themselves and had enjoyed the entire freedom of the air.

Our broadcasting transmitter coming into the picture was obviously not received with open arms by them as the continuous operation of the transmitter interfered to a large extent with their work. At that time most amateurs were using spark sets, and our broadcasting in turn was seriously marred by interference from that source. It came to a point of more or less open warfare, with the amateur operators, if anything, having the best of it.

It must be said, however, to the credit of the amateurs, that later when it was evident to them that the public was seriously interested in our efforts, their organization formulated rules of ethics, which, when observed, quite materially corrected this condition.

You can appreciate from this that the first year of our operations was beset with many difficulties and discouragements, and many discussions were had as to whether the game was worth the candle. But we persisted.

### Westinghouse Executives Lend Support

I am happy to pay tribute to the late General Guy E. Tripp, Chairman of the Board of Directors of the Westinghouse Electric & Manufacturing Company, and to Mr. E. M. Herr, President,

for their broad-minded support and patience. They had confidence in us and backed the undertaking in a personal way, as well as with contributions from the Company's funds to develop this new service. Finally, these efforts were rewarded by an aroused interest on the part of the public—an interest that grew almost to fever pitch in a stampede late in the year 1921, overwhelming an industry wholly unprepared for it.

### Public Interest Awakened

Radio broadcasting became a conversational topic as universal as the weather, and the spell of it became world wide. It is probably a fact that when the response came, no facility or service ever received such a reaction from the public or grew so fast in popularity, when the public was awakened to what it really was. When this happened, almost over night a scientific novelty and a hazardous experiment was transformed into a wide-spread and popular public service.

Thus was radio telephone broadcasting born—a new public service; a service for the benefit or entertainment of any one who might possess even the simplest receiving equipment. The secret of the success of the enterprise lay in the fact that there were then no interfering stations, and because of this only very simple receiving sets were required to "listen in". This was fortunate, as there was nothing else and the available sets were cheap. Being telephonic, the communications could be understood by every one. They required no translation and were substantially unlimited as to the character of the subject matter that might be transmitted and received. In addition, there was the marvel and fascination of listening to messages received out of space with very simple and inexpensive apparatus.

### Newspapers Assisted Growth

We attribute much of this public response to the press work we had been doing. From the start we had sent our announcements and copies of programs to a list of representative newspapers. At first these schedules were typewritten and went to a limited list, but later they were printed, a larger list used, and an organized program of information was carried out in a magazine, which we started, called "Radio Broadcasting News" and sent to about 2000 newspapers. It was not long before KDKA's programs were printed in newspapers all over the United States and in every province of Canada.

In addition to this, a factor which probably contributed much to the success of broadcasting at this time was that broadcasting was done regularly, at well advertised times of the day or

night, and the programs consisted of matter that was of general interest—worth listening to.

Briefly, we endeavored to render a real public service, with regularity, presenting well planned, high grade, interesting and timely advertised programs. It was our conception that it could be made a valuable service different from anything then in existence and adapted to accomplish something entirely new, which was the distinguishing characteristic of our undertaking. This, and our sense of duty to the listening public, assisted in firmly establishing this effort as a definite and all-embracing service.

### Church Service Begins

The first real pick-up service ever attempted was that of the services of the Calvary Episcopal Church of Pittsburgh. Here, again, is an interesting story.

We had been sending out originally, as previously indicated, music and entertainment from phonograph records, and as we had determined to broadcast every day we naturally included Sunday. Our week-day form of program material did not seem quite suitable for Sunday evening purposes. Accordingly, we had a discussion about the matter and the happy suggestion was made—"Why not try to broadcast a church service". But how?

After consideration of the difficulties involved, especially in picking it up, a plan was worked out which we felt would make the technical part possible. As music was the principal make-up of our program, our thought naturally gravitated to the Episcopal service. It so happened that one of our engineers was a member of the choir of the Calvary Episcopal Church in the East Liberty section of Pittsburgh. He was called in, the matter explained to him, and he promised to see what could be done.

We were to learn later that fortune was with us in this thought to the extent that the Rector of that Church—Dr. E. J. van Etten, who is a broad-minded, far-sighted and progressive individual—immediately was interested in our proposal and a connection was formed then that has continued to the present day.

On January 2, 1921, the daring experiment was made of broadcasting the services of Calvary Episcopal Church. This was successful, and was so well received that it became a regular feature.

### Dr. van Etten, First Radio Minister

Dr. van Etten was the first minister whose church services were broadcast. His was the first voice to be heard in a broadcasting of divine services, and he has undoubtedly, through his enthusiasm in this work, done more to bring happiness and religious comfort to the masses of people than any other living man.

The broadcasting of church service alone, which was initiated by KDKA, was in itself sufficient to make radio broadcasting permanent and invaluable. The innovation was at once unique and compelling in its appeal to people of all ages, classes and denominations, and it has proved to be one of the greatest, most popular and beneficent features ever presented. Even today it is doing more to enlarge the church's sphere of influence than any medium heretofore employed.

It is my belief that the happy thought that led to the inclusion of a church in our broadcasting, and our success in selecting the church that we did, the idea of cooperating with the press and the public interest that we gained through it, coupled with our feeling of responsibility and with our unbounded confidence in the future of the service which we had initiated and were developing, and the soundness of the principles we had laid down for our guidance, formed the solid foundation upon which this whole broadcasting industry has been built.

Recognizing the need of expert advice in the development of programs, we sought the cooperation of Mr. Harvey Gaul, the musical director of Calvary Episcopal Church, to assist us in determining the best selection of artists and music. Mr. Gaul was thus the first radio impresario and during the period he was with us he made some valuable contributions to radio musical lore and broadcasting technique.

### Early Forecasting

There is a common saying that "hind sight is better than foresight", and in the light of today's accomplishments it is easy to ascribe many virtues to ourselves and to our undertaking.

But what do the records show? In an article which I wrote in February, 1921, only three months after regular broadcasting had been established, the following truly prophetic statements were made:

"The adaptability of the radiophone to broadcasting reports, news, entertainments, concerts, lectures, etc., creates a field particularly its own.

"It is quite possible that especially constructed transmitting rooms will be provided for such purposes, so that voices and music will be broadcast through unbounded areas and listened to by invisible and widely distributed audiences of vast numbers. The same opportunities would thus exist for the country dweller as for the city resident, and inmates of hospitals and sanitariums, and sick people and invalids in the home, would have opportunities for pleasures and diversions now denied them.

"The importance of reaching such tremendous numbers of people, with practically no effort, offers great possibilities for advertising and the distribution of news and important facts, and in reality introduces a 'universal speaking service'. It is not unreasonable to predict that the time will come when almost every home will include in its furnishings some sort of loudspeaking radio receiving instrument, which can be put into operation at will, permitting the householder to be in more or less constant touch with the outside world through these broadcasting agencies.

"The field of radio application is practically unlimited in the important

affairs of the world, and this development will mark one of the great steps in the progress and evolution of mankind."

Again, in another article which I prepared in January, 1922, the following appears:

"And where will it end? What are the limitations? Who dares to predict? Relays will permit one station to pass its message on to another, and we may easily expect to hear in an outlying farm in Maine some great artist singing into a microphone many thousand miles away. A receiving set in every home; in every hotel room; in every school room; in every hospital room. Why not? It is not so much a question of possibility—it is rather a question of 'how soon'."

*A dream then has become a reality now.*

### Pioneer Records

As part of the pioneer records of KDKA we have the honor to record that Honorable Herbert Hoover's first radio broadcast address was transmitted by KDKA. The address was presented during a dinner held at the Duquesne Club, Pittsburgh, Pa., January 15, 1921, to raise funds for European relief work. Mr. Hoover's pioneer address was followed by addresses of others of prominence. Our records reveal that on February 18, 1921, KDKA transmitted the address of Miss Alice M. Robertson, then Congresswoman-elect from Oklahoma, the first woman elected to Congress, and Colonel Theodore Roosevelt, Jr. Their addresses were delivered before the Pittsburgh Press Club.

One month later, on March 19, 1921, three members of the President's Cabinet addressed the audience of KDKA. These were Honorable Andrew W. Mellon, Secretary of the Treasury; Honorable James J. Davis, Secretary of Labor, and Honorable John W. Weeks, Secretary of War. At another time Honorable William Jennings Bryan made his first radio address over KDKA.

In the history of KDKA's broadcasting there have been a host of world-famous people who have addressed the station's radio audience. The pioneer speakers were of such high calibre that they surely set up a precedent for those who followed.

### Famous Radio Events

Then, in the following months, KDKA rapidly developed and presented a series of "firsts" in broadcasting history. Among these "firsts" were the re-transmission of Arlington Time Signals at 10:00 o'clock nightly. The time signal service introduced a few days after the start of KDKA became at once, and has so remained, one of the most popular and appreciated of radio features.

After the time signals, KDKA introduced the first sports events by broadcast, the occasion being a boxing contest between Johnny Ray and Johnny Dundee, held in Motor Square Garden, Pittsburgh, April 11, 1921. Both boxers, I might add, have long since retired.

Next, on May 9, 1921, KDKA broadcast from the stage of the Davis Theatre in Pittsburgh, the first theatrical program in history. On August 4, 5, 6, 1921, KDKA first broadcast tennis matches, the occasion being the Davis Cup matches held at the Allegheny Country Club, Sewickley, Pa., about 25 miles distant from the transmitting station. On August 5, 1921, KDKA transmitted the first play-by-play account of a baseball game held in the National League Park at Pittsburgh.

These pioneer athletic events were the forerunners of the tremendously interesting sports broadcasts with which the American public has been so well entertained in later years.

One of the first broadcasts made from WJZ was the World Series baseball games, with one of the New York teams as a contender.

KYW's first program was an auspicious one, it being the transmission of Grand Opera direct from the stage by artists of the Chicago Civic Opera Company. This program was the pioneer of the many delightful operatic programs which we have enjoyed in the past and which, I am happy to say, are still a tremendously interesting feature of chain hook-ups.

### Story of Farm Service

In the efforts to develop a diversified program, the agricultural population, of vast importance to any agency attempting to interest all of the people of the United States, was not overlooked. To the contrary, it is another striking instance of KDKA's pioneering that the station was the first to conduct a regular farm service, which included not only livestock, hay and grain reports, but also weather forecasts. On May 19, 1921, KDKA was authorized to broadcast government market reports and immediately began this service. Since that beginning, market reports which, from time to time, have been expanded in scope, have been a nightly feature of Westinghouse broadcasting stations.

Station KFKX, now located in Chicago, is one of the very few stations whose programs are almost exclusively devoted to farm subjects.

### Entire City Available for Programs

To reach the wide field of program material, an extensive system of pick-ups was worked out in Pittsburgh covering some thirty points of contact with events of public interest. Included in this arrangement are schools, churches, theatres, hotels, athletic fields, and halls, with special studios at one University and two hotels.

KYW, Chicago, and WBZ, Springfield, have similar but less extensive systems of pick-up. In the case of WBZ there is the striking feature of a line connection with Boston, 100 miles long, giving an additional pick-up system in that city and including also several studios.

This was all pioneering, and in the development of programs for our service was the endeavor constantly made to develop new and unusual features, as it is these that attract special attention, maintain public interest and win the greatest applause. It can be stated as a fact that there is hardly an element in program service today that was not covered in these early undertakings. In other words, the Westinghouse Electric & Manufacturing Company not only created broadcasting but has been one of the most active forces in developing it.

### Announcers' School

We soon found that training announcers in diction and pronunciation was necessary, since for every mispronounced word we were certain to receive many letters of criticism. This condition prompted us to start an announcers' school, under the capable direction of Mr. T. H. Bailey Whipple, our Literary Critic, who held daily rehearsals of the various announcements to be made.

Most opportunely for us, we were able to secure the services of Miss Marjorie Stewart who, although blind, wrote daily constructive criticisms of all programs, pointing out where improvements might be effected. She thus became the first radio critic and due to her exceptionally keen perception, false notes in our broadcasting, exceedingly difficult for the program manager to detect before delivery of the actual program, were eradicated.

### Feel Public's Pulse by Letters

We continually felt the pulse of the public through the thousands of letters sent to us, to determine their wishes in program arrangement. Some of these early letters were very interesting and instructive, and because of them we were from the very first led to maintain a high standard, not only in musical offerings but also in the lectures, addresses and other forms of program. It is believed that because the most important broadcasting stations have maintained their quality of program the radio listeners in the mass appreciate the quality offering more than one of ordinary grade. Broadcasting, without question, has had an uplifting effect upon the taste of the public in music—a fact well appreciated by the musical fraternity.

### Develop Modulation Meter

It was very soon discovered that the characteristics of the microphone were quite different from those of the human ear. The microphone responds to certain frequencies more readily than to others. Consequently, a grouping in a studio that would be satisfactory to the ear direct might not be at all pleasing when heard over the radio.

A little experience showed that it was necessary to determine accurate standards that can be applied in advance to assure that music as reproduced in the receiver, is properly balanced—that is, proper blending of high and low tones and also proper relation of volume of accompaniment and leading melodies.

Musical tones vary in pitch from the lowest tone on the piano which produces 27 vibrations per second, to the highest tone of more than 4000 vibrations per second. These fundamental tones are superimposed by higher harmonics which determine the nature of the tone produced thus making it possible to distinguish between the violin, flute, clarinet, trumpet, etc., or the most complicated sound, which is the human voice.

To provide a means of control, a modulation meter calibrated from 1-100 was devised. This instrument is now standard equipment in every transmitter. It is used to study the effect of different kinds of music or frequencies upon the current in the modulating tubes—an important factor that determines the quality of broadcasting. Over-modulation causes distortion, and under-modulation gives too weak a signal, difficult to reproduce clearly on the receiving sets.

For a given volume of sound a high pitched tone produces a higher reading on the modulation meter than a lower tone—that is, the higher tones more easily produce distortion of music. This fact makes it evident that the arrangement of instruments in an orchestra, for example, when broadcasting, must be different from that of the usual set-up in an auditorium. It was found that the lower pitched instruments must be placed nearer the microphone than those of higher pitch. On the basis of data compiled on a large number of observations and careful checking of the music actually produced in the studio, and the results obtained on a receiving set, a series of charts was worked out by Mr. A. G. Popek, one of the Westinghouse Electric & Manufacturing Company's engineers, showing the proper location of soloists and piano, also the proper grouping of instruments of various combinations as quartets, orchestra, band, etc.

## Chart Studio Acoustics

Of course, these charts were related to the acoustics of the studio and also to the type of microphone used. For this reason, as the art progressed, it was necessary to make changes in the placing of artists before the microphone.

Greater distance from the microphone is now possible on account of the improvements that have been made in the microphones, and the amplifiers used. The old-time carbon microphone had a strong frying undertone, or "ground tone", the volume of which was a considerable percentage of the volume of music to be broadcast. Up-to-date apparatus has reduced this ground tone to a very small percentage of the sound to be broadcast, and consequently greater amplification is used which results in greater possible distance between performer and microphone.

This increase in distance has simplified the problem of the proper placing of orchestra, for example. The musicians are not crowded about the microphone. The increase in distance has decreased the percentage of error due to slight departures from the proper placing of performers. In fact, the music in an auditorium can be picked up successfully with the regular seating of the orchestra by locating one or more microphones at the proper points.

The results accomplished by this kind of work, together with the work done on microphones and improvements in design of transmitters, have brought about much improvement in transmitting programs of the higher quality with greater fidelity, and if the radio audience use receiving equipment, particularly amplifiers and loud speakers, which will successfully reproduce all the frequencies that are transmitted, nearly perfect reception is possible.

## Short Wave Work

Meanwhile, KDKA was reaching out and pioneering in a branch of development of the radio art which now bids fair to be the most important in the science of communication. I refer to the work that the Westinghouse Company's engineers have done in short wave transmission, and from which much is expected by radio engineers.

Early in 1922 we were convinced that there were wonderful possibilities which were being overlooked in the then unused and rather despised short wave bands, considerably lower than those then in use for broadcasting and for communication. An experimental station known as KDPM was installed at the Westinghouse Company's plant at Cleveland, Ohio, and serious work was undertaken between KDKA at East Pittsburgh and this station in an

investigation of the subject of short wave transmission and re-broadcasting. Since that time, research and development work in this branch of the art have been carried on continuously and vigorously.

In the fall of 1923 the Westinghouse Company located a re-broadcasting station at Hastings, Nebraska, it becoming the well-known KFKX. At this point short wave transmissions from KDKA were nightly received and re-broadcast on the station's assigned wavelength.

## Great Britain Relays KDKA

On New Year's Eve, 1923, through previous arrangement, KDKA transmitted a short wave program to Great Britain. This program was re-broadcast to British listeners through a station operated by the Metropolitan Vickers Company at Manchester, England, and was the first internationally broadcast program, as well as the first to be rebroadcast.

This work in short wave transmission led us to continue striving for distance. On December 12, 1924, KDKA's short wave program was received and re-transmitted in Johannesburg, South Africa, by a newspaper there—The Johannesburg Star—and a few weeks later, January 25, 1925, we transmitted a program to Australia. This transmission marked the ultimate in distance transmission since it was half-way around the world. Two days later, our short wave programs were received and re-broadcast in Melbourne, Australia, completing the record of our achievement. In every event so listed, the event marked the first time in history that such an achievement had been accomplished. The records show that KDKA's short wave transmission have been heard in every part of the world.

## Far North Broadcasts

One important phase of the Westinghouse Company's broadcasting activities has been its so-called Far North Broadcasts, initiated through the foresight of Mr. George A. Wendt of the Canadian Westinghouse Company, Limited.

These programs now consist of a most fascinating list of letters, news reports and information from employes, relatives and friends of that band of adventurous folk whose lives are spent in small habitations, for the most part, above the Arctic Circle. The activities that resulted in the Far North Broadcasts began in the summer of 1923 when a number of receivers was distributed by the Canadian Westinghouse Company, to the Far North posts

of the Royal Canadian Mounted Police. Because of these receiving sets we were enabled to transmit messages to them, at first by KDKA, then later by the other Westinghouse stations. As season after season of transmitting has been conducted, more and more of the companies operating posts in the North of Canada, have supplied receiving sets to their representatives with the result that nearly all such places now have radio receiving installations.

Among the companies which have so equipped their posts are the Royal Canadian Mounted Police, the Hudson's Bay Company, the Revillon Freres, the Oblate Fathers, and others. To this host of listeners, the Westinghouse stations each winter send a series of messages, most of which are of unique importance to those living out of reach of all civilization save that which comes to them from the ether. We have sent messages that have saved lives, rearranged winter plans, have caused heartache, and happy reunion—all over that great area starting from Greenland in the east, thence over the coast of Labrador and all the way across Northern Canada. These Far North Broadcasts are among the most important things that broadcasting has ever accomplished.

The radio messages sent into the Far North were often the only communication those people had with the world for six months; it required often many months for the acknowledgments to reach us.

### **Pioneer in Synchronizing**

Again, in later years, another pioneering step was taken. I refer to synchronizing. We were operating Station WBZ at Springfield, and another station—WBZA—at Boston. WBZA was necessary because the Springfield Station WBZ could not be heard in certain sections of the Boston territory. WBZA, a small relay station, was installed in Boston to overcome this difficulty. At first it was operated on a different wavelength from WBZ, but it was realized that if these two stations could be synchronized and the program transmitted on a common wavelength from both stations, a much better distribution of the broadcast would be possible, and to the listener, of course, it would be as one station.

After some months of experimental work and development this was accomplished, and now for a considerable time these two stations have been run in synchronism with much more general satisfaction to the program listener.

### **Frequency Modulation**

Another pioneering step occurred—this time at East Pittsburgh where KDKA had been operating for some time with a

different type of modulation called "frequency modulation", by means of which we are able to eliminate three-quarters of the number of transmitting tubes that are required in the ordinary manner of transmitting. Further, the wave band is greatly sharpened and eliminates side band interference. Much is expected from this innovation later.

### **Radio Industry of Huge Size**

The business of the radio industry in 1920 did not amount to more than \$2,000,000 for the year. In 1927, this had grown to an annual business approximating \$500,000,000—all due to broadcasting.

Broadcasting, therefore, means everything to the industry since there would be nothing without it. Broadcasting itself would be nothing without the listeners, of which it is now estimated there are 40,000,000. The problem of the broadcasters, therefore, is to constantly strive to hold and increase the interest of the listening public. Nothing could be more useless than a broadcasting station without listeners, or a receiving set without a broadcasting station.

In the year prior to the appointment of the Federal Radio Commission, the entire industry was threatened with destruction due to the chaotic condition existing in broadcasting. Happily the Commission was appointed in time, and through its efforts very great improvements have been instituted.

Broadcasting, however, is still an infant. Much remains to be done in the way of research and development. This is quite evident from the facts herein recited of the step by step pioneering and epochal steps taken at KDKA.

Work of this nature requires the highest kind of engineering and research skill. It requires expensive and extensive facilities and the expenditures of large sums of money. There are, therefore, only a few organizations in the world that are in a position to undertake work of this kind.

### **Start of National Broadcasting Company**

Mr. Owen D. Young, Chairman of the Board of Directors of the Radio Corporation of America, through whose foresight and wonderful organizing ability is due much of the present development in the radio field, realizing this condition, proposed a plan of cooperation between the Radio Corporation of America, General Electric Company and the Westinghouse Electric & Manufacturing Company whereby this important field of broadcasting could be



organized and developed. This resulted in the formation of the National Broadcasting Company—an organization to devote its whole effort to the building up and developing of the broadcasting service through improved methods and programs, and to furnish a service throughout the country to properly located and selected stations in a manner similar to the service furnished to newspapers by the various Press associations.

Nothing could be more fortunate for radio's future than this. The participation of these important electrical organizations in the work of the National Broadcasting Company guarantees to it adequate financial strength and permits an organization and equipment to be provided that will be capable of coordinating and presenting program material of the highest order, backed by the vast technical resources of these large companies.

Certainly this guarantees to the listening public that broadcasting is now on a firm and lasting basis, and that it will become increasingly better as time goes on.

### A National Service

As the name implies, the National Broadcasting Company is a national service. It is not limited to east or west, north or south. It covers the entire nation through several networks and groups and individual stations. Its programs, therefore, have the widest possible appeal to all classes, localities and interests. This organization has, in fact, been charged with the stewardship of national entertainment and enlightenment—the greatest task ever assigned to any commercial enterprise.

Mr. Young further indicated the high purpose he had in mind in the organization of the National Broadcasting Company and guaranteed its good faith to the public by inviting eighteen recognized leaders in public life in this country to serve as an advisory council. This was done so that the National Broadcasting Company might have the guidance of men and women prominent in all phases of public life, and it is believed that from their advice will come the highest utilitarian development of this wonderful service.

Improvement and expansion in program offerings and in program technique, under the able leadership of Mr. Merlin Hall Aylesworth, and his staff, have been very marked since the formation of the National Broadcasting Company.

No history of broadcasting can be complete without reference to Mr. David Sarnoff, Vice President and General Manager of the Radio Corporation of America, an early pioneer, whose fine judgment, clear vision and high executive ability have made him the guiding genius of the entire radio industry. Many times in our

early days have we gone to him with our problems, and have never failed to be encouraged by his unbounded confidence and enthusiasm, and sound advice.

### Who Is to Pay?

From the very beginning the question of "who is to pay" has been constantly raised, and one plan after another has been proposed, and abandoned.

I can say that we have never felt concerned about the point, firm in our belief from the beginning that this service was so necessary in our daily lives that ways would develop to make it self-supporting.

Its advertising value has always been recognized, and it was evident from the beginning that sooner or later that this would be realized and would be the answer to the question.

It is a distinctive and encompassing medium. It is the greatest and most intimate contact that has ever appeared, and wholly personal in its appeal. It has now become the key to millions of homes, and the individual or firm that can bring this subject of its activities in an adroit and satisfying way to the listening millions is employing a means for great commercial possibilities in the disposal of its product, and can justify the expenditure of large sums of money in its development.

### Other Forms of Amusement Safe

It is apparent, therefore, that insofar as this advertising appeal can be effectively developed, we need not worry about the source from which the money to pay will come. In the industrial development of this age, as one innovation succeeds another, there always arises the specter of obsolescence, but its baneful influence extends only to those industries or organizations that have become sterile and impotent. If they have the energy and ability to accept the new and to reconstruct the old, the combination means new life and development in general.

No danger is threatened to other sources of amusement and entertainment in the development of radio except to those that are decadent enough to deserve death, but radio certainly will lead people in that direction and stimulate their interest and desire for the better things of life. Insofar as amusement and entertainment cater to those desires and instincts, they have nothing to fear and everything to gain from radio.

## What of the Future?

But what of the future? Great innovations come infrequently, but often unexpectedly. No one ten years ago would have envisaged the actualities of today, yet we, who are closest to it, may presume to predict that in spite of the great developments to date the ground has scarcely been scratched, and that even more wonderful advances and possibilities are near at hand. Radio vision, whereby we shall see as well as hear by radio, is an accomplished fact; talking movies in the home, nearly here. No more visionary than some of the actualities of today were a dozen years ago, is the possibility of the transmission of power by radio.

We who are now active may have to leave much of these future developments to others; still we can feel content, ourselves, to have been a pioneer whose dreams and struggles have borne the cherished fruits of successful accomplishment—usually a sufficient reward, but in this instance many times amplified when we contemplate the greatness of the service and industry that has developed from the modest beginning I have recited to you today.

You have all heard of the famous statue of Memnon—out upon the shifting sands it sits, a calm on its face, its voice forever hushed. But of old it spoke, and once each day, as each new sun arose, there came forth from its lips a sound. And worshippers came long pilgrimages and knelt in the sand to catch that sound, which was in their ears as a voice from Heaven.

So the voice of Radio comes to its devotees almost as a voice from another world. In fact, radio broadcasting has brought to humanity a new and heavenly vision, if not a new world.

# BROADCASTERS CELEBRATE

## RADIO'S SECOND DECADE BEGINS

Fast Pace of Development Is Expected—Many Surprises Are Promised—Television for the Home Is Possible by 1940

**DR. ALFRED N. GOLDSMITH**, vice president and general engineer of the Radio Corporation of America, is a pioneer in wireless.

His vision to see ahead in radio, his ability to point in the right direction for research to follow on the quest of television and other developments, makes his opinion of what will happen in the second decade of broadcasting of interest to the industry, to research, and to the listener who wonders what radio will have to offer in 1940.

Dr. Goldsmith conservatively vaults across ten years to visualize the anticipated achievements of radio science.

themselves as they journey over the earth carrying with them suitable portable pick-up equipment for telephone and television broadcasts.

The transmitting stations themselves are connected in great synchronized networks which extend over the greater portion of the earth's surface. All stations transmitting a given program can use a relatively small number of wave lengths, thus increasing the number of possible simultaneous broadcasts. The stations of 1940 are chiefly of either the medium power of 500 kilowatts or of the low power of 50 kilowatts, and some stations of power running into the thousands of kilowatts have been erected to feed program material to the population of stretches of territory which justify really high-power broadcasting.

Needless to say, the networks of each nation of the world are capable of instantaneous connection to the networks of any other country. A simultaneous broadcast of an event in both Australia and in the United States, or in both South America and Europe, or in both Japan and the Argentine, involves no particular technical difficulties and is accepted as a normal part of our general broadcasting of 1940. If the regions near the North and South Poles have not been completely explored by that time and are still the object of investigation by enterprising polar expeditions, such expeditions will, of course, be in as immediate touch with the population of the nations of the world as if they were located in a great metropolis. Indeed, it is likely that they will be in closer touch because of the special interest which their activities arouse and the particular care which will be taken to maintain perfect contact with them. Television will carry the airplane pictures of the polar ice cap to the sunny valleys of California.

### An Ally of Radio.

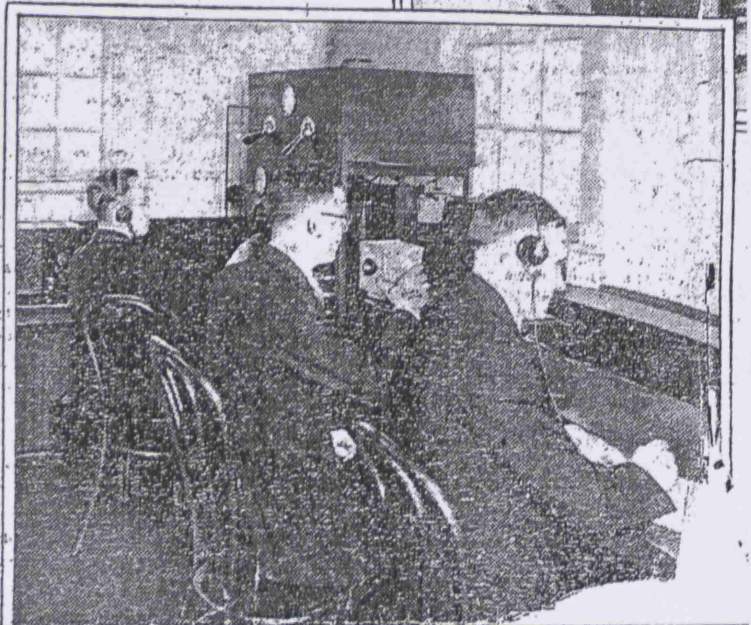
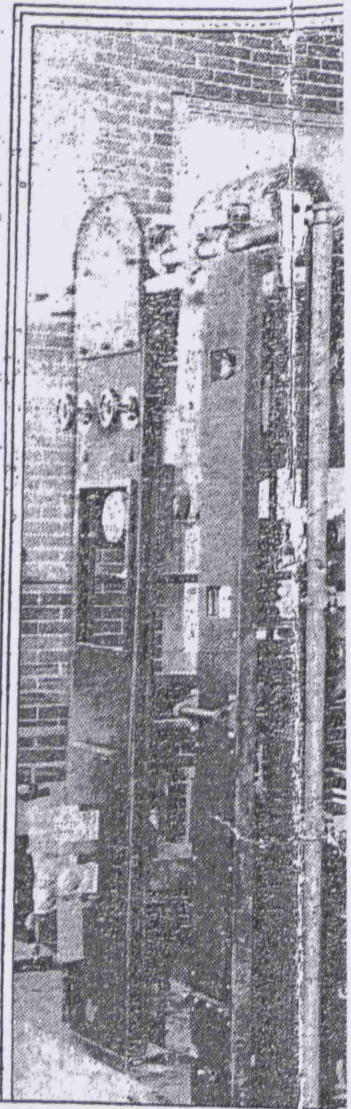
Closely allied to radio and completely coordinated with it in 1940 is the sound motion picture field. Whenever an excellent sound motion picture film is produced, it is available for broadcasting, and if an especially entertaining radio event or an important historical happening is broadcast, it is similarly made the subject of a sound motion picture film.

A number of supplementary electri-

cases even in a single cabinet known as the "electrical entertainer." Essentially the electrical entertainer requires only two outlet portions, namely, a screen for showing a picture and a loud-speaker for producing a sound. Back of the screen is arranged either the television projector or the sound motion picture projector, or both. The educational and entertainment possibilities of such a device are limitless.

### A New Servant for Man.

In 1940 we have the electrical entertainer at the disposal of the public. Its significance in the stimulation of musical taste, as an incentive to the creation of music at home, as an entertainment device and as a means of education has, it is believed, opened a new era. The electrical entertainer has already become a part of the life of the world. If we now look forward to 1950, some of its capabilities will have been further explored and mankind will have begun to derive a larger measure of the inestimable benefits which the applications of electricity can bring to it. And so, through the decades, the force which first frightened man when it flashed in the lightning and soared in the thunderbolt will not only become his servant but even his ally in improving his mind, broadening his cultural taste, and brightening his hours of leisure.



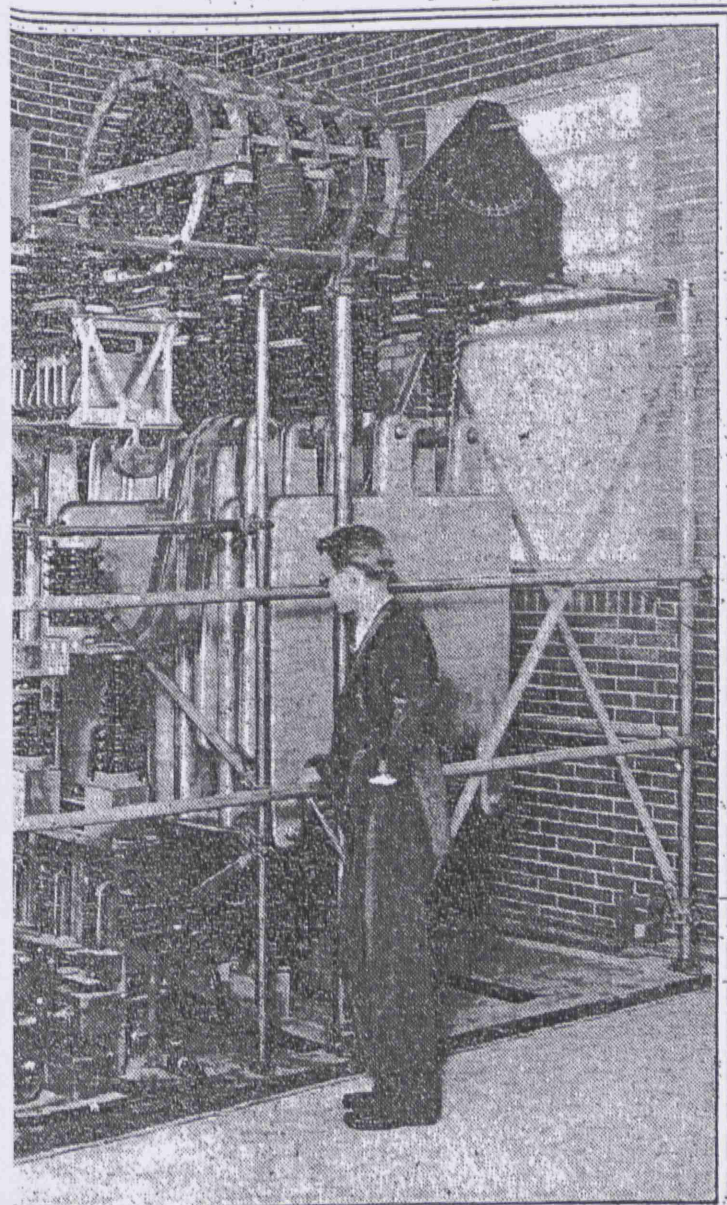
### Dr. ALFRED N. GOLDSMITH.

**R**ADIO broadcasting in 1920—an infant. Radio broadcasting in 1930—a world-wide and mature institution. Electrical entertainment in 1940—will be what? The radio pioneers blazed a splendid trail during the first half dozen years of the development of broadcasting. From an absolutely unknown method of reaching the people, in a brief span of years they established engineering and artistic precedents of basic importance which have enabled the building up of mass communication by radio telephony into a great industry. During the last few years they and their successors have refined the technique and widened the scope of broadcasting until, today, it stands as a highly developed and universally accepted form of major entertainment applied to the people of the world.

### A Doubtful Theory.

It is but natural to ask whether the amazing rate of progress during the last ten years can be maintained, and whether 1940 will see radio as improved compared to the present day conditions as is the broadcasting of today when compared to that of 1921. To the public, which is already well satisfied in its main with the excellent performance of the better modern receivers and transmitting stations, it could hardly appear as if progress now on would be slower than

# FIFTEENTH ANNIVERSARY TODAY



## BROADCASTING EVOLVED FROM THE CHAOS OF WAR

Davis Describes Events That Led to First Program—He Looks Ahead to Television—Future Is Untapped

By H. P. DAVIS,  
Vice President, Westinghouse Electric and Manufacturing Company.

TEN years is not long, as time goes. It is an exceedingly brief period in which to develop an industry. Yet within that brief span the world has seen the beginning, the development, and, almost the maturity of radio broadcasting, an industry which has had the most amazing history of any in the world. Broadcasting is not really an industry. Instead, I like to call it a public service, one of the greatest, if not actually the greatest, of our modern civilization. The industry of radio is built around the service of broadcasting.

It was as a public service that broadcasting was begun and it is as a public service that it will continue its magnificent record of achievement. Like other manufacturers at the close of the World War, we had an investment in radio development in which we had been active during the period of the conflict. In equipment, in time, and in engineering development, this investment had been heavy and so something had to be done about the situation.

### Birth of an Idea.

At that period it was the consensus of opinion that radio telephony, if it were ever developed, would be as a means of private communication. Therefore, developments had been directed along this line; ship-to-shore and point-to-point communication.

One of our transmitting stations with which we were actively engaged in developing radio telephony was located in the home of Dr. Frank Conrad, assistant chief engineer of the Westinghouse Company and then my principal assistant. During the course of his work with this transmitter he had built up an audience, mostly of amateurs in the vicinity. In this manner the radio telephone work of Dr. Conrad began to be well known within the circle of radio enthusiasts. I had no idea of the extent of this interest until one Sunday morning I read an advertisement in a Pittsburgh newspaper that some radio parts were for sale in a downtown department store. It was explained that these units a radio

years. Our first station KDKA was rated at 500 watts. Today we are formally opening a new KDKA, located near Saxonburg, Pa., which may be operated up to 400,000 watts. That is progress.

In the ten years, just past the influence of broadcasting has covered the world. Kings and Premiers have spoken on world-wide networks. Short wave has developed possibilities for world-wide programs undreamed of in the beginning of broadcasting. Millions assemble to hear political leaders and captains of industry. Business depends upon its radio audience for much of its commercial effort.

### In the Next Decade.

With all the possibilities developed today, there is still the future. If it were impossible to forecast the future of broadcasting ten years ago, then it is just as improbable that leaders of today can foresee with any degree of accurate vision what the next decade will bring.

I am satisfied from my contact with the electrical industry that the radio development is the biggest thing that has ever appeared in it. Today this amazing business which has been created by broadcasting gives employment to hundreds of thousands of people and the business done is figured in hundreds of millions. In the ten years of its existence the business done has amounted of \$3,500,000,000. No other industry developed in the United States ever even approximated these astounding figures.

This is so because it represents one of the most remarkable, one of the most fascinating, one of the most tremendous innovations that man ever devised, and radio's future will eclipse its brilliant present because with the certainty of the population of the entire world for its audience, with every worth-while activity in human relations and endeavor anxious to use it, and with some of the best facilities and best brains in the world devoting their entire time and money to develop it, nothing can be surer than an accelerated rate in radio's progress.

### A Believer in the Impossible.

Development in radio and

The Modern KDKA, a 400,000-Watt Transmitter Which Will Be Dedicated Today, Is a More Sturdy and Powerful Broadcaster Than That Used at the First Station, Shown in the Picture at the Left.

## LISTENING-IN

LISTENERS of the world heard a remarkable broadcast during the past week. A three-cornered international program featured addresses by President Hoover, Prime Minister Ramsay MacDonald of Great Britain and Premier Hamaguchi of Japan. The occasion was the depositing of the ratification of the London Naval Treaty at the British Foreign Office.

Comparison note the transatlantic radio tones of Ramsay MacDonald, whose rounded sentences and even tones overlap atmospherics. Furthermore, those who talk across the ocean should take their time. Nevertheless, Shaw's speech was clear enough for stenographers to take down the words after their flight across the Atlantic, and it was

...the past. For this category is extremely doubtful and the scientists and engineers have every reason to believe that not only electrical entertainment in general, but also radio broadcasting in particular, will improve in performance, convenience, and scope, and at a marked pace, as the years go on. New principles and methods, as yet only in the minds of the inventors, or at best in the laboratory, appear to beckon the radio art forward to new accomplishments and triumphs.

#### A Glimpse at 1940.

And so, vaulting over ten years, let us imagine ourselves in 1940. Looking about at the field of electrical entertainment, what do we find? The role of a prophet is at best a difficult one, and it may therefore be hoped that the following picture will not be too rigidly held against its delineator, and particularly not in its details. In such a discussion as this, an author always feels under a severe handicap and experiences some embarrassment when he remembers the existence of an imperishable rag-paper edition of *The New York Times*, which can perhaps be later used against him.

We enter the radio broadcasting studio of 1940. The microphones are nowhere in evidence for the methods used so successfully in 1930 for sound motion picture production, with remote and concealed microphones, will have found their place in broadcasting. Devices oddly like cameras will point at the actors, picking up their images for television transmission, perhaps in color. Motion picture cameras are, in evidence. The studio, with its special backgrounds and furnishings, will look much more like the stage of a theatre or a motion picture studio than like the ordinary room which it resembled in 1930. Television pick-up men and camera men, sound recordists and camera room experts are busily at work. Actors troop out of their dressing rooms in the costume suited to their performance. Their words and their appearance are carried instantaneously by wire line or radio connection to a multitude of outlet stations. In the control room, provision is made in the case of the more important broadcasts to record both the picture and the sound of the performance, either on photographic film or on some equivalent material. The cameras are taking pictures of the television performance which is being broadcast. Thus, the public can purchase sound motion picture records of any particularly attractive or historically important broadcast which has been presented. School children and their parents will have the advantage of seeing and hearing historical events which have been recorded for them at the same time as they were broadcast.

Outside the studio the telephone television pick-up is carried out at any point of interest. Airplanes or balloons flying over a battlefield, if war is not outlawed or even a football field (if this game is not super-

cal entertainment devices have become well known to the public by 1940. For example, facsimile broadcasting for certain special purposes has found its place in the radio régime of that day. The broadcasting of brief news reports, quotations, weather reports, various types of fiction, educational material, drawings, cartoons and photographs was an engineering possibility back in 1930 and now appeals to a large portion of the public which is provided with the necessary facsimile broadcasting receivers.

Another interesting field leading to gratification of the musical creative instinct involves the electrical musical instrument. In 1940 homes and public places are provided, if desired, with electrical musical instruments. These may be played in a manner corresponding to the natural aptitude of the player, either from a piano keyboard or from a string over a fret board, or in any other desired and convenient fashion. They produce a tone quality controllable at will, with any volume of sound that may be desired, and with any pitch of sound from the lowest to the highest notes. Amazing new and charming effects are possible. We find a splendid increase in musical taste and in the number of amateur musical performers as a result of these instruments. Some highly modern music is already being written specially for them.

#### The Electrical Entertainer.

Entering the home of 1940 one might judge from the preceding description that all the electrical entertaining devices to which reference has been made would prevent the owner of the home from entering the living room because of the congestion of pieces of furniture. Yet such is not the case. Instead of a multitude of cabinets each containing a single instrument, the electrical entertaining equipment is assembled in relatively few cabinets and in some

The Original KDKA. Note the Microphone With a Telephone Mouthpiece Protruding From a Box Which the Speaker Is Holding.

## RADIO WILL MIX ELECTION RETURNS WITH MUSIC ON TUESDAY NIGHT

GOVERNOR FRANKLIN D. ROOSEVELT, Charles H. Tuttle, Dwight W. Morrow, and others prominent in the political spotlight will press radio-into service to carry a last-minute appeal to the voters late on the eve of election day. The Governor and Mr. Tuttle, bringing their campaigns to a close, will cross verbal swords in their final plea to voters only seven hours before the opening of the polls.

Mr. Roosevelt will summarize the campaign issues in an address to be broadcast at 10 o'clock over WOR. Mr. Tuttle will face the microphone a half hour later, his talk being broadcast over WABC's network. His address will be devoted to a summation of the issues.

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On election night the entire nation will receive reports of the progress of the election throughout the United States through the facilities of the two national networks and by local transmitters in various sections of the country. Three press associations will cooperate with the network broadcasters. In addition to the news bulletins, David Lawrence and William Hard, political commentators, will interpret the returns for NBC listeners, while Frederick W. Wile

will perform a similar service over the Columbia System.

The first returns in New York State will be given at approximately 7 P. M., followed at intervals by bulletins from States throughout the nation. In the case of practically all the broadcasters the regular programs will be interrupted at intervals to furnish the latest information. Returns will be heard over WABC, WJZ and WJZ, beginning at approximately 7 o'clock.

WOR will broadcast an account of the National, State and municipal elections beginning at 8:30 P. M., but will concentrate on the New York and New Jersey returns. In order to facilitate breaking in on the programs at brief intervals, dance music has been scheduled by WOR.

Station WNYC will carry the election news direct from the Municipal Building, beginning at 6:45 o'clock. Returns will be heard over WGE from 8 to 10:30 and at intervals thereafter.

#### Brown to Speak in Ohio.

Clarence J. Brown, Secretary of State of Ohio, has instructed election officials in eighty-eight counties to install radio sets in their headquarters so that they may receive final instructions in vote counting from WLW at 6:45 P. M., Nov. 4. Mr. Brown, who is in charge of the election machinery, talking from his office at the State House in Columbus, Ohio, at that time, will explain the vote-counting process to the radio audience and will review his instructions to his election officials.

The radio receivers during the re of the election night broadcasts will keep the judges of the elections in constant contact with the office of the Secretary of State in case an emergency should arise.

Election returns will be sent from the office of Secretary of State throughout election night. At 7 P. M., WLW will bring in the final tabulated returns, WSAI will carry the announcements from Columbus at 8:45 P. M., and at 9:45 P. M. All of these periods will be fifteen minutes in length. Beginning 10:30 P. M. and continuing on to half hour, WLW will interrupt its regular programs with ten-minute summaries of the results of voting. From 1:30 A. M., Nov. 5, until the results are in, WLW will carry a special election night frolic with a continuous procession of varied radio presented by its best staff talent. Local election returns will be broadcast during the evening by Station WSAI.

John J. Raskob, chairman of

### Ten Outstanding Events This Week

(Nov. 2-8)

(Time is P. M., Eastern Standard Time.)

#### TODAY

3:00—Philharmonic Symphony Orchestra at Metropolitan Opera House, Erich Kleiber, Conductor; Joseph Lhevinne, Pianist—WABC's Network.

9:15—Concert Orchestra; Beniamino Gigli, Tenor—WEAF's Network.

#### MONDAY

9:00—Minneapolis Symphony Orchestra, Henri Verbrugghen, Conductor—WABC's Network.

#### TUESDAY

6:30-12:00—Election Returns Interspersed With Regular Programs—WABC, WOR, WEAF, WJZ, WNYC, WGBS.

9:30—Symphony Orchestra, Howard Barlow, Conductor—WABC's Network.

#### WEDNESDAY

10:00—Detroit Symphony Orchestra, Ossip Gabrilowitsch, Conductor—WABC's Network.

#### THURSDAY

10:00—Concert Orchestra; Dennis King, Songs—WEAF's Network.

#### FRIDAY

8:00—Orchestral Concert; Jessica Dragonette, Soprano; Cavaliers Quartet—WEAF's Network.

Heretofore, international broadcasts have been limited among the United States, England, Germany and Holland. Now the engineers have succeeded in bringing the Far East into the world-wide radio circle. It was a long jump across the Pacific for the ethereal impulses, nevertheless the short waves again proved their ability to span long distances. They reached California, where the words were plucked from space and fed into the regular nationwide networks. At the same time the words from Japan were directed over wire lines to the short-wave transmitters at Pittsburgh and Schenectady, from where they were again flashed into the air for reception in Europe.

When Mr. Hoover and Mr. MacDonald spoke, their words were relayed to the Orient by KEL at Bolinas, Cal. Premier Hamaguchi heard them, as did an estimated audience of 3,500,000 broadcast listeners who were in tune with JOAK at Tokyo, or one of six other Japanese broadcasters.

A listener in London reported "the transmission was perfect. Every word of President Hoover's speech came through as clear as a bell. So did the voice in Tokyo, 10,000 miles away."

Radio atmospheric conditions along the California coast and over the Pacific have long been recognized as superior to the air conditions over the Atlantic. There is less static on the other side of the Rockies. Now that voices have crossed and recrossed the Pacific, music from Japan is likely to follow. The new and friendly highway of radio through the sky has been opened between the Far East and America.

#### Sensitive Radio Ears.

Uncle Sam's new radio reservation at Grand Island, Neb., built so that it can eavesdrop on radio stations throughout the world is likely to play an important rôle in international broadcasting. It came into prominence during the past week when Premier Hamaguchi's speech in Japan was intercepted as the short waves flashed across the Western prairies. The impulses were amplified and forwarded by telephone line to the Columbia System's network.

This station, which officially opens Nov. 30, in the mid-West, has receivers so sensitive that broadcasts from England can be picked up in the afternoon.

Ten acres will be fenced in, parked and landscaped. It will be expanded to take in 300 acres, which will be covered with a network of aerial wires pointing toward all parts of the world. S. W. Edwards, who five years ago conceived this idea of a central monitor station, is in charge of the station. He is Supervisor of Development and Production of the Department of Commerce Radio Division.

A radio listener who tuned in on George Bernard Shaw's radio debut

as clear, possibly because it was in German, which made it difficult for American listeners to understand.

#### Cold Weather Helps.

The cooler weather is helping the radio business. A week ago yesterday afternoon carpenters and decorators were rushing to finish a new store in Flushing. Those who watched them doubted that order could be restored by 6 o'clock. But they worked fast and the doors were opened as scheduled. Thirty-two sets were sold within the next five hours.

#### WHITE DOES NOT EXPECT NEW RADIO LEGISLATION

NO radio legislation is likely to be passed by the next Congress, which convenes in December, according to Representative Wallace White Jr. of Lewiston, Me., chairman of the House Committee on Merchant Marine and Fisheries. The session, he believes, will be too short for its consideration.

Representative White may be in the Senate, instead of the House, at the next session, as he is the Republican candidate in the approaching election.

The Couzens bill for the creation of a Federal Communications Commission, to replace the Federal Radio Commission, is too controversial, Mr. White said on a recent visit to Washington, to be passed upon within the three-months' session.

was wrong; instead of private communication its field was one exactly opposite. In other words, here was something to which all the world could listen.

With that idea in mind we established a new station with the fundamental thought that a broadcasting station, once established, had a responsibility to its public and that responsibility was a daily prearranged schedule of programs arranged for the benefit of the public.

Our first program, indeed, was the announcing of the election returns that carried Warren G. Harding into the Presidential chair. That first broadcast, Nov. 2, 1920, was the start of KDKA and the beginning of broadcasting. No matter what claims are made now, KDKA was the first broadcasting station established to serve the public on a regular basis.

#### New Transmitter on the Air.

Once KDKA was established, we had a difficult time for several months convincing the public that here was something new. The newspapers again served an important function in developing broadcasting, for a local newspaper began publishing our programs and it was not long until broadcasting, in so far as public interest was concerned, was a success. Then the deluge. Stations sprang up by the hundreds and the industry of radio began.

Broadcasting has gone far in ten

and which we now look upon as impossible.

I have seen so much of the development of this new product of electrical research that I am becoming more and more a believer in the impossible. There are few conceptions that do not demand constant revision with the increasing discoveries in physics and mathematics most of which result in almost magical changes in our daily environment.

Undoubtedly we will have television. Then sight will have been added to sound with all the vast possibilities that this field develops. It seems to me that much of our present methods of communication and entertainment will have been changed by then to conform to the benefit that may lie in broadcasting.

I can visualize a world linked by broadcasting methods, where countries may speak to one another where the ambitions of dynasties and dictators must bow to the welfare of their people; where understandings will have taken the place of diplomatic secrecy and twisted fact; this is at our command, if we are unselfish enough to use the possibilities of broadcasting to their best.

Much lies before us. The possibilities of this great science have not yet been probed. The future is untapped. It is our duty and the duty of those who will follow us to make certain that broadcasting may follow the course that was laid down for it in the beginning. It is a public service, and on that basis its future development and expansion depends.

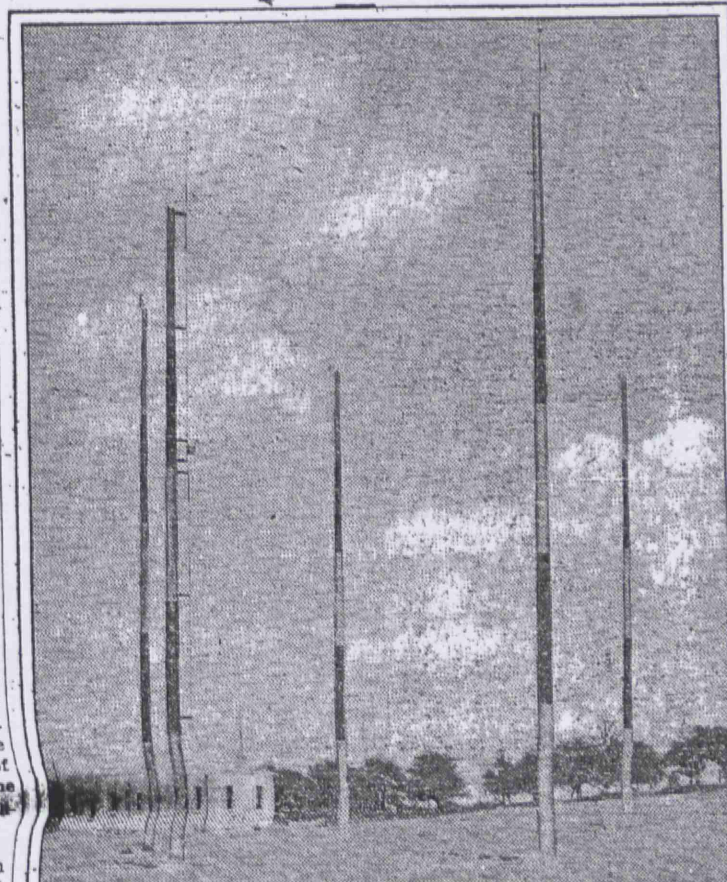
#### WOMEN'S COLLEGES TO BEGIN A SERIES OF BROADCASTS

ON Wednesday afternoon at 1 o'clock WJZ will begin a series of broadcasts by faculty representatives of leading Eastern colleges for women, including Smith, Wellesley, Vassar, Mount Holyoke, Radcliffe, Bryn Mawr and Barnard. Dr. W. Cabell Greet, of Barnard College will inaugurate the series with a talk on American dialect while Dean Marjorie Nicholson of Smith College will be the speaker the following Wednesday. She will discuss the administrative side of the woman's college.

The third speaker in the series will be Aizada Comstock, Professor of Economics at Mount Holyoke, who on Nov. 19, will discuss women and money. On Nov. 26 Charles F. Fawcett, Professor of Political Science at Bryn Mawr, will talk on international relations.

The Dec. 3 speaker is Harlow Shapley, Professor of Practical Astronomy at Radcliffe and director of the Harvard Observatory. He will talk about the stars.

"Women and Music" will be the title of the speech on Dec. 10 by E.



ices of the years go on. New principles and methods, as yet only in the minds of the inventors, or at least in the laboratory, appear to pick up the radio art forward to new accomplishments and triumphs.

#### A Glimpse at 1940.

And so, vaulting over ten years, let us imagine ourselves in 1940, peering about at the field of electrical entertainment, what do we find? The role of a prophet is at least a difficult one, and it may therefore be hoped that the following picture will not be too rigidly set against its delineator, and particularly not in its details. In such discussion as this, an author always sits under a severe handicap and experiences some embarrassment when he remembers the existence of an imperishable rag-paper edition of the New York Times, which can perhaps be later used against him.

We enter the radio broadcasting studio of 1940. The microphones are where in evidence for the methods used so successfully in 1930 for sound in the picture production, with their hidden and concealed microphones, we have found their place in broadcast. Devices oddly like cameras will be used at the actors, picking up their voices for television transmission, and perhaps in color. Motion picture cameras are in evidence. The studio, with its special backgrounds and furnishings, will look much more like the stage of a theatre, or a motion picture studio than like the ordinary room which it resembled in 1930. Television pick-up men and camera men, sound recordists and control room experts are busily at work. Men troop out of their dressing rooms in the costume suited to their performance. Their words and their appearance are carried instantaneously by wire line or radio connection to a multitude of outlet stations. In the control room, provision made in the case of the more important broadcasts to record both the picture and the sound of the performance, either on photographic material or on some equivalent material, the cameras are taking pictures of the television performance which is being broadcast. Thus, the public can purchase sound motion picture records of any particularly attractive or historically important broadcast which has been presented. School children and their parents will have the advantage of seeing and hearing historical events which have been recorded for them at the same time as they were broadcast.

Outside the studio the telephone television pick-up is carried out at any point of interest. Airplanes or balloons flying over a battlefield (if war is not outlawed) or even a football field (if this game is not superseded by something still more exciting) transmit the picture and sound by short wave radio to a ground station and thence into the national and international broadcasting networks. Travelogues are sent by the travelers

fiction, educational material, drawings, cartoons and photographs was an engineering possibility back in 1930 and now appeals to a large portion of the public which is provided with the necessary facsimile broadcasting receivers.

Another interesting field leading to gratification of the musical creative instinct involves the electrical musical instrument. In 1940 homes and public places are provided, if desired, with electrical musical instruments. These may be played in a manner corresponding to the natural aptitude of the player, either from a piano keyboard or from a string-over-a-fret board, or in any other desired and convenient fashion. They produce a tone quality controllable at will, with any volume of sound that may be desired, and with any pitch of sound from the lowest to the highest notes. Amazing, new and charming effects are possible. We find a splendid increase in musical taste and in the number of amateur musical performers as a result of these instruments. Some highly modern music is already being written specially for them.

#### The Electrical Entertainer.

Entering the home of 1940 one might judge from the preceding description that all the electrical entertaining devices to which reference has been made would prevent the owner of the home from entering the living room because of the congestion of pieces of furniture. Yet such is not the case. Instead of a multitude of cabinets each containing a single instrument, the electrical entertaining equipment is assembled in relatively few cabinets and in some

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#### SATURDAY

- 1:15—Football: Illinois-Army—WABC (WOR at 1:30); 1:45—Harvard-Michigan, WJZ; 1:45—Pennsylvania-Notre Dame—WEAF.
- 9:10—Symphony Orchestra, Walter Damrosch, Conductor—WEAF's Network.

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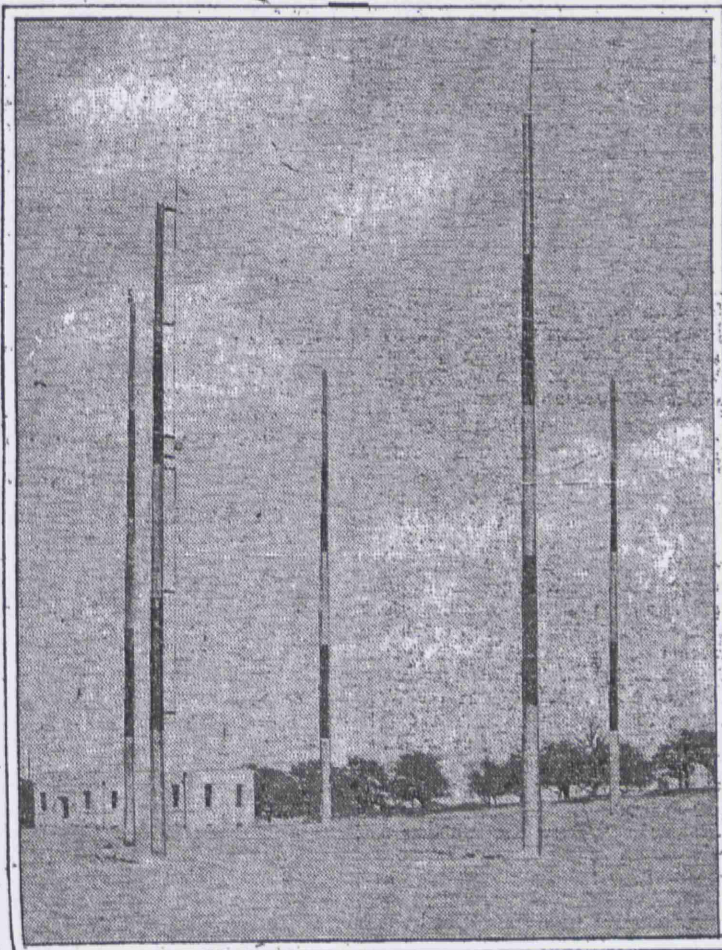
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The Dec. 3 speaker is Harlow Shapley, Professor of Practical Astronomy at Radcliffe and director of the Harvard Observatory. He will talk about the stars.

"Women and Music" will be the title of the speech on Dec. 10 by Professor Marta Millinowski, head of the piano department at Vassar. The final speaker will be Elinor Gamble, Professor of Psychology at Wellesley. She will talk on psychology and common sense.



Short Wave Antenna System at Saxonburg, Pa., Which Is Associated With KDKA for World-Wide Broadcasts.



DOCUMENTS FROM WESTKATHOLE  
MS 424 BOX 17 FOLDER 16

# Westinghouse Station at Hastings, Nebraska, Opens New Era in Radio Broadcasting

## First of Its Kind in the World

**H**ASTINGS, NEBRASKA, is the place selected by our Company for the location of its first radio repeating station to serve as the connecting link of the pioneer station—KDKA—with the people living on the Pacific Coast and also the citizens of the western states.

The installation of the Hastings station KFKX, as its license reads, means that broadcasts from station KDKA, will be picked up as easily and with the same apparatus in the furthest western states, as KDKA's broadcasts are now received by people living a few hundred miles from East Pittsburgh.

The repeating station marks a great forward step in radio, almost as great a stride in radio progress as was made when our Company first started radio broadcasting with the establishment of its world's pioneer broadcasting station KDKA, in November, 1920.

Always a pioneer in radio, our Company, because of its engineering genius, has now removed the limitations of distance in the broadcasting of programs. The transmitting station at KDKA is as fine and as modern as radio engineers can make it. It is possible to receive KDKA all over the country, but, naturally, the greater the distance away from the station, the more sensitive must be the apparatus. To pick up KDKA in California, for instance, requires very sensitive, high-priced apparatus. Recent developments perfected by our engineers have made it possible to rebroadcast or repeat KDKA's concerts from Hastings, which will serve as a booster station to points on the Pacific Coast. Thus the same simple apparatus which can be used on the Pacific Coast to pick up local broadcasts can also pick up the repeated program from KDKA.

The station at Hastings is one of the marvels of the radio engineering world.

KFKX can receive broadcasts sent from KDKA on 3200 kilocycle frequency (94 meters) and transmit direct to its territory on 1050 kilocycles frequency (286 meters) which is its assigned broadcasting wave-length. It can transmit also its own broadcasts from a local studio on 1050 kilocycles, for the benefit of the people living in its territory, or westward to the Pacific Ocean.

KFKX can also receive broadcasts from KDKA on, say 3200 kilocycle frequency (94 meters) and repeat the same broadcasts to other transmitting stations located on the Pacific Coast or elsewhere on 2800 kilocycle frequency (107 meters). Both these frequencies are much higher than are used in radio broadcasting and will not interfere either with radio broadcast traffic or amateur traffic. Thus it seems quite possible to repeat the programs of a single station so that they can be heard all over the country.

For this repeating, two special transmitters are required, with special receivers to receive the high frequencies.

A feature of the high frequency broadcasters is the short antenna used. The antenna at Hastings and at East Pittsburgh are not over 35 feet long. This is much smaller than the antenna required for ordinary broadcasting. There are only 35 feet between flat top and counterpoise. The antenna and counterpoise consist of two small cages.

One of the difficulties attendant upon high frequency broadcasting is that every precaution must be taken to prevent any outside influences, such as vibration, that would change the frequency. The vibration of the ground or the swinging of the antenna would serve to throw the set off its frequency. To guard against the possibility of swinging, both the East Pittsburgh and Hastings high frequency stations antennae, including the flat top and counterpoise, are stretched between cross arms rigidly attached to the tower instead of the more common swinging spreaders.

The down lead from the antenna to the counterpoise consists of copper tubing rigidly mounted on long high voltage porcelain insulators on the poles. The various inductances on the set are wound on rigid forms. Copper tubing is used to make all the connections.

The high frequency set at East Pittsburgh is located on the top of the K building which is nine stories high and naturally would ordinarily be subjected to vibrations. This set is therefore suspended on a system of springs, so that vibrations of the building cannot effect the operation of the set.

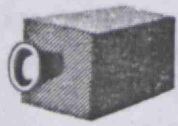
At Hastings, Nebraska, the set is located in an isolated building and is not subjected to any vibrations, so the precaution of suspending this set on springs has not been necessary.

The transmitting set at Hastings consists of three panels; the rectifier panel, the modulator panel and the oscillator panel. The rectifier converts the high voltage a-c. current received on the antenna to high voltage d-c. for the plate circuit. The modulator with its accessories impresses the voice frequency on this high voltage d-c. current before it goes to the oscillator. Finally the oscillator converts the high voltage d-c. currents into radio frequency, in which form it is delivered to the antenna.

For local broadcasting a studio has been suggested in the main business section of Hastings, which will be connected with the station by means of telephone line. The studio, if built, will compare favorably with any Eastern studio and a special type of condenser transmitter will be installed to insure good tonal quality.

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# Story of Radio Broadcasting



**THE ROMANCE** of radio broadcasting—from its beginning in the Wilksburg garage where the late Dr. Frank Conrad played phonograph records in front of a converted-telephone transmitter—is told in five-star fashion in the new motion picture, "On the Air," produced by Paramount Studios for Westinghouse Radio Stations, Inc.

The film will be shown throughout the Company, under a schedule arranged by the Westinghouse Motion Picture Bureau at Pittsburgh.

With a cast of more than 100 persons, and featuring Bob White, KDKA Program Director, in the narrator's role, the 30-minute movie records the swift rise of the radio industry from the days of wireless telephony to a billion-dollar enterprise reaching into virtually every home in the nation.

For good measure, "On the Air" goes behind the scenes in a modern broadcasting studio to tell how a radio show is whipped together, rehearsed and put on the air; how sound effects are created for broadcasting; how voices and music get from the broadcasting studio to the radio receiver in your home (see next page); how the nation's 900 stations can be on the air at the same time without interfering with one another, and how broadcasts from various stations are artfully beamed to cover only clearly defined areas.

Highlights of the historical portion of the film (see montage on opposite page) show Dr. Conrad working in his garage laboratory (which was faithfully recreated, even down to the soap boxes that formed the base for some of his equipment) . . .

The clerk in a Pittsburgh department store listening in and getting an idea that if more people knew about the Wilksburg scientist's putting music on the air it would boost the store's sales of crystal-set receivers . . .

H. P. Davis, then Vice President at Westinghouse, catching from the resulting store advertisement a vision that radio was an instrument of public rather than private communication, and convincing the Company heads that his hunch was worth a trial . . .

The resultant birth of Station KDKA, and radio's overnight

## NEW RADIO PROGRAM

In addition to the Westinghouse Sunday afternoon program (2:30, Red Network), the Company will inaugurate on March 13 a brand new radio program.

The new show, basically a musical program, will be on the air from 10:15 to 10:30 every Monday, Wednesday and Friday evening, over the 159 stations of the Blue Network.

Make a date now with your easy chair and radio for the premiere March 13.

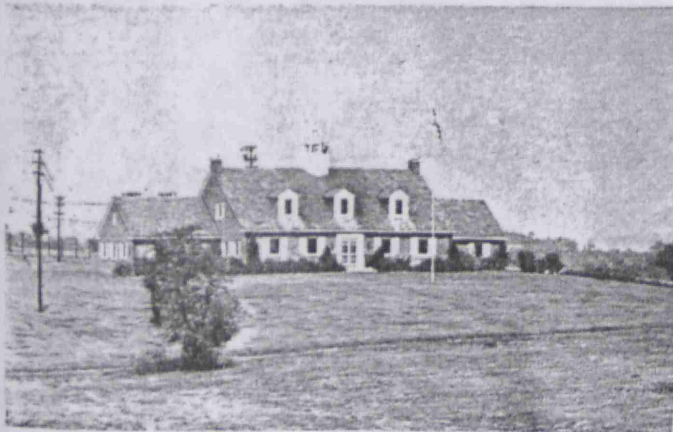
growth from a hobby to a national institution.

"On the Air" has a number of pleasantly nostalgic scenes showing the first tube-type receivers which replaced the home-made crystal sets, and there's even one sequence showing how a set of earphones was placed in mother's mixing bowl to amplify for a roomful of guests the sounds that came from the air.

The wonders of modern radio broadcasting are shown in a behind-the-scenes trip through Station KDKA's Allison Park transmitting station, the KYW news room as an important news flash goes on the air, and through other studios where orchestras play and actors speak.

**AT ITS CONCLUSION**, "On the Air" looks to the future, a future in which new chapters will be written in radio's history—in radiophoto transmission, in frequency-modulation (FM) broadcasting, in television and in international short-wave broadcasting.

"As each radio day brings information, entertainment and education to your home," concludes the film's narrator, "scientists continue to reach into the future . . . planning and developing new services that will make your street, your home, the center of the universe . . . so that the whole wide world of pictures and colors and sounds will be as close to you as your radio."



A far cry from the two-story garage where broadcasting began is KDKA's million-dollar transmitting station at Allison Park, a suburb of Pittsburgh. At the extreme right is the 60-ton, 718-foot steel transmitting tower.

KDKA's Chief Engineer, T. C. Kenney, records data from dials at the transmitter station. Behind these metal walls are wires, vacuum tubes, electrical condensers, coils, switches, relays and much other complex apparatus representing years of research.





The first broadcast of WJZ took place on October 1, 1921. A room in the Westinghouse factory in Newark served as a studio for the program. Thomas H. Cowan, the station's first announcer and program supervisor, is seated at the piano in the same studio at a slightly later date. At the table is Joe Watts, Westinghouse engineer and announcer. Cowan, a radio veteran, is still to be heard on the New York municipal station, WNYC.

sets were bought just for this event. The announcer, J. Andrew White, gave the first blow-by-blow radio description of a boxing match. The Jess Willard-Luis Firpo fight in 1923 set a pattern for radio broadcasting that was to grow tremendously in popularity. Attendance at sports events increased greatly, too, their popularity stimulated by radio.

The number of stations listeners could tune in on grew rapidly. The Detroit *News* station, WWJ, which had been operating a radiophone, was granted a license for regular broadcasting in 1921. WJZ, then at Newark, New Jersey, broadcast its first program in 1921 from a small building erected on a factory roof. Its studio resembled a storage room, draped with odds and ends, old rugs, nondescript chairs and tables, and a rented piano and phonograph.

In 1921, KDKA, Pittsburgh, still located at the company's East Pittsburgh plant, did a series of "firsts" that included the first remote church broadcast, first broadcast by a national figure (Herbert Hoover), the

first regular broadcast of baseball scores, the first market reports, and the first World Series broadcast. Westinghouse that year produced the first popular-priced home radio receiver (approximately \$60, not including headsets or loud speakers) and established radio stations in cities where it had manufacturing plants. These were KBZ, East Springfield, Mass.; KYW, Chicago; and WJZ, Newark. Incidentally, one station—now WBZ—remains in the original studio site at the East Springfield Plant.

The sale of radio sets grew so quickly that the manufacturers could not meet the demand.

In this period radio stations were not selling time for advertising, but were broadcasting primarily to stimulate the sale of sets.

Although the program which announced the election of Harding on KDKA in 1920 is usually considered the historic beginning of broadcasting, there are numerous other claims to this honor. Station KQW in San Jose, California, produced its first broadcast in

A

Other organizations soon entered the broadcasting field; General Electric, AT&T, and of course, RCA, were soon in the broadcasting operation.

By the end of 1920, thirty broadcasting licenses had been issued by the Federal Government. Two years later, over 200 licenses had been issued, and in 1923 there were nearly 600 licenses. The main problem at the time was financial. No one had yet determined an adequate and regular method by which stations could support themselves.

During this entire period, the American Telephone and Telegraph Company had been watching broadcasting activities with a great deal of interest. The development of the radio and radiotelephony had been progressing steadily throughout the years. In 1922, AT&T financed and built station WEAF in New York, replacing another AT&T station, WBAY, which had proved unsuccessful because of its location. A great deal of money was put into the new WEAF, and many technical innovations were installed. It was at WEAF that many techniques of broadcasting and commercial sponsoring were developed. The company, anxious to test the potentialities of radio, inaugurated the policy of continuous broadcasting and sold time at the rate of ten minutes for \$100.00. In one of the first sponsored programs ever to be broadcast, on August 28, 1922, at 5:15 to 5:30 P.M., H. M. Blackwell discussed the advantages of apartments in Jackson Heights, New York. In November of 1922, the New York Philharmonic Society broadcast its first complete concert, and President Calvin Coolidge gave his opening message to Congress, which was broadcast over six stations. On December 6, 1923, stations WEAF (New York), WCAP (Washington, D. C.), and WJAR (Providence, R. I.) were connected by wire, to become the nation's first network.

The era of expansion for radio had begun, creating one of the most extraordinary new product demands in the history of the United States. From all over the country, orders for radio receiving sets and for radio broadcasting equipment poured into the offices of manufacturers.

Said *Radio Broadcast* in its first issue, May, 1922:

The rate of increase in the number of people who spend at least a part of their evening in listening is almost incomprehensible. To those who have recently tried to purchase receiving equipment some idea of this increase has undoubtedly occurred as they stood perhaps in the fourth or fifth row at the radio counter waiting their turn only to be told when they finally reached the counter, that they might place an order and it would be filled when possible. The manufacture is probably not even yet at its height. It is still growing in some kind of geometrical progression. It seems quite likely that before the movement has reached its height, before the market for receiving apparatus be-

comes approximately saturated, there will be at least five million receiving sets in this country.

Church services were first broadcast in New York City from station WJZ in January of 1922. During the chapel service in the Christ Episcopal Church, Glenridge, New Jersey, Rev. George P. Dougherty delivered his Christmas Eve message to the radio public.

In his autobiography, Vincent Lopez gives a colorful account of his first experiences with broadcasting. The year was 1921, and Lopez had agreed to help out his friend Thomas Cowan, who was then program director of station WJZ, by substituting with his band for a program that had been cancelled at the last minute. They wouldn't be paid, of course, but Cowan said, "There'll come a day soon when we'll both get paid—plenty. Wait and see."

A big payoff hardly seemed around the corner when we saw the WJZ studio that next evening. It was located in an old clock room in an unused area of Westinghouse's Newark factory. There were no elevators. Just a rickety stairway barely large enough for us to thread our instruments upstairs.

The small room was decorated with some absorbent material dyed an ugly shade of red to give it some semblance of uniformity. There were also some secondhand lamps as well as some rugs to help deaden studio sounds. Somehow an old upright piano had been squeezed in. Even Casey's in Brooklyn had owned a better one. But we were there, and we made the best of it.

• • •

We had been so worried about everything else, we hadn't given a thought as to what the program would be. I'll never forget Tommy Cowan turning to me and saying, "Vincent, why don't you announce the program?"

"Me announce the program?" I was so frightened as it was, I didn't know what to do. Tommy and I argued the point for a few minutes. I told him it was my first time near a mike, but he finally talked me into saying hello to the radio audience. When the program began I stepped up on a little platform and said, "Hello, everybody. Lopez speaking." Cowan jumped up alongside me and said right into the microphone:

"Is that all you're going to say, Mr. Lopez?"

"That's enough for me," I answered.

Tommy took over as announcer and said, "The first selection will be 'Anitra's Dance' in a fox-trot tempo." I called out to the orchestra, "Number 42, boys," and we were on our way.

There's one other thing about that first radio show I'll never forget. Sometime during the program Cowan suggested that I play a piano solo. I motioned to the broken down upright and said, "On that?" But Tommy paid no attention to me and brought the mike near the piano. Well, there was no backing out then, so I played "Canadian



"Lopez speaking . . ." Vincent Lopez's radio career goes back to 1921, when he and his band played regularly over WJZ from the Pennsylvania Grill in New York.

Capers," the song which had been responsible for getting me the job at the Pennsylvania Hotel.

In those days there wasn't any specific time limit on programs. If something was good, it went on and on. Our show lasted an hour and a half.

. . .

When the show was over the telephone started to ring. Many of the calls were from Westinghouse officials who were pleased with the show. I was still answering the congratulatory phone calls that lit up WJZ's undersized plug board long past midnight!

One call came all the way from Washington, D.C. It was from Joseph Tumulty, the secretary to President Wilson. Radio had no more ardent fan than Mr. Tumulty. He even came to New York a few weeks later to watch us broadcast.

There was some additional talent on the show that night—a young baritone doubling in radio to help advertise his appearance at a Newark theatre. His name? John Charles Thomas.

Tommy Cowan had quite an inspiration that evening. With the regular programs finished, he introduced Mr.

Tumulty on the air and interviewed him about the world political situation. Cowan chalked up another first for WJZ: the radio commentator.

Most of my band regarded our trip to Newark that night as a lark—or an annoyance. Paul Whiteman had already turned down such appearances for his band with the quick comment that radio was for kids, who liked to build crystal sets and fool around with them. I had a hopeful idea that radio would somehow increase our popularity, but I didn't foresee the millions of fans it would create for us within a few short years.

. . .

The mail response to our music had the Newark Post Office working overtime for several days and Cowan asked us to broadcast regularly. However, E. M. Statler had no enthusiasm for that idea. He wanted us at the Pennsylvania Grill, quite naturally, not out in Newark.

"Can't you put a microphone right on our bandstand and send it out over the wires to Newark?" I asked Tommy, trying to hold on to the broadcast time.

"The telephone company says it isn't feasible," Cowan explained. "I think they're wrong about it. Let me see if Western Union can rig something up."

The rigging took a month and involved special wires out to Newark, but everything straightened out and we went on the air one Thursday night, with the announcement we'd be broadcasting regularly right from the Grill—another first—and we all wondered if people would like to come in and watch the band do a program.

Within an hour, telephone calls had soaked up every table reservation for the following evening—and the calls kept coming in that night and the next day.

Early Friday evening, Seventh Avenue and the two side streets looked like Ebbett's Field back in the old days when the New York Giants were fighting the Brooklyn Dodgers for the pennant. What's more, the entire hotel was sold out by mid-afternoon.

"Vincent," said an amazed E. M. Statler, "I couldn't build business up like this in a thousand years of hard work. You did it in an hour. I think radio has some real possibilities." It was the understatement of the century.

The first stage show for broadcast emanated from station WJZ on February 19, 1922, and featured Ed Wynn in *The Perfect Fool*. The comedian's reaction to the microphone was the subject of an article in *Radio Broadcast*, which said:

Ed Wynn approached the microphone gingerly. He looked at it suspiciously. The time came for him to perform. As with all professionals, he was a trifle nervous. The nervousness, however, wore off, but Wynn was appalled by the silence. He had told some of his best stories and had not even heard a snicker. He asked the announcer to help him and the announcer quickly assembled all the people from around the studio including the electricians in shirt sleeves, scrub-women, with their skirts tucked up,



One of the earliest programs on WJZ in 1922 featured Ed Wynn in *The Perfect Fool*. Wynn, born in 1886, has been in show business virtually all his life, starting in vaudeville and graduating into musical comedies on the New York stage. He starred in the *Ziegfeld Follies of 1914* and in many other Broadway hits after that. Wynn's type of humor, which he brought virtually intact to radio, relied heavily on outrageous puns and a giggling delivery. His trade mark, a long, drawn out "so-o-o-o-o," was interpolated in the telling of his fantastic yarns. In his Texaco "Fire Chief" shows of the early 1930's long-suffering Graham McNamee was his announcer and straight man. After many years of semi-retirement Ed Wynn has recently made a very successful comeback as a character actor in television and motion pictures.

telephone operators and artists who were billed later on the program. They were all invited into the studio to view the show. It was a strange audience, but their approbation turned the trick. With the giggles, guffaws and shouts of merriment to encourage him, Wynn proceeded with the entertainment. He needed only the responsive sight of his hearers doubled over with laughter. Had he been a more

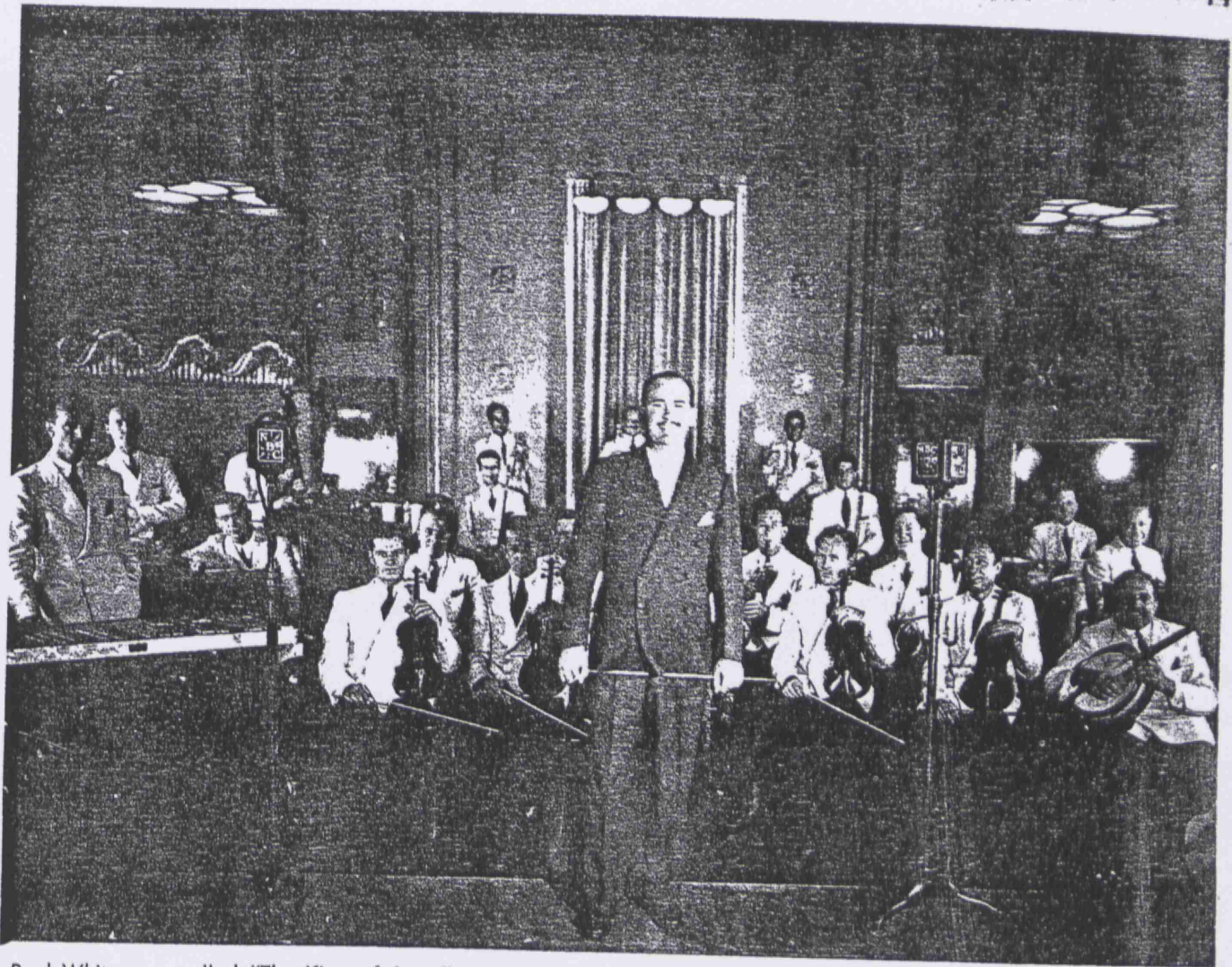
Some vintage Wynn humor:

"A married woman? My goodness, everyone knows what a married woman is! That's someone who has nothing to wear, and six closets to keep it in. The wife likes clothes so much that one day when the husband comes home, she says, 'How do you like this new skunk coat I bought? It's genuine skunk. I bought it for a song.' He says, 'What's the song—"I walk alone"?"

"Here the mood changes, and the finish of the story takes place ten years later. They have an eight-year-old boy. He is always fighting with other boys. If he isn't fighting on one side of the street, he is fighting on the other, and he always gets beaten up. His mother almost goes crazy because she never knows which side her brat is battered on."

frequent radio performer, he would have been able to imagine the fans in their homes tuned in on his program and convulsed with mirth.

Paul Whiteman entered radio about 1922 and his first experience in the WJZ studio also was somewhat disconcerting. The importance of the audience in the



Paul Whiteman, called "The King of Jazz," entered radio about 1922, doing his first broadcast from WJZ. In the next quarter of a century there was hardly a year he couldn't

be heard on the radio and he became one of the pioneers in the new medium of television. Here he is before a broadcast in the 1930's.

studio was recognized almost immediately and became a main factor in the creation of a successful broadcast.

Radio stations, by May, 1922, totalled 314, creating a great number of difficulties. The problem of so rapidly expanding an industry became serious enough for President Warren G. Harding, in mid-winter, 1922, to instruct Secretary of Commerce Herbert Hoover to call a conference of manufacturers and broadcasters—the First National Radio Conference—in Washington. Secretary Hoover declared that the country was on the threshold of a new means of widespread communication which would have profound importance from the point of view of public education and welfare.

The conference accomplished a number of important results, which included the establishment of a Federal legal authority to control all transmitting stations except amateur and experimental stations. It also revealed that radio communication was to be

considered a public utility and as such should be regulated by the Federal Government in the public interest.

Despite the fact that the first sponsored program had been made in August, 1922, few radio stations throughout the United States had hit upon a method by which money could be made, other than through the sale of radio equipment. Most American radio station operators found great difficulty in maintaining the cost of radio broadcasting. England solved the problem in 1922 by creating a government-controlled monopoly of broadcasting supported by taxes levied annually on each radio set. However, such a solution was considered impossible in the United States and serious difficulties were encountered by station broadcasters. Within the next few years, administrators in the broadcasting industry realized that only through sponsored programs could radio survive and flourish, giving birth to one of the greatest advertising media in the world.

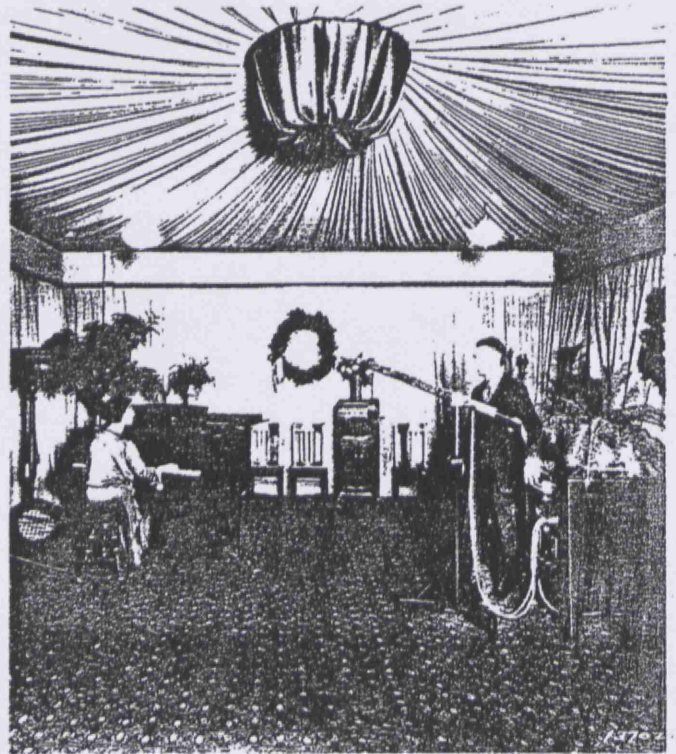




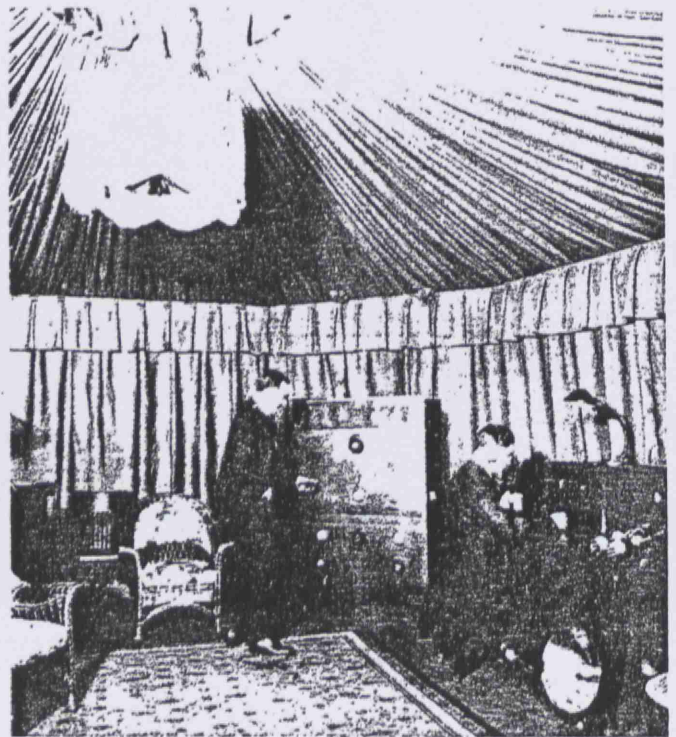
T. J. Vastine conducted radio's first band concert over KDKA in 1921.



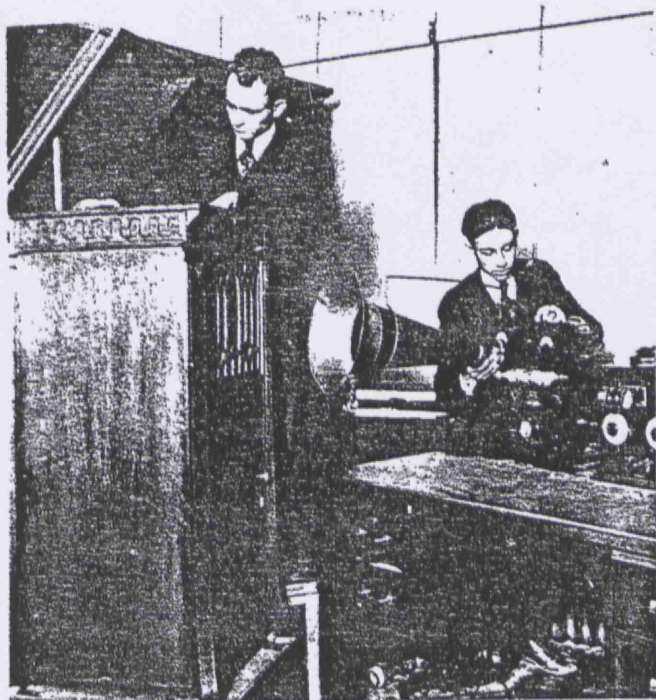
This 1921 picture shows an early microphone with a boom arrangement that permitted it to be raised or lowered according to the performer's height.



This sumptuous indoor tent studio was installed in a Pittsburgh Westinghouse plant in 1921. One of radio's first on-the-air mishaps occurred here, when a stray dog knocked over a microphone and added his loud barks to the ensuing pandemonium.

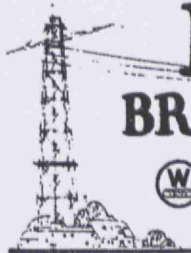


Other stations used the tent-studio idea to combat echo. Here is RCA's first broadcasting studio at Roselle Park, New Jersey, in 1921.



The original crew of WWJ is shown ready to go on the air in 1922, using the station's first transmitter. The horn type of microphone funneled the voice—or in this case the phonograph music—into the transmitter. Power was supplied by a 150-watt, 500-volt direct current generator driven by a quarter-horsepower motor placed under the table.

## RADIO BROADCASTING NEWS



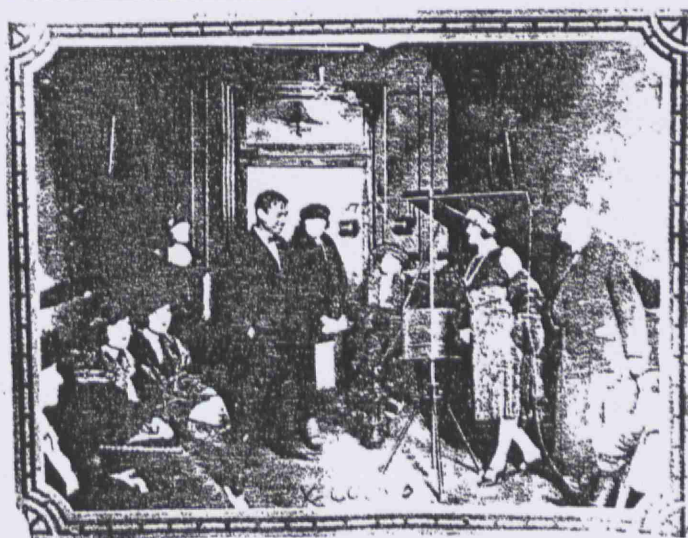
Sixty-sixth Week Broadcasting

March 26, 1922

KDKA Edition. Vol. I. No. 1



"The great commoner," William Jennings Bryan, broadcast a sermon from Point Breeze Presbyterian Church in Pittsburgh over KDKA in 1922.



Will Rogers and a group of Ziegfeld Follies girls broadcast from the Pittsburgh Post studio of KDKA in 1922.

Crystal sets were generally in use in 1922, requiring the listener to use earphones in order to hear the programs picked up. This contraption made it impossible for more than one person to listen in. Loudspeakers which could transmit the sound loud enough for groups of people had not yet been perfected. Considerable static in radio reception was also a tremendous problem at that time, and it was not until years later that solutions were discovered.

When Station WJZ was eleven months old in August, 1922, a young singer named Milton J. Cross was hired. His singing voice was ideal for broadcasting, but his speaking voice also won great acclaim and was destined to become one of the most familiar voices in radio. Another notable performer from the studios of WJZ in the spring of 1922 was Miss Bertha



*We two boys without a care  
Entertain you folks out there—  
That's our hap-hap-happiness!*



Billy Jones and Ernie Hare, radio's legendary "Happiness Boys," were perhaps the first of the broadcasting comedians to gain a wide audience.

Brainard, who made regular appearances in a series called "Broadcasting Broadway" in which she reviewed plays and offered other information about the theater.

During the same year, Gimbel Brothers' department store broadcast an hour-long musical program. The

American Tobacco Company came on the air and joined radio with its Lucky Strike Radio Show.

On August 22, 1923, the Happiness Candy Company went on the air with a new type of program. The show called "The Happiness Boys," featured Billy Jones and Ernie Hare, and provided a comparatively small audi-



Vladimir Rosing lets a song go out of his heart, apparently to a piano and phonograph accompaniment. The year is 1922.



Bertha Brainard, sometimes called the "First Lady of Radio," made regular appearances on WJZ in a program series called "Broadcasting Broadway," in which she reviewed plays and offered other information about the current theatre.



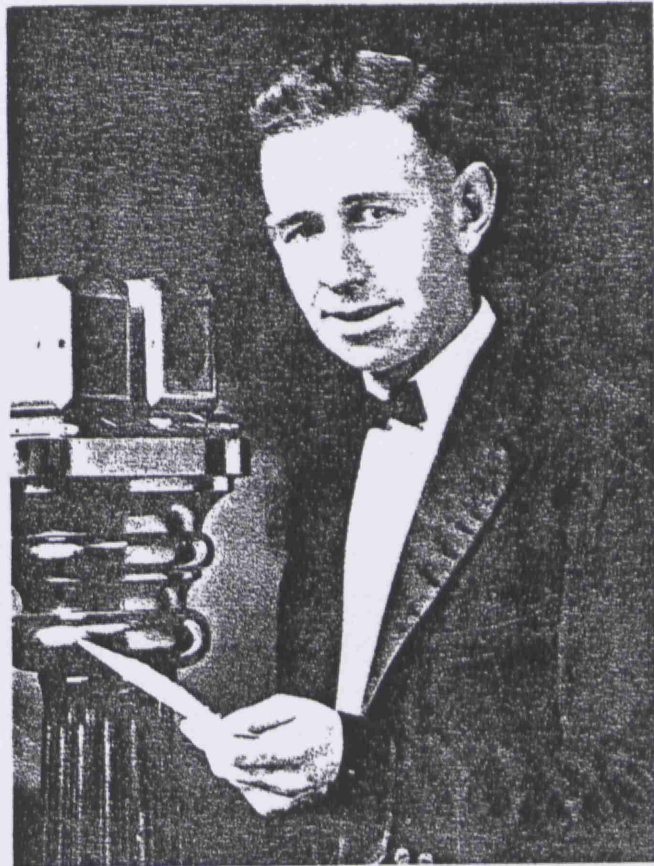
A young man named Milton Cross joined the staff of WJZ in 1922. Despite the fact that he made his debut as a tenor, he was hired as an assistant to Thomas H. Cowan, New York's first radio announcer. Cross, shown here in about 1928, was destined to become the nation's foremost commentator on musical programs, particularly the Metropolitan Opera broadcasts, with which his name is almost synonymous.

ence with the first real comedy of radio. Utilizing a small studio so that the laughter would be heard on the air, "The Happiness Boys" helped to plunge the nation into a new era of radio programming.

Also in 1923 Roxy (S. L. Rothafel) and His Gang began their Sunday morning broadcasts from the Capitol Theater in New York, a series that was to continue, in only slightly altered form, into the late 1930's as The Capitol Theater Family with Roxy's successor, "Major" Edward Bowes.

One of radio's most beloved figures, Dr. Walter Damrosch, who would play an incalculable role in the popularization of serious music in America, made his first air appearance on October 29, 1923, with a lecture recital on Beethoven, over WEAF.

A young man named Graham McNamee made his debut that year, too. McNamee, who was more notable for his ability to project the atmosphere and excitement of a sports event into the nation's living rooms than for his reporting accuracy, became one of the



The nation's first full-time radio announcer was Harold W. Arlin of KDKA. Mr. Arlin spent five years behind the mike. During this period he introduced such public figures as William Jennings Bryan, Marshal Foch, and David Lloyd George. He also broadcast the first play-by-play account of a football game, between the University of West Virginia and the University of Pittsburgh.

most popular announcers in early radio. Together with Phillip Carlin, he covered most of the important sports events of a decade and more.

WEAF, WCAP, and WJAR provided the vehicle for a number of important personages: David Lloyd George, Prime Minister of Great Britain on a goodwill tour to the United States, made an important broadcast. Ex-President Woodrow Wilson broadcast a ten-minute message to the country on the significance of Armistice Day. The first broadcast of a football game was made by Graham McNamee at the annual Army-Navy event.

Republicans gathered in Cleveland on June 10, 1924 for a three-day national convention. It was the first convention to be broadcast to the American people. When Graham McNamee and Major John Andrew White reported in vivid language the exciting Coolidge "bandwagon" scene, millions of listeners were experiencing history in the making.

Later in 1924, when 1,444 delegates assembled in



Frank E. Mullen, a Sioux City Farm editor, broadcast a regular farm program on KDKA in 1921.



Helen Hahn, one of the first radio hostesses and woman announcers, was heard over WBAY in New York.

Madison Square Garden, New York City, the American radio audience was able to listen in on the Democratic National Convention.

A typical program of 1924 is reproduced below. This WEAF program log records an interesting mixture of sustaining and sponsored offerings.

PROGRAM—FRIDAY, SEPTEMBER 12, 1924  
STATION WEAF—AMERICAN TELEPHONE AND  
TELEGRAPH COMPANY  
(492 Meters 610 Kilocycles) (Daylight Saving Time)  
195 Broadway, New York City

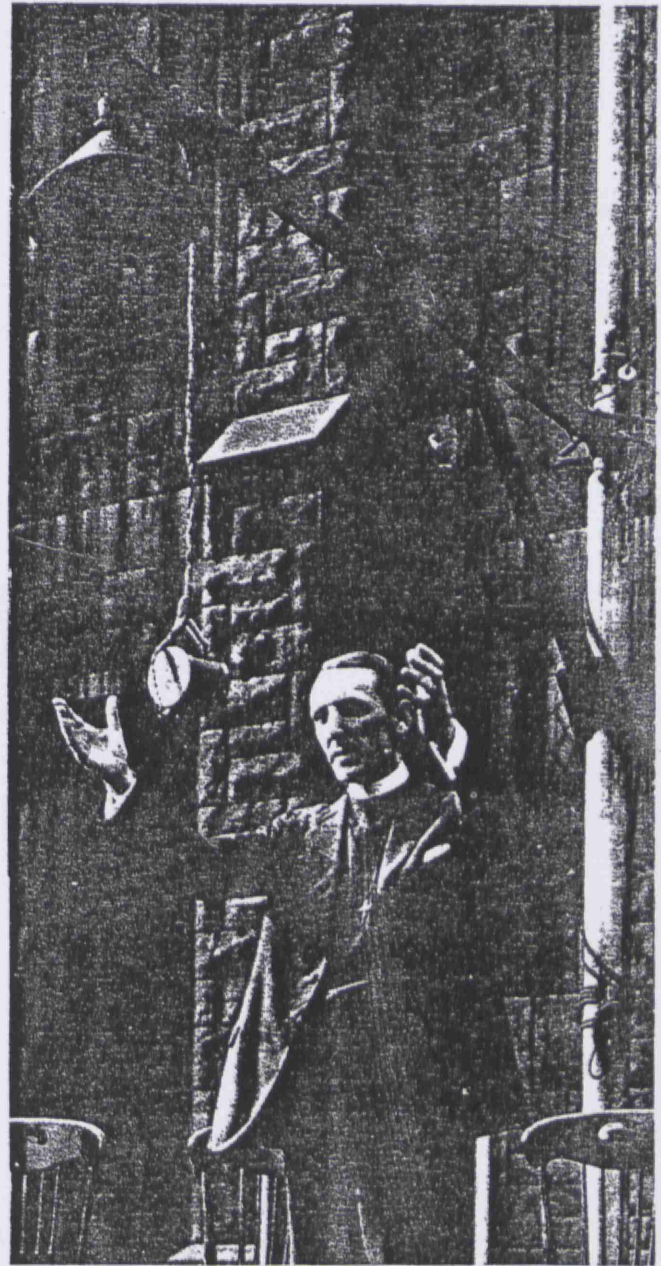
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|--|---|
| <p>11:00 a.m. Helen Morris, Soprano.<br/>11:10 a.m. Health Talk under the auspices of the Association for the Prevention and Relief of Heart Disease, by Dr. Wm. St. Lawrence.<br/>11:25 a.m. "The Flower Garden's Big Opportunity" by Leonard Barron, Editor of <i>Garden Magazine and Home Builder</i>.<br/>11:50 a.m. Consolidated Market and Weather Reports by the United States Department of Agriculture and the New York State Department of Farms and Markets, together with <i>American Agriculturist</i>.<br/>4:00-5:00 p.m. "Women's Club Program."<br/>4:00 p.m. John Burnham, Concert Pianist, Program: "The Harmonious Blacksmith" (Handel); First Movement "Sonata" (Beethoven); "By the Brook" (Boisdefre).<br/>4:10 p.m. Talk by Mr. Arthur J. Westermayr.</p> | <p>4:25 p.m. John Burnham, Concert Pianist, Program: "Waltz" (Chopin).<br/>4:35 p.m. "When Every Voter Votes," the second in a series of lectures on "Getting Out the Vote" by Mrs. Raymond Brown, Managing Director of Woman's Citizen, speaking under the auspices of the New York League of Women Voters.<br/>4:50 p.m. John Burnham, Pianist. Program: "Impromptu" and "Gavotte Antique" (compositions by Mr. Burnham).<br/>6:00 p.m. Dinner Music from the Rose Room of the Hotel Waldorf-Astoria, New York City, Joseph Knecht, directing. Program: "Marche Lorraine" (Ganne); Selection "Les Huguenots" (Meyerbeer); "Arlesienne" (Bizet); "Caprice Viennois" (Kreisler); Entr'acte and Valse from "Coppelia" (Delibes); "Habañera" (Chabrier); "Lob der Frauen" (Strauss); "Madame Sherry" (Hoshna).<br/>7:30 p.m. "Sir Hobgoblin Broadcasts a Get-Up-Time-Story" by Blanche Elizabeth Wade, the G. R. Kinney and Company Story Teller.<br/>7:45 p.m. Harry Jentes, Jazz Pianist.<br/>7:55 p.m. Rosella Sheiner, 10-year-old Violinist.<br/>8:05 p.m. Isabel Duff "Scotty" Wood, Soprano, Program of Scotch Songs.<br/>8:20 p.m. Harry Jentes, Jazz Pianist.<br/>8:35 p.m. Joseph White, Tenor, Accompanied by Winifred T. Barr.<br/>8:50 p.m. Rosella Sheiner, 10-year-old Violinist.<br/>9:00-10:00 p.m. B. Fischer and Company's "Astor Coffee" Dance Orchestra.</p> |
|--|---|



Joseph M. White, the "Silver Masked Tenor," was heard over WEAJ in New York from 1923 to 1927 as soloist with the Goodrich Silvertown Orchestra. His identity was carefully guarded, and he wore a sterling silver mask when he appeared in public. He signed an exclusive contract with NBC in 1929 and was heard regularly until 1940, when he retired after sustaining serious injuries in an automobile accident. He died in 1959.

10:00 p.m. Joseph White, Tenor.  
 10:15-11:00 p.m. Special Radio Program on National Defense Test Day direct from the War Department Building, Washington, D.C. Speeches by General J. J. Carty, Hon. John W. Weeks, Secretary of War, and General John J. Pershing, General of the Armies of the United States and Chief of Staff, in order named.

The summer of 1924 also saw a continuance of the controversy regarding the question of financial support of radio broadcasts. Secretary of Commerce Herbert Hoover expressed the opinion that broadcasting should be supported by industry. H. B. Thayer, president of the American Telephone and Telegraph Company, solved the company's problem by selling time on all its broadcasting stations. David Sarnoff, vice-president and general manager of the Radio Corporation of America, advocated outright endowment of radio broadcasting stations. He argued that because radio had reached the stage where it actually contributed a



An afternoon religious service broadcast by KDKA in 1923.

great deal to the happiness of mankind it deserved endowments similar to those enjoyed by libraries, museums and educational institutions. For the General Electric Company, Martin P. Rice stated that broadcasting should be supported by voluntary contributions or by licensing individual radio sets.

Since little money was available, few performers were paid for their services. The great newspaperman Heywood Brown, in protest, described the plight of the unpaid artist and predicted that this situation would be solved by some sort of financial support by advertisers.

The impact of radio in this country was so great that it had become one of the most influential forces in American life, stimulating every phase of activity.



Calvary Episcopal Church, Pittsburgh, was the scene of the first regularly scheduled church broadcasts, January, 1921.



The first portable radio? This perambulator-borne set may be it. Apparently people without babies could substitute dolls, as this young lady has done.

New stars were born, new expressions were popularized as new program formats were being offered. Radio was penetrating every third home in the country, and tenement house roofs were covered with forests of antennae.

Politically too, radio was making its mark. When after Harding, President Calvin Coolidge delivered his message to Congress, for the first time, people of the Nation had an opportunity to listen to this important event. Undoubtedly radio played a vital role in the career of Calvin Coolidge and helped to re-elect him in 1923.

His inauguration was covered by radio on March 4th, 1925, by 21 stations from Boston to San Francisco, under the banner of the AT&T network. It was estimated that fifteen million people listened to the voice of the President on this occasion.

This same year saw the appearance of John McCormack, the famous Irish tenor on WEAf, and of Lucrezia Bori of the Metropolitan Opera Company. This was the first in a series of broadcasts of great figures in the music world who had not previously been heard on radio because of the fear that broadcasting would adversely affect the sales of their recordings made for the Victor Talking Machine Company. A sustaining program of grand opera followed, with five stations participating in the broadcast. The program was so successful that a radio opera company was organized under the name of "The WEAf Grand Opera Company" and directed by Cesare Sodero.

1925 also saw the emergence of new radio personalities. The "A & P Gypsies" were delighting listening audiences on six stations, the "Gold Dust Twins"



Heavyweight champion Jack Dempsey listens to the radio music box, tuned in by Major J. Andrew White, a pioneer announcer. This took place at Dempsey's training quarters a few days before the Dempsey-Carpentier fight in 1921.



Actress Olga Petrova appeared before the microphone in costume, as many performers in radio would later do.

**Daily Schedule  
Is Announced for  
Radio Broadcast**

Oct 9 - 1921

FOR the information of those who already have receiving sets or those who may install them during the week, following is the time schedule of the numbers on the daily broadcasting schedule:

1:45 P. M.—World Series, play by play.

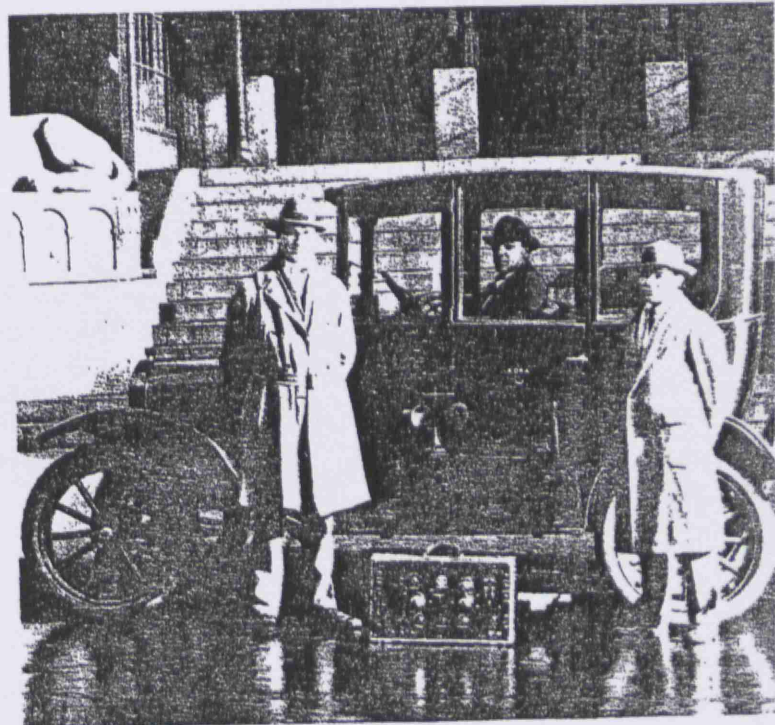
8:05 P. M.—Baseball comment and an analysis of the World Series game.

8:15 P. M.—Summary of the day's important news dispatches.

8:30 P. M.—Concert program of musical and vocal selections.

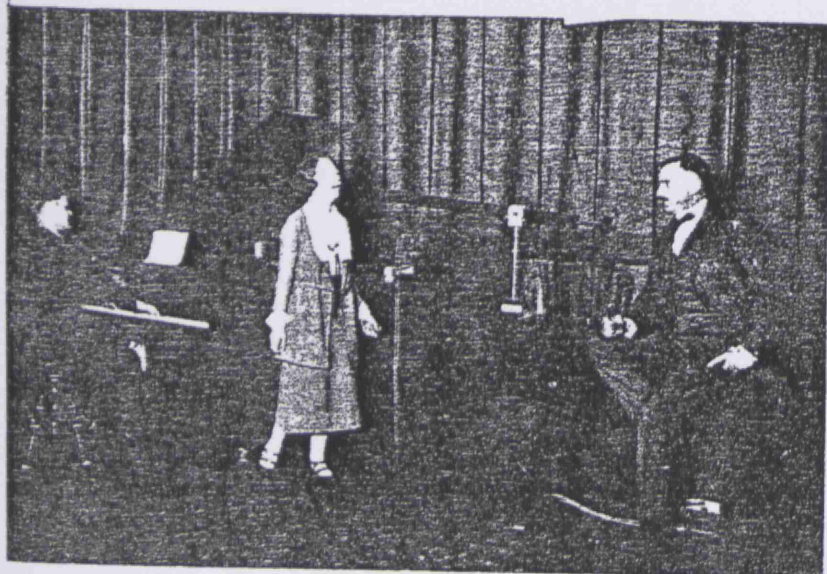
On Friday night at 7 o'clock fairy stories told by The Man in the Moon and three musical numbers especially selected for children.

The sending of the World Series reports, of course, is governed by weather conditions. In the event that rain may prevent the game taking place, announcement of that fact will be made at several intervals during the afternoon.

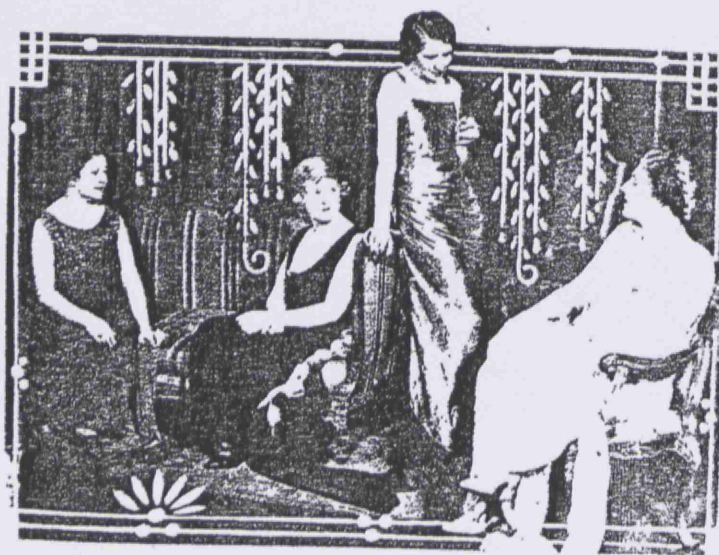


Mobility was the thing in radio even in 1926. By that time KDKA had more than forty pick-up points in Pittsburgh, besides this car and crew which were used to cover special events.





A scene in KDKA's East Pittsburgh studios in 1925. The soloist (unidentified) was required to sing extremely loud in order to have her voice carry over the airwaves.



Borrowing prestige from the legitimate theatre, WJZ in 1923 broadcast *The Laughing Lady*, starring Ethel Barrymore, who was appearing in the same play on Broadway.

brought unique programs to the listeners of eight radio stations; the soft music of the Goodrich Silvertown Orchestra, and the singing voice of the Silver Masked Tenor, were a regular Thursday night transmission on

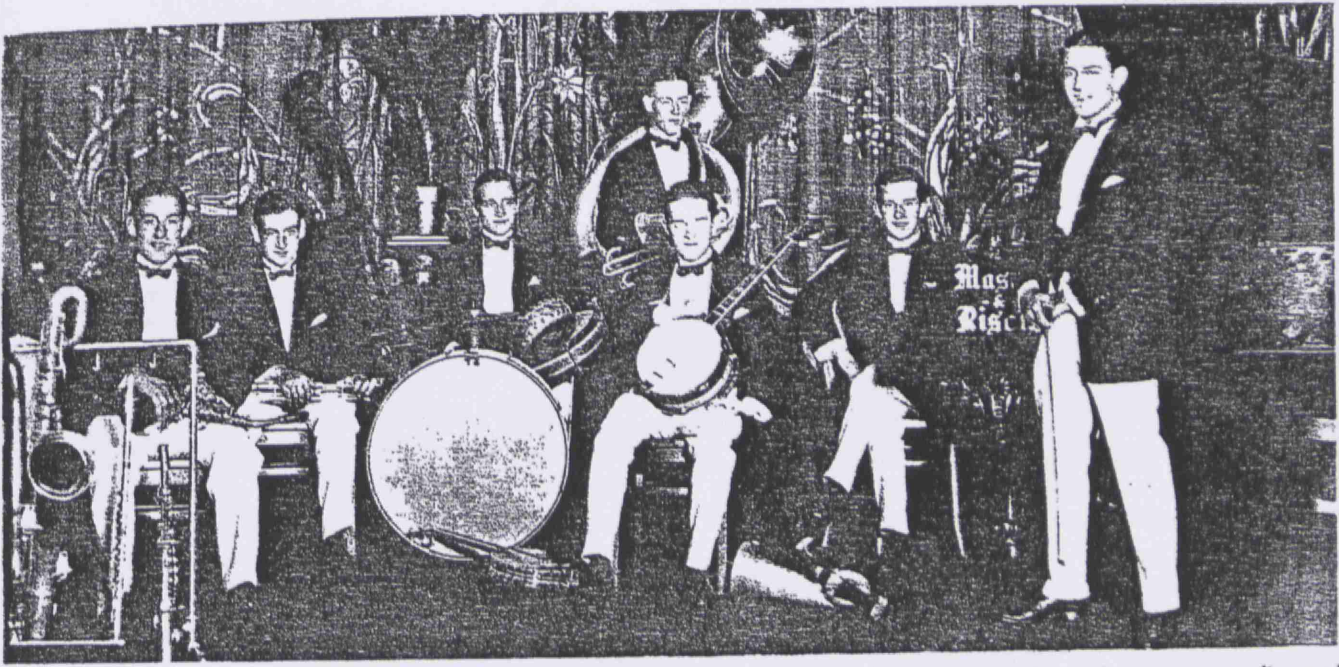
WEAF. The famous Atwater Kent program was inaugurated in October of 1925, and brought the world's great musicians to the fast-growing radio audience. By this time, of course, the industry had succumbed



Harry B. Thayer, president of the American Telephone and Telegraph Company, speaks directly to England on January 14, 1923, over the first radio-telephone line.



"One, two, three, four . . ." KDKA began early-morning physical culture broadcasts in 1924. "Spike" Shannon was the instructor.



"The sweetest music this side of heaven." Guy Lombardo and his Royal Canadians were early performers on radio and one of the first orchestras to achieve national fame through this medium. Lombardo developed a sweet style of playing which has changed little through the years. For many people the New Year wouldn't seem official without Lombardo's "Auld Lang Syne."

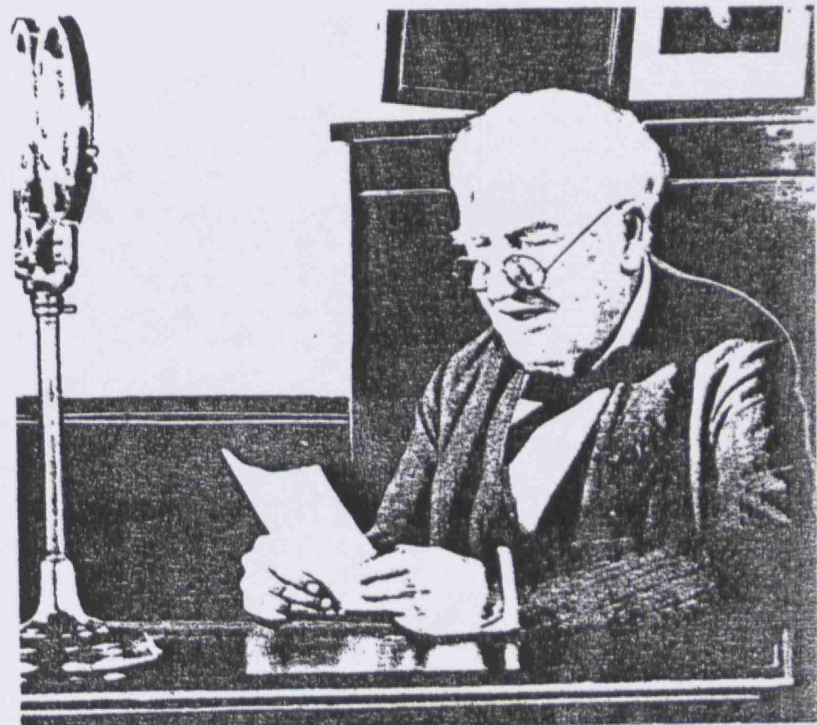
to, and was flourishing on, the financial support of advertisers.

The extent of radio's success was feared by newspaper publishers throughout the country. The American Newspaper Publishers Association warned members that advertising on radio would result in a split in advertising appropriations and therefore would mean less revenue for newspapers. This fear was so great that many newspapers refused to carry radio logs in their papers, and the very word "radio" was forbidden in news columns. However, time proved this fear to be groundless and newspaper publishers gradually realized that radio had become an important supplemental medium, in many instances helping the newspaper industry to prosper.

America's first nation-wide network, the National Broadcasting Company, was born on November 15, 1926. The new network, with WEAJ in New York as its key station, combined a group of nineteen scattered affiliated stations, using more than 3500 circuit miles of special telephone wires.

The Federal Radio Commission was appointed by President Coolidge on the basis of the Radio Act of 1927, which Congress passed in an effort to control broadcasting. A period of transition had ended and a new period of rapid development was born. In January of 1927, the first coast-to-coast program, originating in California, was broadcast. It was the Rose Bowl Football game and it was broadcast over the NBC network.

In 1927, radio took on larger dimensions for the American people. It was reaching greater distances at night, and the quality of programs was improving and their number increasing. A one-hour broadcast of Floyd Bennett's funeral service in Arlington held the nation spellbound. The voice of Herbert Hoover, accepting the Republican nomination from Palo Alto,



Thomas Alva Edison addresses the radio audience in 1926.

# Announcing the National Broadcasting Company, Inc.

National radio broadcasting with better programs permanently assured by this important action of the Radio Corporation of America in the interest of the listening public

**T**HE RADIO CORPORATION OF AMERICA is the largest distributor of radio receiving sets in the world. It handles the entire output in this field of the Westinghouse and General Electric factories.

It does not say this boastfully. It does not say it with apology. It says it for the purpose of making clear the fact that it is more largely interested, more selfishly interested, in the best possible broadcasting in the United States than anyone else.

### Radio for 26,000,000 Homes

*The market for receiving sets in the future will be determined largely by the quantity and quality of the programs broadcast.*

We say quantity because they must be diversified enough so that some of them will appeal to all possible listeners.

We say quality because each program must be the best of its kind. If that ideal were to be reached, no home in the United States could afford to be without a radio receiving set.

Today the best available statistics indicate that 5,000,000 homes are equipped, and 21,000,000 homes remain to be supplied.

*Radio receiving sets of the best reproductive quality should be made available for all, and we hope to make them cheap enough so that all may buy.*

The day has gone by when the radio receiving set is a plaything. It must now be an instrument of service.

### WEAF Purchased for \$1,000,000

The Radio Corporation of America, therefore, is interested, just as the public is, in having the most adequate programs broadcast. It is interested, as the public is, in having them comprehensive and free from discrimination.

Any use of radio transmission which causes the public to feel that the quality of the programs is not the highest, that the use of radio is not the broadest and best use in the public interest, that it is used for political advantage or selfish power, will be detrimental to the public interest in radio, and therefore to the Radio Corporation of America.

To insure, therefore, the development of this great service, the Radio Corporation of

America has purchased for one million dollars station WEAF from the American Telephone and Telegraph Company, that company having decided to retire from the broadcasting business.

The Radio Corporation of America will assume active control of that station on November 15.

### National Broadcasting Company Organized

The Radio Corporation of America has decided to incorporate that station, which has achieved such a deservedly high reputation for the quality and character of its programs, under the name of the National Broadcasting Company, Inc.

### The Purpose of the New Company

*The purpose of that company will be to provide the best program available for broadcasting in the United States.*

The National Broadcasting Company will not only broadcast these programs through station WEAF, but it will make them available to other broadcasting stations throughout the country so far as it may be practicable to do so, and they may desire to take them.

*It is hoped that arrangements may be made so that every event of national importance may be broadcast widely throughout the United States.*

### No Monopoly of the Air

The Radio Corporation of America is not in any sense seeking a monopoly of the air. That would be a liability rather than an asset. It is seeking, however, to provide machinery which will insure a national distribution of national programs, and a wider distribution of programs of the highest quality.

*If others will engage in this business the Radio Corporation of America will welcome their action, whether it be cooperative or competitive.*

If other radio manufacturing companies, competitors of the Radio Corporation of America, wish to use the facilities of the National Broadcasting Company for the purpose of making known to the public their receiving sets, they may do so on the same terms as accorded to other clients.

The necessity of providing adequate broad-

casting is apparent. The problem of finding the best means of doing it is yet experimental. The Radio Corporation of America is making this experiment in the interest of the art and the furtherance of the industry.

### A Public Advisory Council

In order that the National Broadcasting Company may be advised as to the best type of program, that discrimination may be avoided, that the public may be assured that the broadcasting is being done in the fairest and best way, always allowing for human frailties and human performance, it has created an Advisory Council, composed of twelve members, to be chosen as representative of various shades of public opinion, which will from time to time give it the benefit of their judgment and suggestion. The members of this Council will be announced as soon as their acceptance shall have been obtained.

### M. H. Aylesworth to be President

The President of the new National Broadcasting Company will be M. H. Aylesworth, for many years Managing Director of the National Electric Light Association. He will perform the executive and administrative duties of the corporation.

Mr. Aylesworth, while not hitherto identified with the radio industry or broadcasting, has had public experience as Chairman of the Colorado Public Utilities Commission, and, through his work with the association which represents the electrical industry, has a broad understanding of the technical problems which measure the pace of broadcasting.

One of his major responsibilities will be to see that the operations of the National Broadcasting Company reflect enlightened public opinion, which expresses itself so promptly the morning after any error of taste or judgment or departure from fair play.

*We have no hesitation in recommending the National Broadcasting Company to the people of the United States.*

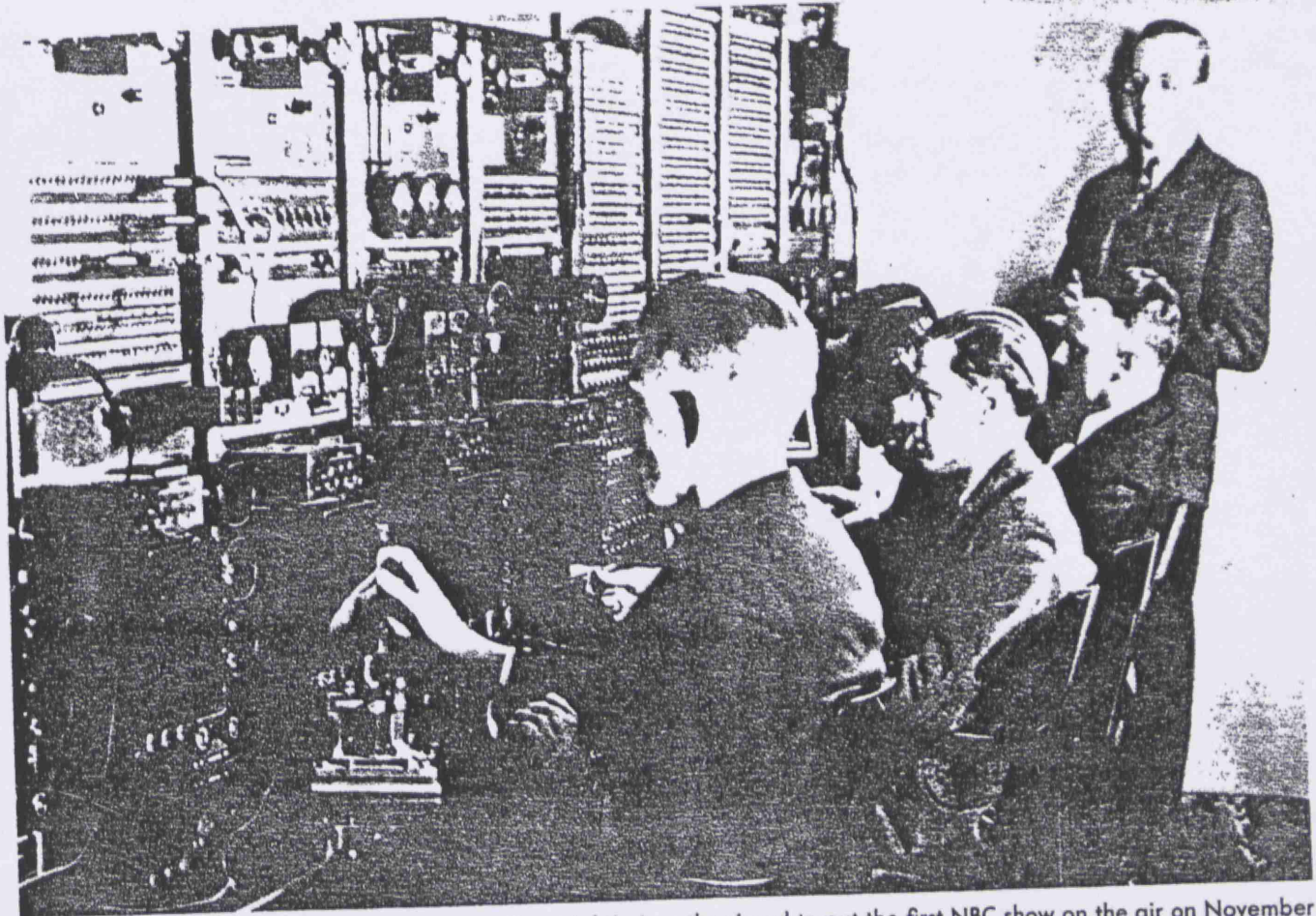
*It will need the help of all listeners. It will make mistakes. If the public will make known its views to the officials of the company from time to time, we are confident that the new broadcasting company will be an instrument of great public service.*

## RADIO CORPORATION OF AMERICA

OWEN D. YOUNG, Chairman of the Board

JAMES G. HARBORD, President

This newspaper advertisement proclaimed the founding of NBC in 1926. It heralded the dawn of a new era in home entertainment and public service in broadcasting.



Here goes! Chief Engineer O. B. Hanson (standing, right) gives the signal to put the first NBC show on the air on November 15, 1926.

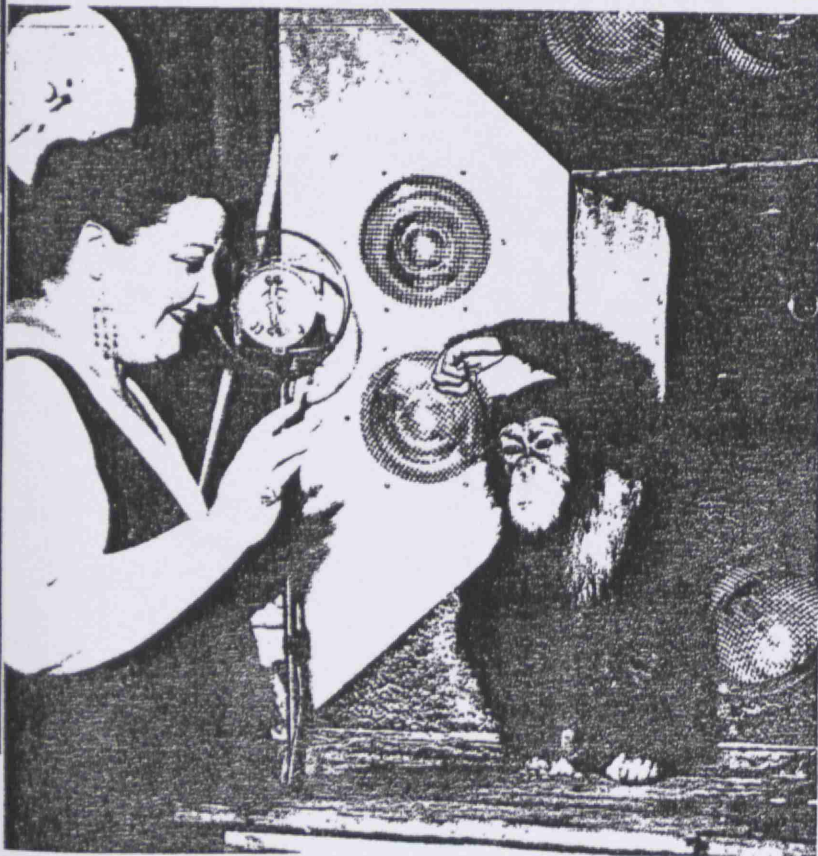
was a major radio event. Americans were listening to Moran and Mack, the "Two Black Crows," and sitting in rapt attention before their loud speakers for the Sunday afternoon broadcast of the Columbia Symphony Orchestra. Sponsors like Dodge, Listerine, Wrigley, and Studebaker were buying time on radio. By now there were eight million radio families in the country. This year, too, found such popular programs as that of Ida Bailey Allen and her cooking school. One of the country's popular radio personalities was an announcer named Ted Husing, whose specialty was sports events, but who doubled in anything that came along. It was Husing who broadcast the arrival of the *Graf Zeppelin* over New York in its first transatlantic flight. It was also Husing who made the memorable broadcast of the 1928 election returns.

During the same year, NBC was organized into two semi-independent networks, the Blue and the Red. The Blue Network consisted of WJZ and the older Radio Group Network. The Red Network encompassed WEAF and the older Telephone Group Network.

The Columbia Broadcasting System was founded in 1929, under the aegis of William S. Paley, the twenty-seven-year-old heir to a tobacco fortune. Paley

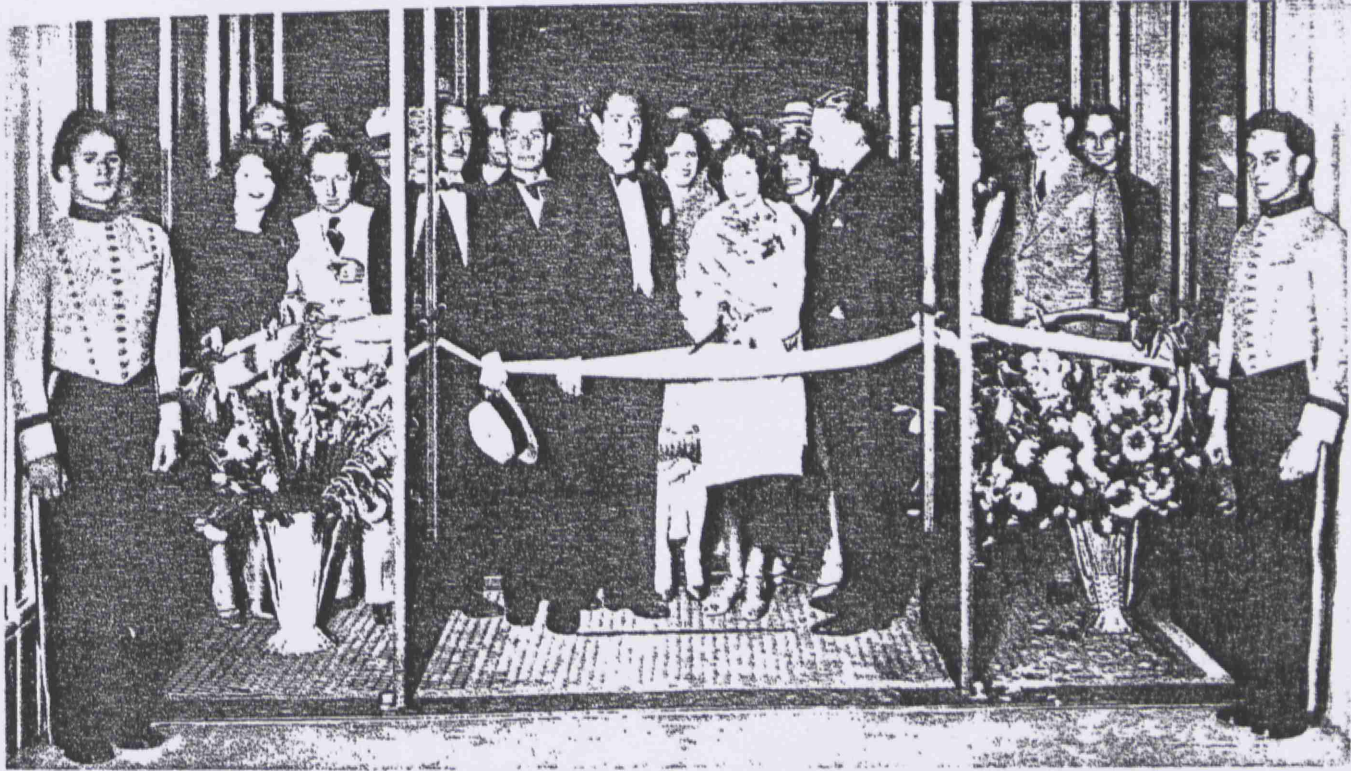


Veteran stage trouper Alice Brady faces a lamp shade that hides a microphone. Even experienced performers "froze up" when faced by a mike in 1926.



Vaughn de Leath is said to be the original "radio girl" and the first woman ever to have sung on the air. According to one story, Miss de Leath was invited into the original De Forest Laboratory, where she faced a phonograph horn. Then, it is said, she sang "The Old Folks at Home"—just for a lark. In any case, Vaughn de Leath, in the early 1920's, created the style of singing known as "crooning." Her style was imposed on her by the limitations of the radio equipment of the day, since the high notes of sopranos often blew out the delicate tubes of the transmitters. Ben Gross of the *New York Daily News* reported that "after her first broadcast, more than thirty years ago, Vaughn received one of the first radio fan letters ever written. It read: 'You have inaugurated a new form of song which, no doubt, will become very popular.'"

Miss de Leath also participated in the early NBC television broadcasts. Here she is on a novelty program in the late 1920's. She shares the camera with "Young Tarzan."



When CBS opened its new building at 485 Madison Avenue on September 18, 1929, President William S. Paley was on hand to supervise the ceremonial cutting of the ribbon.

had been greatly impressed by the boost in cigar sales as the result of a program broadcast over the almost-bankrupt Columbia Phonograph Broadcasting Company network. He merged the network with an organization called United Independent Broadcasters, which had been formed to supply talent for independent stations, and retained the Columbia name (although he sold the record company). The new network went on the air with 47 stations, with WABC (now WCBS) in New York as its key station. Interestingly enough, CBS in 1938 would repurchase the record company that gave it its name and build it up to the position of prestige it holds today.

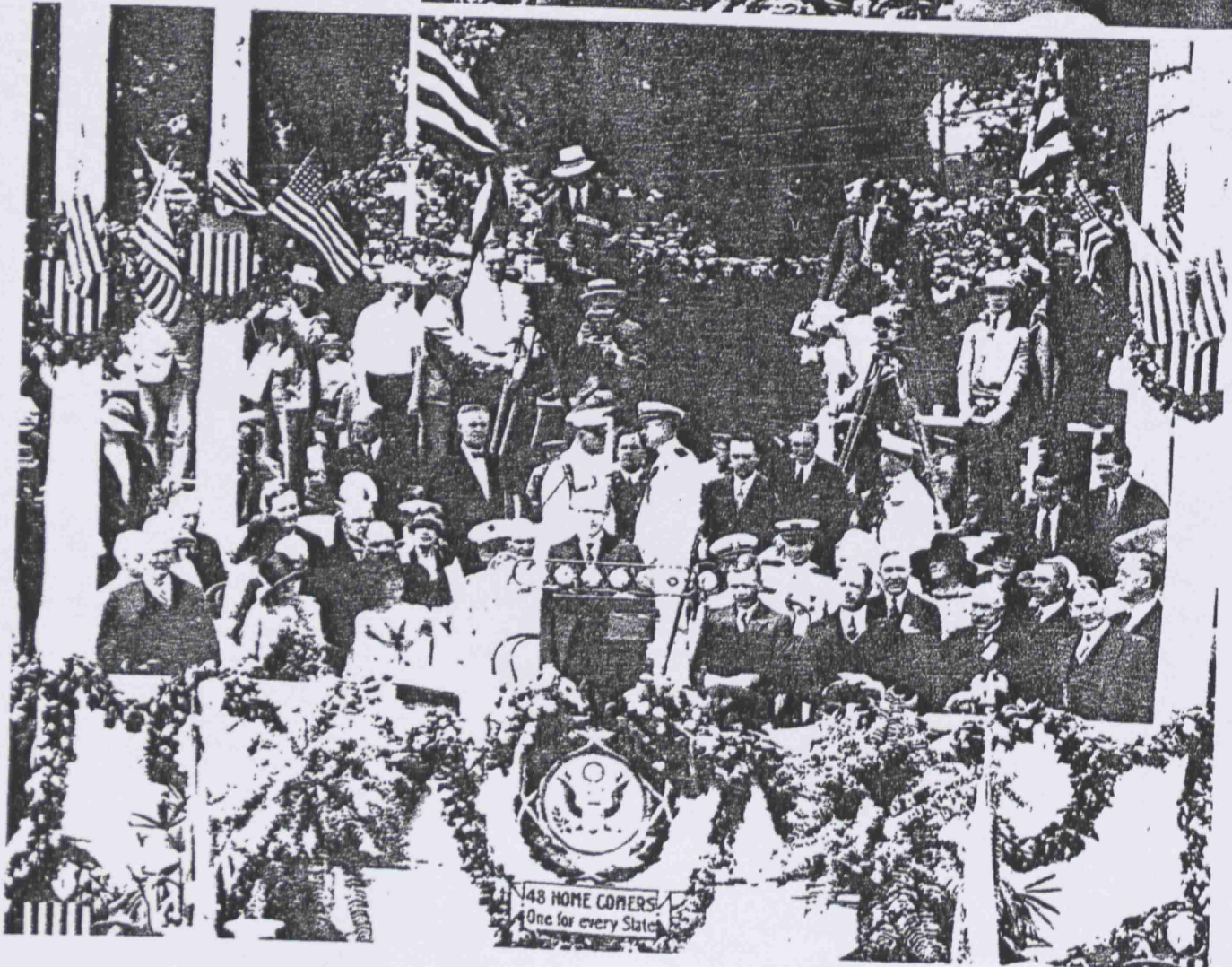
The first sponsored opera broadcast originated from the stage of the Chicago Civic Auditorium in 1927. Cities Service, one of radio's oldest continuous sponsors, started its concert series in February of that year.

A major event of 1927 was the arrival of Charles A. Lindbergh in Washington, D.C., after his historic flight to Paris. The arrival was broadcast by Graham McNamee on a coast-to-coast network, with one of the greatest radio audiences in history listening in. The Dempsey-Tunney prizefight was broadcast from Chicago over 69 stations, the largest network of stations ever to carry a program to date. On November 7, General Motors began its first series on NBC, and the following month, the "Palmolive Hour" began.

In 1928, Al Jolson, already a star in other fields of entertainment, made his radio debut, and later that



Weber and Fields, vaudeville immortals, brought their act to radio in the early days.



Charles A. Lindbergh's solo flight across the Atlantic in May, 1927, was probably the event that more than any other epitomized the decade. "Lindy" was young, goodlooking, and daring—a made-to-order hero for a generation that revered these qualities above all others. The nation went wild when the news came that he had landed "The Spirit of St. Louis" safely outside of Paris and wilder still when he arrived home aboard a United States battleship. Graham McNamee was on hand in Washington to describe the hero's return to radio listeners. President Coolidge made him welcome in ceremonies broadcast from the foot of the Washington Monument. Later, Governor Alfred E. Smith of New York awarded him the State Medal in ceremonies held in Central Park.

In 1931, CBS awarded the aviator the Columbia Medal for Distinguished Service to Radio during a broadcast that was carried by the largest network of stations ever assembled up to that time.

Tragedy entered Lindbergh's life in 1932, when his infant son was kidnapped and later found dead. The picture shows a group of NBC newsmen making an on-the-spot broadcast in connection with the case.







Dr. S. Parkes Cadman, noted Brooklyn clergyman and nationally syndicated columnist, pioneered in a regular weekly religious series over NBC in 1928.



Microphones were getting fancy in the late 1920's and so were performers on radio, as more and more movie stars and Broadway actors tried the new medium.



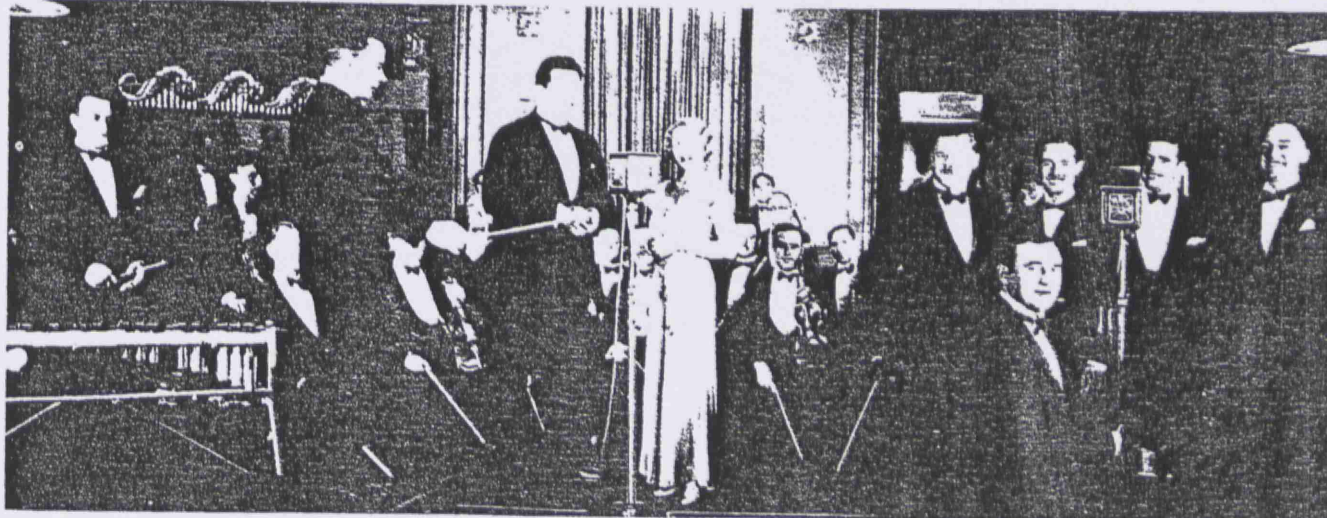
Broadway showman S. L. Rothafel became well known to radio listeners as "Roxy." The famous Roxy Gang, broadcast from the Capitol Theatre in New York, was an NBC favorite for many seasons. Roxy gave the country such personalities as Erno Rapee, James Melton, "Wee Willy" Robyn, Caroline Andrews, and Marie Gambarelli.

year one of the first religious programs, the "National Radio Pulpit," became a network offering.

The broadcast coverage of the Republican Convention in June of 1928 was one of the most comprehensive ever attempted, and the Democratic Convention was covered to an equal extent during the same month. On August 6, one of the first dramatic series was begun. The program was called "Real Folks," and attained immediate popularity. The same year saw the inaugural programs of the "National Farm and Home Hour" and the "Music Appreciation Hour" with Dr. Walter Damrosch.

Radio listeners heard Herbert Hoover accept victory and Alfred E. Smith of New York concede defeat. Smith's "raddio" became a humorous expression throughout the country.

The "Voice of Firestone" began on December 24, and December 23 saw the inauguration of NBC's



Destined to become one of radio's brightest stars, lovely Jessica Dragonette gave up the concert stage for broadcasting. In the picture at the bottom Miss Dragonette appears on a Cities Service concert in the late 1920's. With her are conductor Rosario Bourdon and announcer Ford Bond (at microphone). When Jessica Dragonette retired from radio

after a disagreement with her sponsors in the late 1930's, listeners were so distressed that in some cities fans resolved to boycott radio until she returned. During a concert tour 150,000 people turned out to hear her in Chicago's Grant Park, and in Minneapolis 15,000 people braved a blizzard and a taxi strike to hear her.

coast-to-coast network of 58 stations on a permanent basis.

1929 was also the year of Bing Crosby, of blindfold tests, and of Paul Whiteman. The La Palina Smokers' broadcast brought leading entertainers of stage and screen into America's living rooms. A CBS commenta-

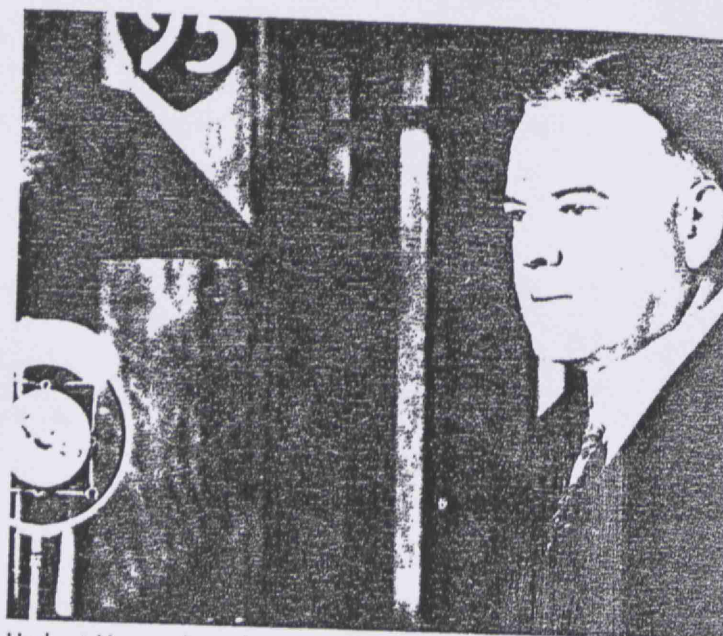
tor named H. V. Kaltenborn excited the public with his reports and analyses of major news events. This was the year that radio broadcast the ratification of the Kellogg-Briand Pact, and the short-wave flash of Byrd's flight over the South Pole.

The first short-wave broadcast from England was



The beloved Sir Harry Lauder was always a welcome guest in radio's first decade.

made on February 1, with a program of symphonic music from Queen's Hall, London. Other "firsts" during this period included a regular weekly West-to-East program broadcast from San Francisco, the first airplane broadcast called "Over and Under New York," and the first re-broadcast from Sydney Australia. A parachute jumper broadcast his sensations as he



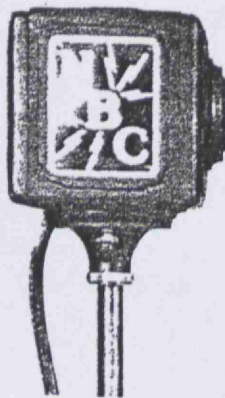
Herbert Hoover broadcast his acceptance of the Republican nomination for President in 1928. As Secretary of Commerce under Harding and Coolidge, Hoover played a large role in the early development of broadcasting.

floated down to earth one day in October. He was equipped for this NBC broadcast with a 25-pound, two-watt pack transmitter.

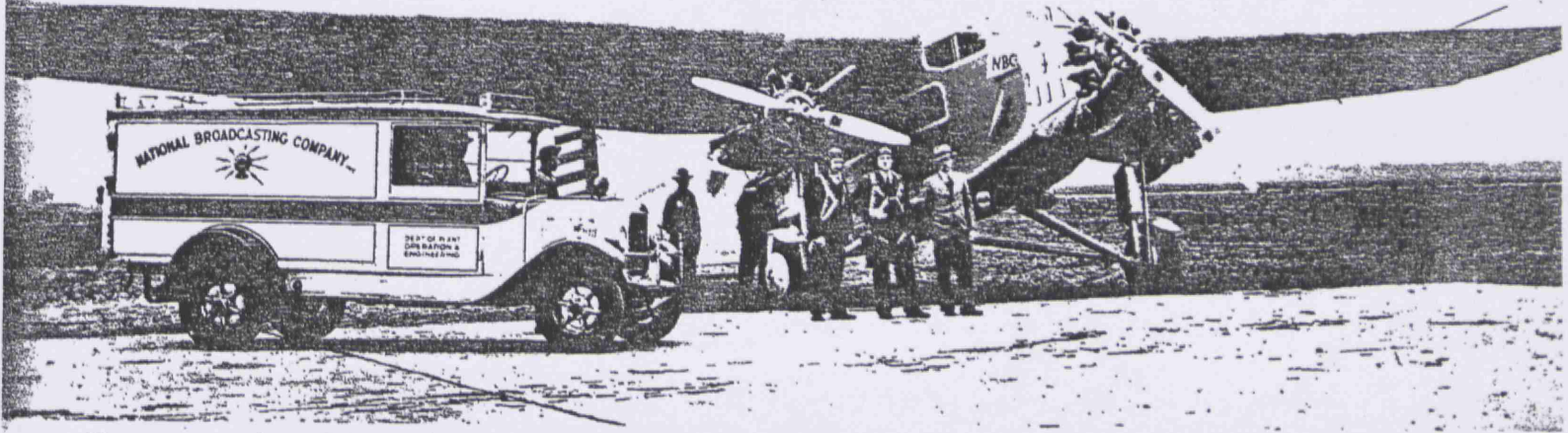
In the feverish autumn of 1929, the lugubrious strains of "A Perfect Song" every weekday evening announced "Amos 'n' Andy," and millions of listeners settled down for a much-needed laugh. Expressions



Graham McNamee interviews Babe Ruth during a game at Yankee Stadium.



Elsie Janis, vaudeville and Broadway star who became known as the "Sweetheart of the A.E.F." because of her indefatigable entertaining of the troops during World War I, made frequent radio appearances after the war. She was featured in several network productions, including "Hollywood on Parade."



History was made on February 2, 1929, when an NBC mobile unit brought voices from a plane in flight into the nation's living rooms.



Freeman Gosden ("Amos") and Charles Correll ("Andy") met in 1919 and formed a vaudeville team, doing a black-face act called "Sam 'n' Henry." They brought "Sam 'n' Henry" to Chicago radio in 1926 and in 1928 changed the act's name to "Amos 'n' Andy." Under the new name the show, which had been only moderately successful, became an immediate hit and in August of 1929 it went on the NBC network under the sponsorship of Pepsodent.

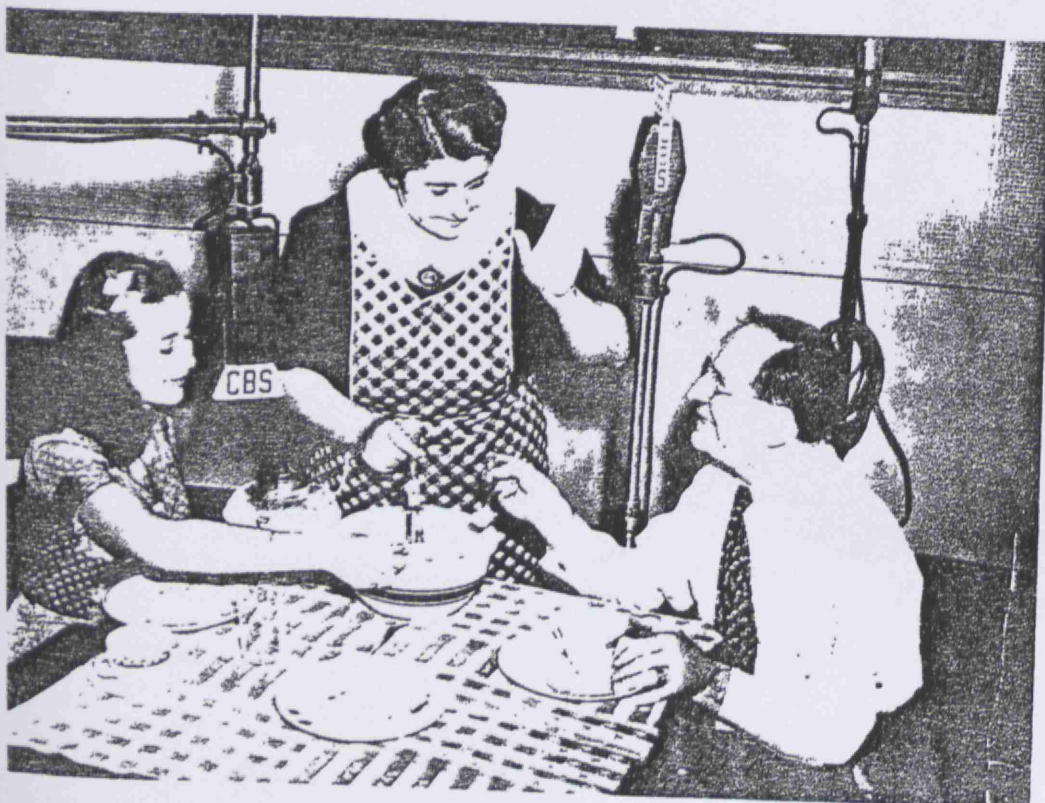
In the early days Gosden and Correll played all the roles on the program, but later other actors were added. The original team stills plays "Amos 'n' Andy" on radio, but other actors handle the roles on TV.

The tremendous and enduring popularity of "Amos 'n' Andy" was well deserved, for the program had real warmth and wit, and in such characters as the raffish "King Fish" and "Madame Queen" it presented some of the few truly original creations of radio comedy.





"The Rise of the Goldbergs" made its bow on NBC on November 20, 1929. Gertrude Berg, writer, producer, and star of the program, became so closely identified with the character she played that her friends called her "Molly." The Goldbergs continued their adventures on radio until 1946, and the show was revived on television in 1949. The roster of alumni of "The Goldbergs" is a distinguished one. Among the voices to be heard at one time or another on the show were those of Everett Sloane, Van Heflin, Joseph Cotten, Joan Tetzl, and Marjorie Main.



such as "I's regusted" and "check and double-check" made their way into the speech of the nation, and the trials and tribulations of Andy and the King Fish became popular topics of conversation.

Kate Smith, the "Songbird of the South," made the first appearance of her long radio career in 1929, and on a local station in Baltimore could be heard a young man who billed himself as Red Godfrey, the "Warbling Banjoist." (Radio in its early days made extensive use of descriptive sobriquets. There as Wendell Hall, the "Red-Headed Music Maker," Arthur Tracy, the "Street Singer," Ed Wynn, the "Fire Chief," Jan Garber, the "Idol of the Airlanes," Wayne King, the "Waltz King," and so on and on.)

Rudy Valley—he was the "Vagabond Lover"—kept millions of women virtually chained to their radios, from his opening "Heigh-ho, everybody" to the last nasal strains of "Your Time Is My Time." He and his Connecticut Yankees began their weekly broadcasts, called the "Fleischmann Hour," in October of 1929. He is often credited with being the originator of the radio variety show.

The 1920's saw the beginning of programming for children, with a host of imaginary "uncles" and "aunts" bringing entertainment to the nation's children. This trend was started by Don Carney and his "Uncle Don" program on WOR in New York. For almost twenty years his patter would change hardly at all. With parents sending him thousands of letters weekly, Carney could come up with such apparently omniscient items as this:

"Now today is the birthday of Willie Smith of Brooklyn, who has not been eating his vegetables the way he should. No he hasn't! And he ought to. But his Mama and Papa love him very much just the same, and if Willie will look behind the piano, I think he will find a present for his birthday."

Second only to "Uncle Don" in longevity was the celebrated CBS series, "Let's Pretend," a program produced and written by Lila Mack, on which children acted out stories.

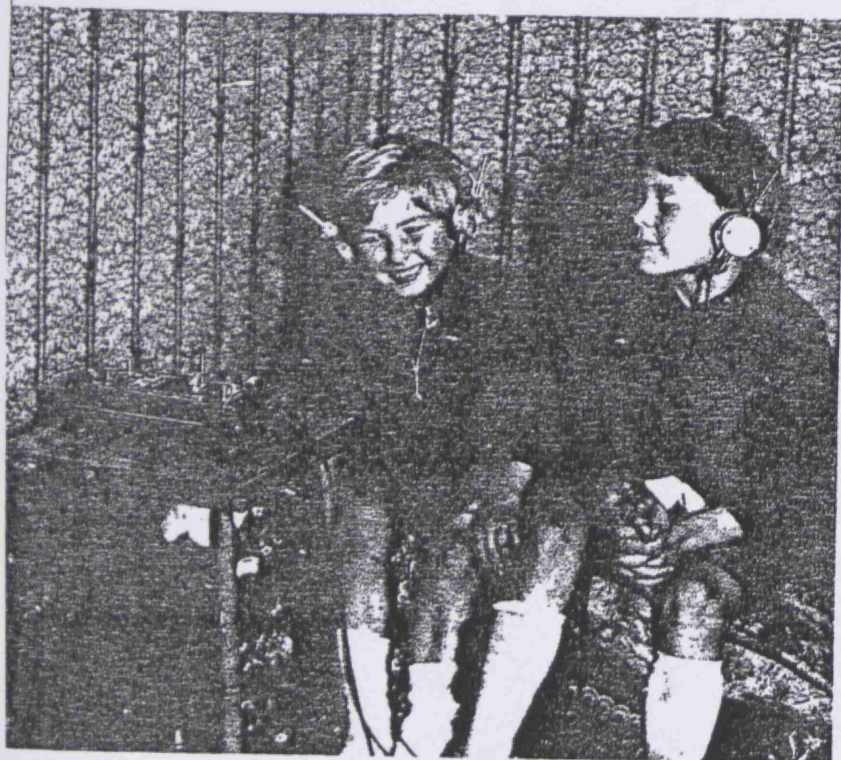
Another early favorite was Irene Wicker, the "Singing Lady," who provided programs of nursery rhymes, interspersed with little skits and stories.

The early 1930's would see the rise of "radio clubs" with buttons, badges, secret signs and codes. Typical of these was "Chief Wolf Paw," with his password, "Ho-wah-ho-so-wah-ka." Another development of the 1930's was the amateur show, such as the "Horn & Hardart Children's Hour," and the "juvenile theatre," in which the children themselves participated. This was a format which attracted both children and their parents, and was therefore commercially very sound.

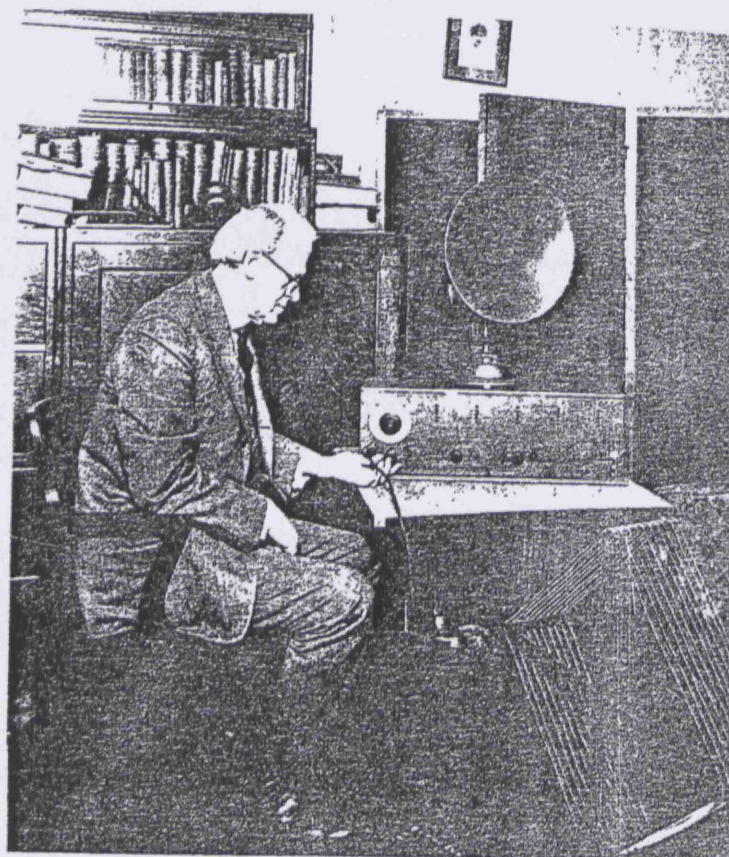
Dramatizations of comic strip characters, such as



Will Rogers became America's best-loved personality by dispensing his homespun philosophy and trenchant political observations on radio. Rogers was born in 1879 in Oklahoma. He spent his early years traveling in a wild west show, and made his first appearance on the vaudeville stage in New York, twirling a lariat. Subsequently he developed a humorous monologue and successfully performed in many Broadway shows. He became one of the great stars of the *Ziegfeld Follies*, and in 1918 began to appear in motion pictures. He published syndicated newspaper articles and frequently appeared on radio. Rogers was killed with Wiley Post in an airplane accident in 1935.



During the period from 1920 to 1930 the development of the radio receiver was phenomenal, as these three pictures, with only a few years between them, illustrate.



"Skippy" and "Little Orphan Annie" would prove tremendously successful in the 1930's. This was the era of the "box top thrillers," which combined an exciting story with the opportunity to get a free prize through the mail. All Junior had to do was see to it that Mom bought the sponsor's product.

Abuses crept into these programs. In an effort to retain audiences, the element of suspense was carried to extremes and there was often an excess of physical violence. Nationwide protest reached such proportions that Congress itself was moved to act, and bills were introduced designed to restrict the radio stations and networks in their programming for children.

Responding to the pressures, and in an effort to head off restrictive legislation, the networks promulgated their own codes for children's programs, eliminating "torture, horror, use of the supernatural or superstition likely to arouse fear" and banning profanity, vulgarity, kidnapping, and "cliff-hanging."

A program which adhered scrupulously to the code and yet achieved such popularity that it is probably the best-remembered of all children's serials was "Jack Armstrong, All-American Boy." When she heard its theme song ("Wave the flag for Hudson High, boys..."), Mom knew that the kids were about to have a painless lesson in law and order, clean living, fair play, and good behavior.

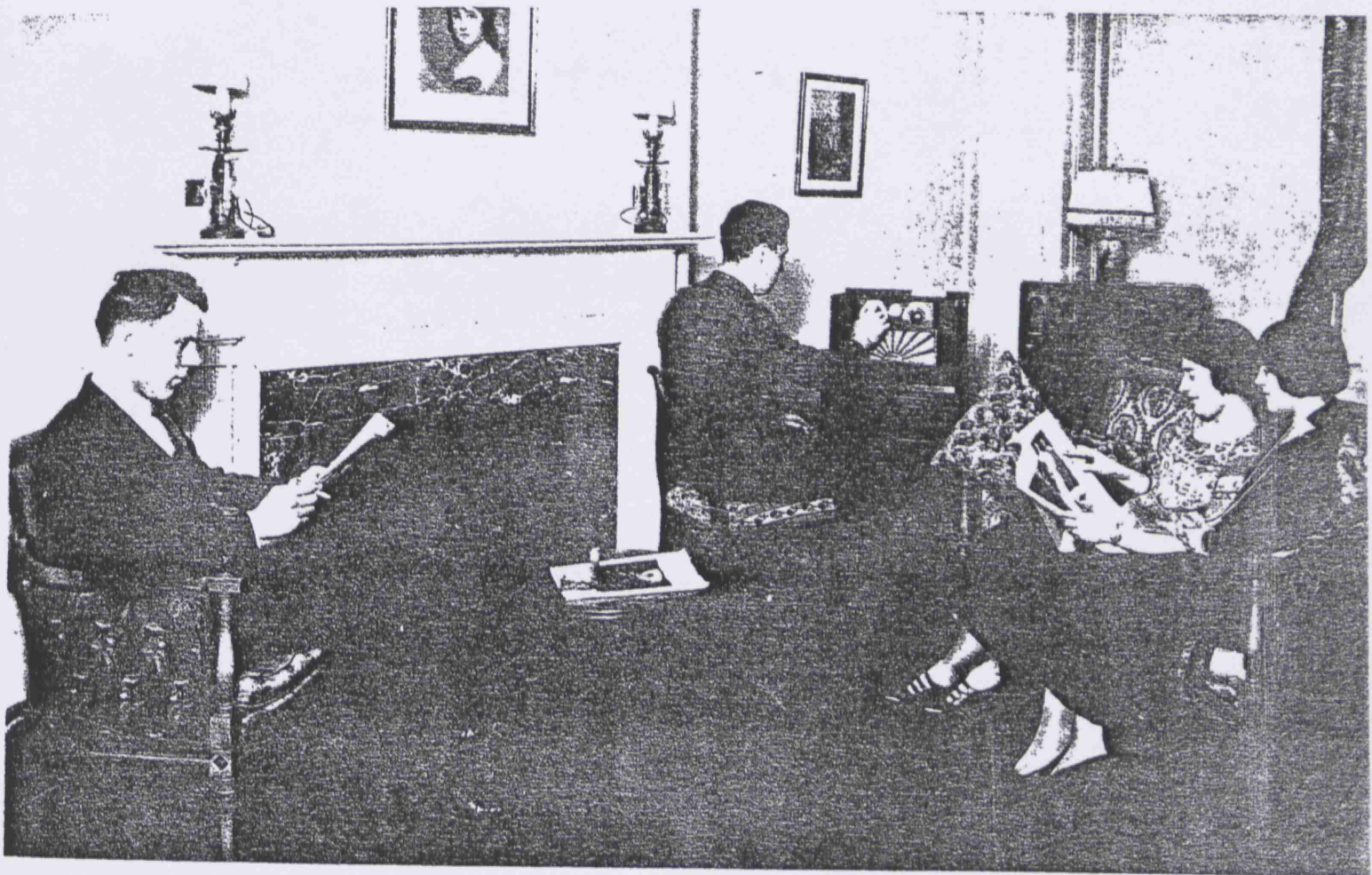
Popular in the late 1930's and into the 1940's were

such serials as "Buck Rogers," "Dick Tracy," "Captain Midnight" "Superman," and "The Lone Ranger."

The latter program, incidentally, was destined to make a peculiar contribution to American history. "Hi-yo, Silver!"—the "Lone Ranger's" familiar call to his horse—was actually used as a password by American troops entering Algiers during World War II.

Radio had taken root in the 1920's, and its branches rapidly expanded into all phases of American life. Both programming and listening during this decade were changing their patterns. Program personalities were beginning to attract loyal listeners. Obscure announcers and crooners became public heroes, to be idolized by millions of people who knew them only by voice.

The stock market crash and the subsequent depression were destined not to depress radio, but to add substantially to its ever-increasing audience. While movie houses closed, night clubs languished, and theatrical stock companies disappeared, radio boomed. Here was a medium of entertainment that was free, a mode of amusement provided to rich and poor alike without cost and in the privacy of the home. Thousands of families who had purchased much of their household equipment on credit gave up their vacuum cleaners, their cars, and their furniture, but kept up the payments on their radios. Radio had become a



part of their lives with which they could not part.

New national figures suddenly came into prominence. Radio philosophers arose who lectured to the millions on the ways of life and regularly received thousands of letters requesting help on personal problems. On the swelling tide of radio came scores of unemployed vaudeville and movie actors, night club performers, and concert stars to lend lustre and ingenuity to broadcasting. Advertisers, amazed by the huge audience, moved out of other media into radio, giving rise to a boom the like of which had never been experienced by any other industry. People loved radio and believed in it. Glued to their ever-more-elaborate sets, they were entranced by singing commercials, crooners, soap operas, mystery shows, comedians, quizzes—everything the magic box had to offer.

But there was criticism of the new medium, too.

Lee De Forest, speaking to a convention of broadcasters, cried out in dismay: "What have you done with my child [radio]? You have made him the laughing stock to intelligence, surely a stench in the nostrils of the gods of the ionosphere. Murder mysteries rule the waves by night and children are rendered psychopathic by your bedtime stories. This child of mine is moronic, as though you and your sponsors believe the majority of listeners have only moron minds."

Taking up the cry with De Forest were educators, sociologists and many government officials in the halls of Congress.

But the tide continued in the late twenties, and the industry was not to stop and take stock of itself until the 1930's, when mounting criticism caused the networks to set up their own codes of behavior and put forth increasing numbers of public service programs.

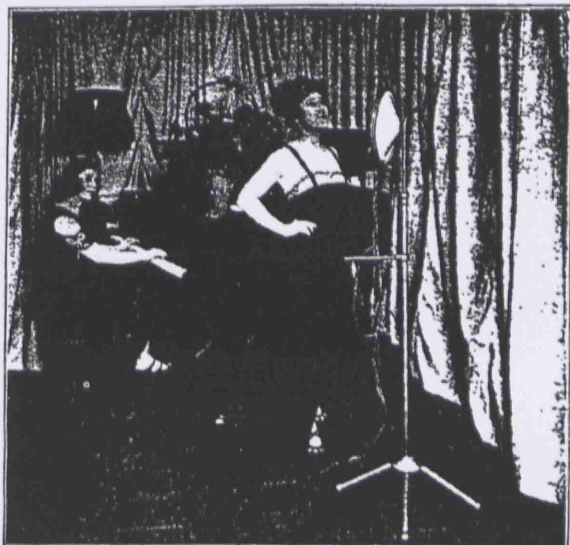




Scenes from the Westinghouse movie "On the Air," recreating the birth of radio broadcasting, appear in this photomontage centered around the garage in which Frank Conrad built his experimental transmitter. From left, starting at the top, are shown: Dr. Conrad's

transmitting equipment; Dr. Conrad and assistants in his laboratory; phonograph music being sent over the air; an early radio fan with a primitive crystal set; department store salesmen trying one of the first retail sets; a home audience enjoying their first loud speaker.

## THE BROADCASTING STATION



A famous star singing to the "unseen audience" from radio receiving station.

At present there are perhaps 125 to 200 radio telephone broadcasting stations in the United States which are regularly sending out news and entertainments to the hundreds of thousands of listeners who have receiving apparatus. They are located in the larger cities, which is essential for two reasons: that their programs may reach the largest number of people possible and that artists of recognized ability may be secured to join the other entertainers.

A broadcasting station is generally divided into two or more rooms. The studio, with its piano, phonograph and other equipment for the artists, resembles the music room to be found in a home, except that the ceiling and walls are generally covered with some cloth or material which will eliminate any reverberating sounds or echoes.

One or more small "pick up" instruments known as microphones, mounted on standards, are usually the only pieces of electrical apparatus to be found in this room. Wires from these convey the voice or music into another room, which in many cases is at quite a distance from the studio. The latter resembles a laboratory with its various pieces of electrical apparatus, transmitting vacuum tubes, panel boards, storage batteries, etc. Here the music or speech is put through a number of steps of amplification by means of smaller vacuum tubes which increases the volume of the sound waves thousands of times. The amplified speech currents then enter another bank of vacuum tubes, known as modulators or molders of the electric waves sent through the ether.

Vacuum tubes, made in the same manner

and containing the same number of elements as the small tubes used for receiving, but much larger and therefore capable of handling more power, usually are used for radio broadcasting.

Direct current at a high voltage is necessary for the operation of a transmitting station. To obtain this, a low voltage alternating current, such as used for lighting purposes in the home, is boosted to a high voltage by means of a motor-generator. This voltage is then applied to a number of vacuum tubes. The electric power supplied to these tubes causes electrical oscillations in the aerial wire system known as the antenna, and the antenna in turn radiates electrical waves which are molded to the form of the inflexions of the voice or of music, by other tubes termed modulators.

The power used at a broadcasting station is measured by the energy delivered to the antenna system, rather than the energy taken from the power lines. For this reason the rated power of a broadcasting station seems rather low to the uninitiated.

Many of the broadcasting stations employ 500 watts of radiated energy, which is equivalent to nearly one horsepower. However, one of the largest broadcasting stations in the United States, located in Schenectady, New York, and owned by the General Electric Company, has facilities for greater power, but this is used only for special experimental tests. The masts used to support the antenna at this station are 183 ft. high and have been erected on the roof of a five story building.

Operators at broadcasting stations must possess the faculty of clear diction; they must be able to carry on a conversation in moderate tones sufficiently modulated and at low enough speed to insure correct and faultless reception at all the receiving stations.



A corner of the Radio Corporation—Westinghouse Station "WJZ".

The average range of the several high power broadcasting stations now in existence is 100 to 500 miles, although the stations maintained by the Westinghouse Electric and Mfg. Co., the General Electric Co. and the Radio Corporation of America have been heard over several thousand miles. In one instance an operator on board a ship more than a thousand miles at sea received a complete concert from a broadcasting station near New York with great enough intensity to pass it over the ship's telephone lines to 25 different staterooms at the same time.

It is estimated there are between 500,000 and 750,000 receiving sets in use, and artists at the larger broadcasting stations have had their entertainment heard by more than one hundred thousand people simultaneously.

As previously explained, the range of a receiving station depends upon a number of variable factors and the distances pointed out here have been covered by receiving stations employing sensitive apparatus, involving several stages of vacuum tube amplification. These facts should be considered in purchasing radio receivers.

## THE FIVE FUNDAMENTALS OF RADIO RECEPTION

**M**OST of us know that there are various types of apparatus for the reception of radio broadcasting. Some of these "sets," as they are called, are more sensitive than others. Sensitivity, in the sense we apply it to receiving sets, is a quality analogous to power in transmitting apparatus. Most receiving sets, have five distinct functions—intercepting, tuning, detecting, amplifying and reproducing. It will be helpful to us later, when we consider receiving sets as complete units, if these functions are understood.

### Intercepting

"Antenna" and "Ground," the externals of a radio receiving set, intercept the broadcasted signals and lead such energy as they collect to the receiving set by means of wires. In practice the ground usually consists of a wire connecting a certain binding post or terminal connection on the set with a water pipe, or other metallic conductor which leads to the ground. The antenna, in its simplest form, may consist of a single bare wire, thoroughly insulated from adjacent objects, seventy-five to one hundred and twenty-five feet long and raised horizontally to the earth as high as possible. This also is connected with the receiving set by means of a wire called the lead-in; details for the installation of the ground and erection of antenna are furnished in printed directions which accompany every set sold by the Radio Corporation of America.

### Tuning

All radio broadcasted speech or other signals arrive at the receiving antenna on a definite radio wave length, that is, the wave length to which the broadcasting station is adjusted or "tuned." Every sound we hear, therefore, is carried through space by electrical waves, but these electrical waves are not audible to the human ear until, first, they have been "tuned in" at the receiver, and second, made audible by the "detector" and the head telephone. The radio transmitting station does



Every living room of the average home becomes a radio receiving station.

not radiate a "sound wave." It radiates an electrical wave which serves to carry through space the inflexions of the human voice or of music or of telegraph signals.

Tuning, as applied to radio, means the manipulation of wave changing controls on the receiving set so that the apparatus may be adjusted for a maximum signal from the broadcasting transmitting station. Once the receiver has been tuned to the wave length of the distant station, no further tuning manipulation is necessary for the reception of the entire concert. Nor is tuning a difficult operation for the beginner; all that has to be done is to turn the controlling knobs or levers on the tuning elements until the signal is heard loudest.

### Detecting

The detector rectifies or "changes" the energy received by the radio set into a form of energy which will produce an audible sound in a reproducer such as the head telephone or loud speaker. There are two classes of detectors, mineral crystals, and vacuum tube detectors. A vacuum tube detector is better

than the crystal detector because it is much easier to adjust and it performs its functions with greater efficiency as it amplifies incoming radiophone signals many times.

A receiving set equipped with a crystal detector is known as a "crystal receiver"; a receiving set which employs a vacuum tube detector is called a "vacuum tube receiver"; a receiving set using a vacuum tube detector which has special means for amplifying signals is called a "vacuum tube regenerative receiver."

#### Amplifying

Amplifying devices are used when the receiving set is far removed from the broadcasting station, or when it is desired to have the received signals actuate a loud speaking device.

The essential of an amplifying device is the vacuum tube. Each vacuum tube utilized in such apparatus (not to be confused with the detector tube) is known as one "step" of amplification.

Amplifier tubes operate on an electrical principle analogous to the mechanical principle of a firearm. Pulling the trigger of a gun requires very little physical energy, yet it releases a terrific energy stored in the shell in the form of powder. When energy is impressed on the amplifier tube, it "triggers off," from a battery storing electrical energy, a given signal having many times the energy of the original.

In some receiving sets, the tubes are so placed as to amplify the signal before it is fed to the detector tube. This is called "radio frequency amplification." In other sets, the tube

is made to amplify the signal after it has passed through the detector. This is known as "audio frequency amplification." Where extreme amplification is desired, the set may contain amplifier tubes in both positions.

#### Reproducing

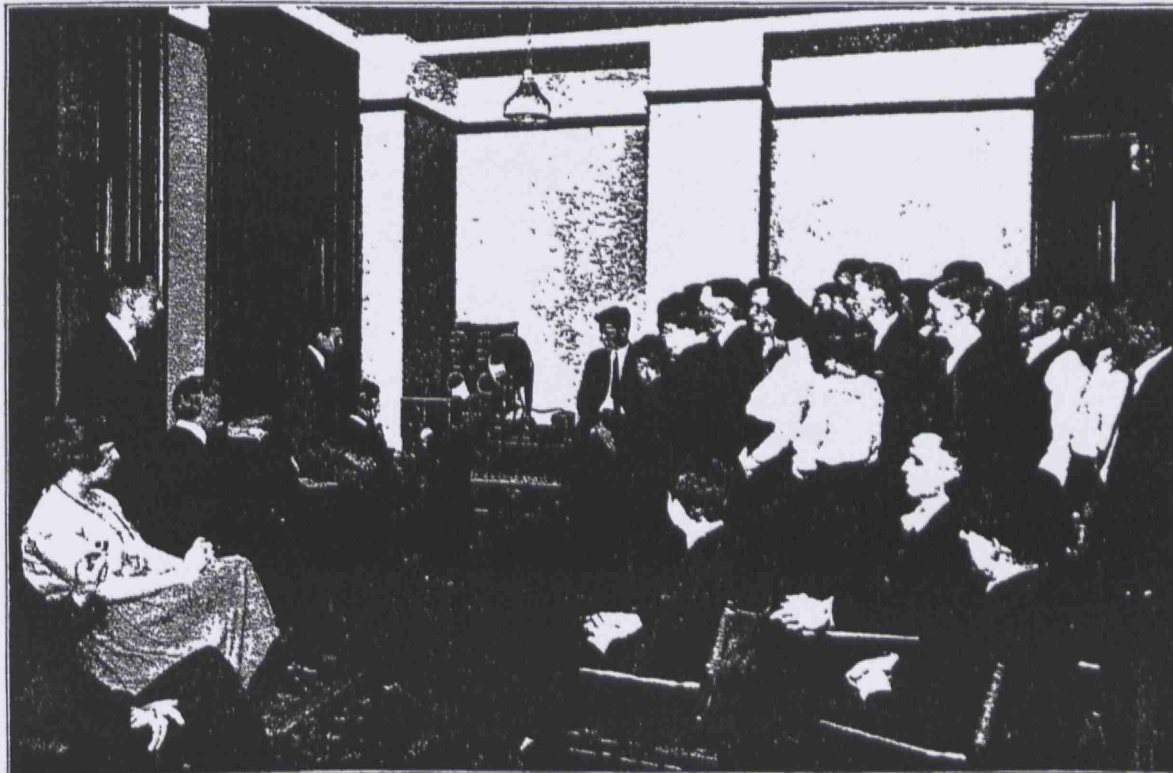
The function of the reproducer is to convert the energy which has been passed through the various apparatus described above from electrical pulsations into sound waves. A pair of head telephones constitute one type of reproducer. Another is the loud speaker, consisting of a sensitive telephonic reproducer attached to a suitable sound chamber or horn.

A very slight vibration from the head telephone will suffice to convey the sound to the ear. On the other hand, a loud speaker, to make the signal audible over an entire room, must have a diaphragm vibrating vigorously. Obviously, a loud speaker requires a signal of much greater intensity than a telephone headset, and it is one of the functions of amplification to furnish this louder signal.

#### General Remarks

The strength and quality of the audible sound made by the reproducer is directly dependent upon how well each of the five functions is performed by the receiving set.

Crystal receivers do not amplify signals; they simply tune, and rectify or change the energy at the detector and pass it directly to the reproducer, which is invariably a head telephone set.



The Radio Concert becomes a reality by the use of a combination receiver-amplifier unit in conjunction with a loud speaker.

## CLASSES OF APPARATUS AND THEIR APPLICATION

ONCE any of the telephone receiving sets, intended for concert reception, is installed in your home, there is no need for technical knowledge. The usual questions that are asked can be briefly answered here:

"How much will it cost and what distance will it carry?" "Do city conditions differ from those of the country in regard to radio reception?"

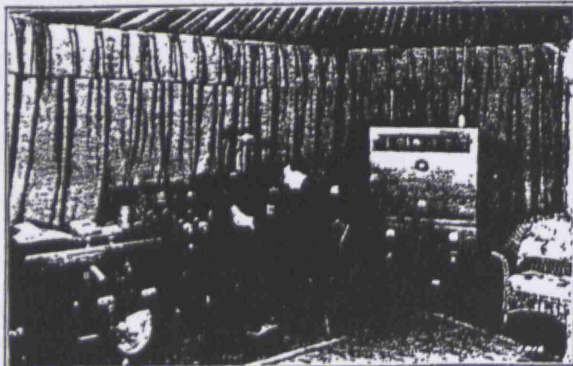
In general it may be said that there are four classes of radio apparatus, each one designed at a specific price and for a specific use. These are:

- (1) The simple circuit crystal type receiver which may cost from \$18 to \$50, and which may receive effectively from five to twenty-five miles, according to skill in setting up antenna, and atmospheric conditions.

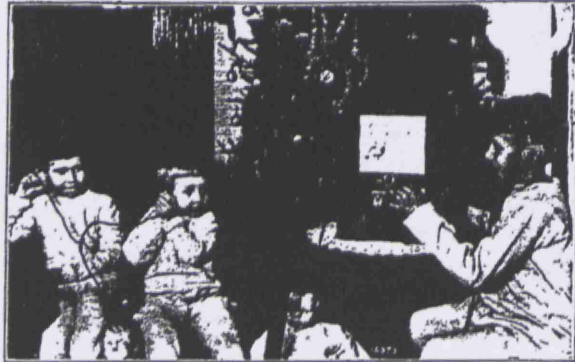
Crystal detector apparatus necessitates the use of an outdoor aerial, and reception is accomplished by means of head telephone receivers.

- (2) This class of apparatus may be said to be practically the same as Class 1, except in this instance we depart from the simple crystal detector to the vacuum tube detector, with an improvement in receiving qualities. The cost in this instance may range from \$65 to \$100.

It is also necessary to employ the outdoor antenna, as well as the head telephone receivers. It is not possible in this instance to make use of loud-speaking devices, for the energy received by the single vacuum tube detector is not strong enough to handle the loud speaking device unless the set is located within 2 or 3 miles of the transmitting station.



The "Man in the Moon" in action at "WDY" Broadcasting Station formerly at Roselle, N. J.



Bed time stories and music by radio have delighted thousands of little tots within a radius of several hundred miles from Newark, N. J. and New York.

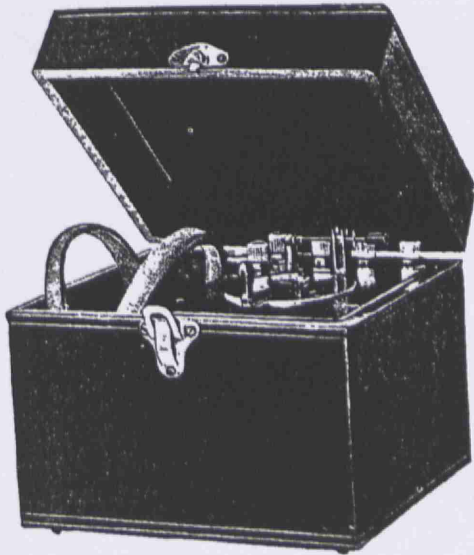
- (3) In this class, it is also necessary to use the antenna and ground contact of the other systems mentioned. But much greater efficiency is obtained because vacuum tube amplification is employed. Receivers of this type usually consist of a receiving or tuning unit, a vacuum tube detector and two stages of vacuum tube amplification. This type of receiving equipment may cost from \$150 to, possibly, \$300. It has a much greater range of operation than the other types, and will function quite well up to 100 miles, although under exceptional receiving conditions, as much as 1000 miles may be obtained, employing the head telephone receivers.

It is also possible, in this instance, to employ a loud speaker and thus eliminate the head telephone receivers, thereby permitting a roomful of people to hear radio. The extra two stages of amplification permit this, for they increase the original intensity of a signal to such a point as to effectively operate the loud speaker.

- (4) This is the de luxe type of radio receiver, usually embodied in a complete cabinet, similar to that of the phonograph. All necessary instruments are enclosed in the cabinet and the tuning and adjusting devices are greatly simplified. It is designed for the use of the technically uninformed general public. A unit known as the "Aeriola Grand" is now on the market which incorporates these desirable features, and which is sold for \$350.

## RADIO BROADCASTING RECEIVING OUTFITS

## AERIOLA JR. RECEIVER, MODEL RE



Aeriola Jr. is compact, inexpensive, requires no batteries, and is easy to operate

**A**ERIOLA JR. is a complete Radio receiving outfit designed and manufactured by the Westinghouse Electric and Manufacturing Company. Its range varies from ten to twenty miles. Any one who can operate a talking machine or a camera can operate an Aeriola Jr.

## Simple Adjustments

No technical knowledge is required. The only adjustments necessary include the occasional finding of a "sensitive spot" on the crystal detector and the simple turning of a tuning control arm to obtain the maximum intensity of reception.

The complete receiver is built in a very substantial and attractive wood cabinet which has a compartment for storing the telephone receivers when the set is not in use.

The tuning elements and the crystal detector are mounted on a black panel which forms the top of the receiving set when the cover is lifted. All the metal parts are finished in nickel. Under the tuning control arm, there is a calibrated dial. Where the receiving station is within range of several broadcasting stations operating on different wave lengths, it is possible to determine just what setting is necessary in order to hear any of the stations at a given time by noting the position of the

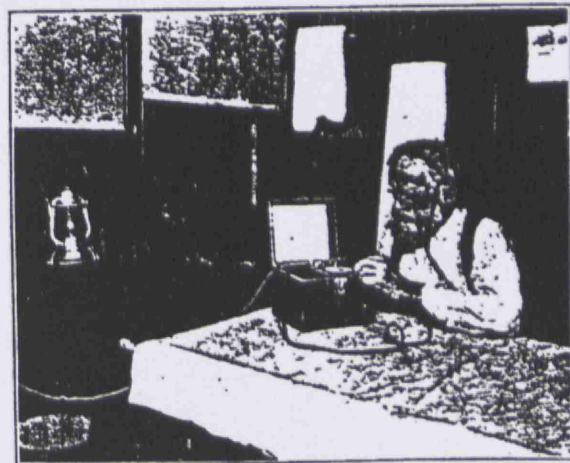
tuner control arm with relation to the calibrated dial. With Aeriola Jr. there is no maintenance cost. Once the antenna has been erected and the ground connection made according to the instructions given, it is only necessary to adjust the detector and rotate the tuner control arm until radio signals are heard in the head telephone receivers. The wavelength range of Aeriola Jr. is particularly adapted to broadcasting reception on the 190-500 meter wavelength band.

## Reliable and Inexpensive

Aeriola Jr. includes everything necessary for this type of receiver—a tuner, a fixed condenser, a supersensitive crystal detector, and a high grade set of head telephones. In order to secure the best results from this outfit it is but necessary to follow the directions given in another section of this book and devoted to the erection of the antenna and securing the ground connections.

The entire design assures a degree of selectivity and reliable operation not usually found in this type of receiver.

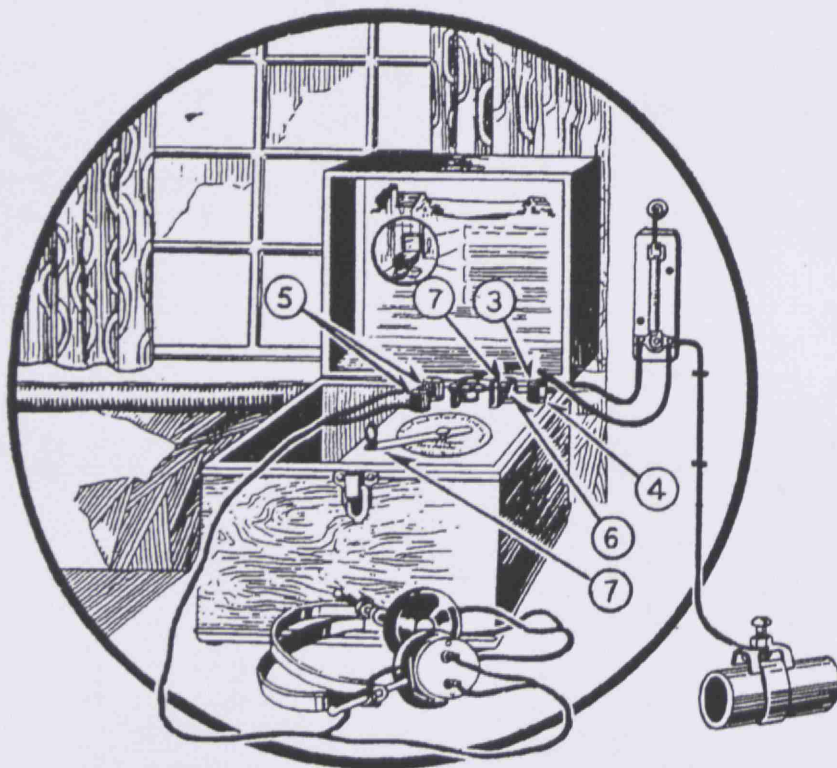
Aeriola Jr. may ordinarily be employed for receiving from the broadcasting stations up to a maximum distance of 20 miles. Under some circumstances this range may be increased; often the Aeriola Jr. will pick up broadcasting over distances up to 35 miles.



The farmer located within easy distance of a broadcasting station may use Aeriola Jr. to advantage for the reception of market and weather reports.

**Aeriola Jr. Makes an Ideal Set for the Beginner. It is Portable, Compact and Inexpensive. Requires no Batteries of any Kind.**

OPERATING INSTRUCTIONS FOR AERIOLA JR.



Text numbers correspond with above diagram.

- No. 1. First, refer to accompanying sketch, then erect antenna and place protective device in position as described on page 56.
- No. 2. Connect a wire leading from terminal marked R on protective device to binding post indicated by arrow for stations below 350 meters.
- No. 3. For stations between 350 and 500 meters, connect the above wire to this post.
- No. 4. Connect this post with terminal G of protective device.
- No. 5. Connect telephone receivers to these two posts. Adjust detector by pulling movable crystal away from stationary crystal and then allowing it to come in contact again at various points. While making this

adjustment, rotate tuning handle (7) slowly over the scale, listen until sound is heard in the telephone receivers. Temporarily stop adjustment of detector and manipulate tuning handle until maximum strength is obtained. Leave tuning handle in this position and readjust detector. After a short time, the operator will become skillful in finding delicate adjustments on this crystal detector. Various stations may be heard by simply rotating the tuning handle over scale.

**Note:** As crystals are rubbed together, a black deposit appears on the movable crystal, decreasing the sensitivity of the set. This deposit may be scraped off lightly with a knife. Further precautions regarding the care of crystals are pointed out in part 4 of this book.

**Complete Aeriola Jr. Broadcasting Receiver, Model RE, 190-500 Meters, with Head Telephone Receivers, Spare Crystals, Antenna Equipment and Full Instructions. . . . . \$32.50**

**Aeriola Jr. Broadcasting Receiver, Model RE, as above, less Antenna Equipment. . . . . \$25.00**

**Dimensions:** 7 in. x 8½ in. x 7¼ in.

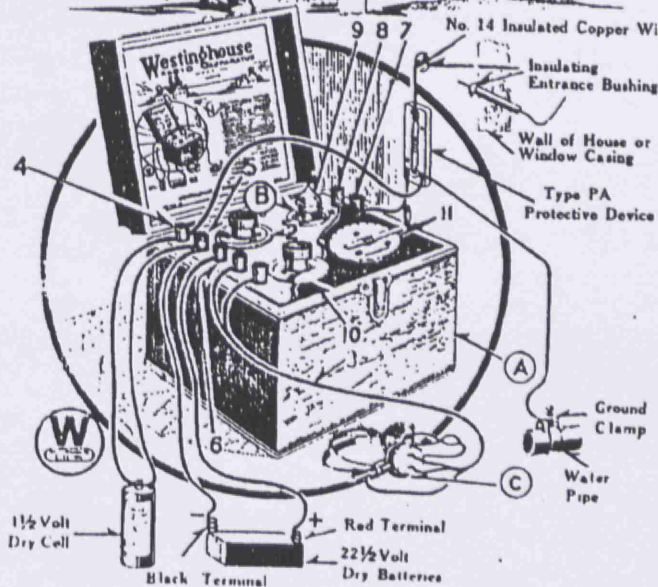
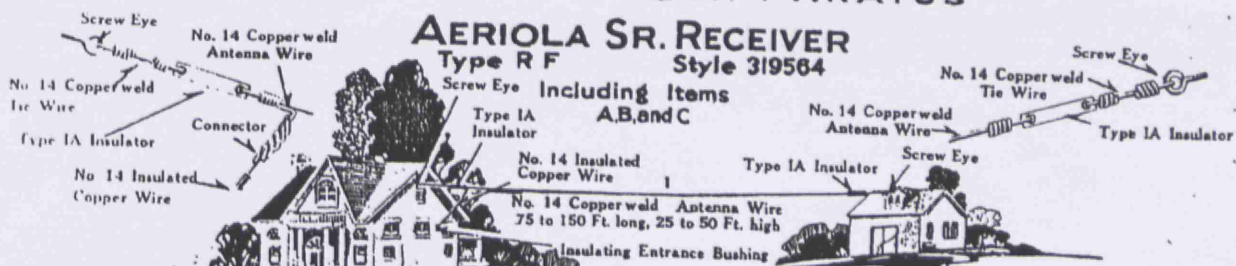
**Weights:** Net, 5 lb.; Shipping, 10 lbs.; with Antenna Equipment, 17 lbs.

*NOTE: For Prices of other Complete Receiver Combinations, see page 35.*

# Westinghouse

RADIO APPARATUS

## AERIOLA SR. RECEIVER Type R F Style 319564



- 1 Erect Antenna, as explained in instructions included with Type AD Antenna Outfit.
- 2 Turn Rheostat as far as it will go toward tail of arrow.
- 3 Connect head phones as shown.
- 4 Connect to positive (middle) terminal of 1 1/2 volt dry cell. Connect wire between this post and ground side of Protective Device as shown.
- 5 Connect to negative (side) terminal 1 1/2 volt dry cell. Also connect to negative terminal (marked -) of 22 1/2 volt dry battery.
- 6 Connect to positive terminal (marked +) of 22 1/2 volt dry battery.
- 7 Connect antenna wire from Protective Device to this post for amateur and broadcasting stations below 350 meters. (Do not run closer than 1 foot to ground wire).
- 8 Connect antenna wire to this terminal for stations between 300 and 500 meters.
- 9 Insert Type WD-11 Aeriotron Tube, Style No. 319533. Note holes in base which receive prongs on tube are not symmetrical, permitting insertion of tube in one way only. Be sure prongs register with holes and then press in firmly. Turn Rheostat (2) toward point of arrow until tube shows dull red. Do not try to burn tube brightly as it will destroy tube.
- 10 Place Tickler pointer on 0 point of scale.
- 11 Move tuning handle slowly over scale, listening at same time in head set for signals. Adjust to best position and then increase Tickler (10) until maximum strength of signal is obtained. If Tickler is turned too far toward maximum position, signals will lose their characteristic tone, and reception of telephone signals will be very difficult.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.  
EAST SPRINGFIELD WORKS

SPRINGFIELD, MASS

I. L. 1096-A



The Pittsburgh Press

TELEVISION/RADIO

Jees echoes Randolph co

RADIO NOTES

Gene Romano, program director, says he pilfered the idea from another station. And now WTKX-FM in Pensacola, Fla., has launched its own "Gulf Coast Breeders' Cup." But the winning husband and wife — there are three couples "competing" — get only \$1,000. So kudos to WDVE for being more generous and pragmatic.

Incidentally, I talked with Pittsburgh Planned Parenthood about DVE's promotion. A spokeswoman there said as long as couples chose to participate, they have no objection.

I figured as much, but I still was curious.

KDKA celebration

It's safe to say most listeners enjoyed KDKA's 24-hour anniversary bash Friday. Talk show host Fred Honsberger broadcast for 4½ hours from a shack — a replica of the building where the station's first regularly scheduled broadcast took place 70

years earlier. It was created by the Pittsburgh Antique Radio Society.

Original equipment from that first night was used during Friday's broadcast.

Honsberger spoke with the son of Leo Rosenberg, the announcer for KDKA's broadcast of the Harding-Cox presidential election returns, and played material from the era.

Highlights included the truly dippy jingles written for the station over the years; projections into the future by local business figures in 1959, guessing what the world would be like in 1979 (nuclear power was hot then); portions of a 1937 anniversary special; and my favorite: the inept hurricane report from Corpus Christi, Texas, by someone who must have sprung from "Greater Tuna."

WIXZ-AM in East McKeesport provided essential equipment for the Honsberger show. The shack will be open to visitors in the lobby of the Westinghouse Building, Gateway Center, Downtown, until Christmas.

Around the dial

A glance at WTAE-AM's talk show schedule has convinced me I'm going to have to

start of the I'm Music is Bi Psych gent tradit

Ale show on M Thurs with Ji jocks listeners will ask question listener

Harry show la Times" f of goodi with dist with a li Wagner

(Mich Pittsburg

Today's sex and violen

not blind you New York City area. He is modest and humbl



# Radio's early days included Peoria

□ First local station operated from Bradley Polytechnic Institute

As noted last week, it took a long time to develop electronics and the subsequent inventions of the telegraph, telephone and wireless telegraph. But once we knew that sound could be transmitted through the air, radio came on the scene at a fast pace.

It's impossible to know when it first occurred, but station KQW in San Jose, Calif., produced its first radio broadcast in 1909, and ran a regular schedule in 1912. In 1916, station 2ZK in New Rochelle, N.Y., was broadcasting music regularly. By the late summer of 1920, the Detroit amateur station 8MK was broadcasting regularly, and both Dr. Lee DeForest and Reginald A. Fessenden were doing experimental broadcasting that year.

But what is generally accepted as the beginning of commercial radio as we know it today also came in 1920, with the first licensed station listed with the U.S. Department of Commerce (the FCC came later). It was station KDKA in Pittsburgh, Pa.

This all began, though, back in the teens during World War I. Dr. Frank Conrad, an assistant chief engineer at Westinghouse Electric and Mfg. Co. in Pittsburgh, was operating an experimental radio station in his garage behind his house in Wilksburg, Pa., a Pittsburgh suburb. Its call letters were 8XK. His station was used to test U.S. Signal Corps equipment built by Westinghouse. After the war he aired musical programs from the garage.

He made regular talks over the radio, and later began playing recorded music. Conrad began announcing in advance a series of "broadcasts," which is said to be the first use of that term.

When his supply of records ran out, the Hamilton Music Store in Wilksburg offered him a continuous supply of records if he would announce that they were from that store. This "trade-out" became the first radio commercial.

On Sept. 29, 1920, the Joseph Horne Co., a Pittsburgh department store, ran an ad in the Pittsburgh Sun newspaper, describing a radio program that ran for about 20 minutes the previous Saturday night about 10. It stated that Victrola phonograph music was played, consisting of two orchestra numbers and a soprano solo, plus a juvenile "talking piece." The advertisement ended with this sentence. "Amateur Wireless Sets, made by the maker of the set which is in operation in our store, are on sale here \$10 and up."

This newspaper ad impressed a Westinghouse vice president, H.P. Davis. He reasoned that if a well-known store saw merit in advertising radio sets, maybe there was something to this "broadcasting" thing. He sold other Westinghouse officials on building a more powerful transmitting station than Dr. Conrad's.

A license application was submitted on Oct. 16, 1920, and on Nov. 2, KDKA in Pittsburgh went on the air. The first program consisted of election returns of the Harding-Cox presidential election. This has been considered the world's first regularly scheduled commercial radio broadcast.

The returns were received by telephone from a Pittsburgh newspaper. During intervals between returns, phonograph music was played, and two live banjo artists also played. These election returns had impressively demonstrated radio's potential. Later, Harding's inauguration ceremonies were broadcast. President Harding, himself, was intrigued with radio, and delivered a series of messages to the American public via radio. The new medium was to affect the American way of life as nothing had ever done before.

Sporting events boomed as a result of radio. On July 2, 1921, the Dempsey-Carpentier fight was broadcast from Boyle's Thirty Acres in Jersey City. The announcer was J. Andrew White, who also gave radio's first blow-by-blow description. This bout and the Jess

Please see ADAMS, Page A6

FROM PAGE A5

## ADAMS

Willard-Luis Firpo fight in 1923 were two my dad listened to with the use of headsets.

Other stations grew rapidly. The Detroit News station WWJ had been operating a radiophone, and was granted a license in 1921, and WJZ in Newark, N.J., also broadcast its first program in 1921.

In 1921, Westinghouse also produced its first popular-priced home radio receiver. It cost approximately \$60, not including headsets or loud speakers. (It must have been difficult to hear anything on it without them). But sales grew so quickly the manufacturer couldn't keep up with the demand. During this period radio stations weren't selling advertising time. They were broadcasting primarily to sell radio sets.

Other organizations entered the field, including General Electric, AT&T, and RCA. As yet, no one had discovered how a station could make money. They had not yet discovered the paid commercial. But by 1923, there were nearly 600 licenses.

It was during this exciting time of the early '20s that Peoria's first experimental station went on the air. A professor at Bradley Polytechnic Institute, Eric G. Shalkhauser, built a transmitter and was doing "unofficial" broadcasts in the summer of 1921. A government license was obtained on Jan. 4, 1922, and station 9YAN went on the air, a little over a year after KDKA, Pittsburgh.

The transmitter and receiver was built and assembled in the physics laboratory at Bradley's Main Hall. It was located on one of the lecture tables in the basement. The antenna consisted of a wire stretched between a tower of Bradley Hall and the chimney of the



PEORIA RADIO SALES CO., 127 S. JEFFERSON ST. CIRCA 1921-22.

Photo courtesy of Peoria Public Library

power house across Glenwood Avenue.

Station licenses and renewals were issued on a three-month basis then, and a new application was made to the Department of Commerce on March 18. The renewal was received on April 23 but carried new call letters. 9YAN became WBAE and the license was good until July 20. But the school year ended in June, so no more regular broadcasts were aired after that, because much of the programming consisted of talks by the faculty, and music programs from Bradley's music department.

Newspapers were now expressing interest, so a new application was made on July 18 by the Peoria Star. The Star joined Peoria Radio Sales Co., a partnership between Eric Shalkhauser and Lyle H. Gift,

and a new station went on the air in August. The call letters were WJAN. It was located on the third floor of the new Peoria Star building at 125 SW Madison. Shalkhauser built it with much of the equipment from the former WBAE and 9YAN. It operated for three years, until the early fall of 1925.

That same summer of 1922, Shalkhauser was contacted by Brown's Business College, which was interested in a radio class. He built and licensed another station for that purpose with the call letters WFAP. It also went on the air that summer and operated for about one year, in cooperation with the Peoria Journal.

It wasn't until about 1½ years after WJAN went off the air in 1925 that Enos Kahler went on the air from the living room of his home at

107 E. Glen Avenue in Peoria Heights. The date was Feb. 14, 1927, and he chose the call letters WMBD, which represent "World's Most Beautiful Drive." His house was near Grandview Drive, which former President Theodore Roosevelt described as the world's most beautiful during a visit here in 1910.

Yes, Peoria was right there "among 'um" back in the early 1920s, when experimental radio began.

... and it (almost) seems like only yesterday!

(Some of the above facts are from the book, "A Pictorial History of Radio" by Irving Settel.)

Play Nostalgia Quiz with Bill Adams every week on TelEdition. Call him on a touch-tone phone at 682-5050. Then press 5555. He'll tell you instantly whether your answers are correct.

WESTINGHOUSE ELECTRIC CORPORATION

CHRONOLOGY OF RADIO BROADCASTING

1915

Dr. Frank Conrad, assistant chief engineer at Westinghouse, becomes interested in radio as a result of a \$5.00 bet on the accuracy of his \$12.00 watch; builds small wireless receiver to hear time signals from Navy transmitter at Arlington, Va.

1916

Conrad builds transmitter over garage at his Wilkesburg (Pa.) home. Station licensed 8XK. First listed in government records August 1, 1916.

1917

Apr. 7: Radio amateurs under security ban as the United States enters World War I.

Conrad's facilities used during World War I, under special authorization, to test military radio equipment built by Westinghouse for the U. S. and British governments.

Conrad develops one of the first practical vacuum tube receivers.

1918

Conrad vacuum tube receiver placed in production at Westinghouse for the U. S. Army Signal Corps.

1919

May Westinghouse generators aboard U. S. Navy seaplane NC-4 power first continuous over-water plane-to-shore radio transmission on historic North Atlantic crossing.

Oct. 1: Wartime security ban on amateurs lifted.

Oct. 17: Conrad delights "hams" with phonograph record concert; later announces series of "broadcasts", first recorded use of this word to describe a radio service.

more

1920

- Oct. 16: Westinghouse files application for radio station at East Pittsburgh.
- Oct. 27: First KDKA license granted. Letters assigned from roster of ship calls.
- Nov. 2: KDKA PRESENTS WORLD'S FIRST REGULARLY SCHEDULED BROADCAST. Harding-Cox election returns.
- Conrad turns attention to shortwaves. Begins experiments with frequency modulation (FM) at 8XK.

1921

- Jan. 2: First regularly scheduled church broadcast and necessary remote pickup.
- Jan. 15: First broadcast by a national personage, Herbert Hoover, speaking for European Relief.
- Mar. 4: First Presidential inauguration speech broadcast. Harding speech read on air while being delivered in Washington.
- Mar. 10: First broadcast from a theatre, Davis Theatre, Pittsburgh.
- Mar. 19: First official of cabinet rank on air, Secretary of War John W. Weeks.
- Apr. 11: First blow-by-blow boxing broadcast, Johnny Ray vs Johnny Dundee, Pittsburgh.
- Apr. 13: First regular broadcast of baseball scores.
- May 19: First market reports. Forerunner of all farm radio services.
- May: First broadcasting studio. Tent on roof of Westinghouse East Pittsburgh factory building.
- June: Westinghouse builds first popular-priced home radio receiver, Aeriola, Jr.
- July 2: First World's Heavyweight Boxing Championship, Jack Dempsey vs George Carpentier.
- Aug. 5: First play-by-play baseball, Pittsburgh Pirates defeat Philadelphia Phils 8-5.
- Sept. 12: First political broadcasts. Free time provided for candidates of all major parties in Pittsburgh primaries for mayor.
- Sept. 15: Westinghouse WBZ, Springfield (Mass.) licensed.
- Sept. 19: WBZ makes inaugural broadcast from Eastern States Exposition, West Springfield. Second station to provide regularly scheduled service.

more

1921 (Con.)

- Sept. 19: Westinghouse becomes first operator of a group of radio stations with opening of WBZ.
- Sept. 20: First radio news room, Pittsburgh POST.
- Sept. 30: Westinghouse WJZ, Newark (N.J.) licensed.
- Oct. 1: WJZ makes inaugural broadcast.
- Oct. 3: First indoor studio, East Pittsburgh.
- Oct. 5: First World Series, New York Yankees vs New York Giants. Announcer: Grantland Rice.
- Oct. 8: First play-by-play football, Pitt 21, West Virginia 13.
- Nov. 11: Westinghouse KYW, then in Chicago but since 1935 in Philadelphia, makes inaugural broadcast.
- Nov. 28: First Catholic broadcast. Forerunner of Catholic Hour.

1922

- August Westinghouse shortwave service inaugurated with EXS established at East Pittsburgh.
- Dec. 4: First Musical organization formed exclusively for broadcasting. KDKA Little Symphony under the direction of Victor Saudek.

1923

- Mar. 4: KDPM, second Westinghouse shortwave station, installed at Cleveland (O.). First radio "repeater" station. Milestone in radio link transmission and prominent factor in television network development.
- May 15: WJZ sold to Radio Corporation of America.
- August EXS attains international stature when shortwave broadcasts of KDKA programs are heard in England.
- Nov. 22: KFKX, third Westinghouse shortwave station, installed Hastings, (Neb.).

Electronics television pickup introduced by Dr. Vladimir K. Zworykin, physicist in Westinghouse Research Laboratories. System made obsolete prior mechanical scanning and still is in use in the iconoscope, eye of the television camera.

Westinghouse introduces thermionic vacuum tube, eliminating batteries and making possible operation of radio receivers from ordinary house current.

more

1924

January First radio Barn Dance.

Jan. 17: KDKA Far North Service inaugurated.

June London Conference considers radio link Europe to South America. Conference favors ultra-long wave. Shortwave substituted at a saving of three and a half million dollars after dramatic demonstration by Dr. Conrad using small receiver and curtain-rod antenna in London hotel room.

Conrad transfers 8XK license to Westinghouse. Company releases 8XS, shifting Pittsburgh shortwave activities to 8XK.

1925

Mar. 30: Lowell Thomas makes radio debut at KDKA.

1929

March 8XK call letters changed to W8XK.

Dr. Zworykin demonstrates electronics television receiver, the kinescope. Demonstration is final step in invention, development and showing of all-electronics television at Westinghouse.

1930

January Westinghouse opens second international shortwave station, W1XAZ, Springfield (Mass.).

1935

W1XAZ call letters changed to W1XK.

1939

August W8XK becomes WPIT; W1XK becomes WBOS.

1940

Dec. 16: WPIT moved to Boston.

1941

Jan. 1: WPIT and WBOS merged as WBOS, Boston.

more

1942

Nov. 1: WBOS taken over by Office of War Information and Coordinator of Inter-American Affairs. In Psychological Warfare Service.

NOTE TO EDITORS

All "firsts" are KDKA's unless otherwise noted.



in behalf of WWJ is based upon imperfect recollection rather than upon facts susceptible of proof.

Further evidence on the point confirmatory of this conclusion of fact was obtained for the author by Wayne L. Randall, Director of Publicity of the National Broadcasting Company. At the author's request, Mr. Randall wrote to Col. Patterson, Assistant Secretary of Commerce, and received a report under date of July 16, 1938, signed by Alexander V. Dye, Director of the Bureau of Foreign and Domestic Commerce, from which the following is a quotation:

"The early records of these amateur stations were listed under the heading of 'Radio Service' by the Bureau of Navigation, Department of Commerce, in a publication entitled, *Amateur Radio Stations of the United States of America*. In this bulletin, published June 30, 1921, on page 156, Station 8CS is listed as belonging to W. J. Scripps, of 3664 Trumbull Avenue, Detroit, Mich., and as having a capacity of 20 watts.

"In the same volume on page 160, there appears the name Radio News and Music Company, Inc. of Detroit, Mich., as the operator of Station 8MK with a power of 1000 watts. Whether this is a station established by the *Detroit News* is not evident."

The report confirms the date given by the author for the first listing of WBL, November, 1921, and states that the name was changed to WWJ in March, 1922. As previously noted, this change did not appear in the *Radio Service Bulletin* until June, 1922.

Now that official records have demonstrated that Station 8CS (operated by W. J. Scripps, now manager of WWJ) was first listed in a bulletin published June 30, 1921, whereas KDKA was listed eight months earlier, we may safely conclude that the Pittsburgh station is entitled to priority on that score alone. But as previously indicated, KDKA could claim Dr. Conrad's experimental station as its origin and go back to August 1, 1916. It would seem therefore that WWJ's claim to priority is disproved on all counts.

#### *Sec. 118a. Station KDKA Broadcasts from a Tent.*

Immediately after its successful performance on election night, November 2, 1920, KDKA established an evening broadcasting schedule that ran until 9:30 P.M. Its program was at first not unlike that of Dr. Conrad's amateur station—largely drawn from phonograph records. The astute H. P. Davis, the godfather of this new form of public entertainment, soon perceived that mere phonograph music over the air could never stimulate growth of the industry. People would not buy expensive radio sets in order to listen to phonograph records that they themselves might play on their own phonograph. No indeed, something more vital must be provided.

Band music—broadcast from an actual concert—was a logical idea. Westinghouse already had an excellent band. Mr. Davis resolved to utilize the Westinghouse band. A difficulty, however, was at once encountered. The rude penthouse on the roof was only large enough for the operators. Dr. Conrad believed that an auditorium could be utilized as a broadcasting studio. An auditorium of East Pittsburgh soon became the headquarters of Station KDKA but complaints from the radio audience began to pour in. There were disconcerting echoes and distortion in the broadcasts. The pioneers had encountered that bug-a-boo of early broadcasting—resonance! Try as they might the auditorium was unsatisfactory for band music.

In desperation they took the band out-of-doors and lol the broadcast improved amazingly. Back went the studio to the roof-top for out-of-doors band concerts. Stormy weather, however, made necessary a large tent to shelter the musicians. The tent worked admirably—no resonance was encountered. Thus during the Spring and Summer of 1921 Station KDKA lived its life like a true pioneer—in a tent!

This first broadcasting station was now equipped with a 100-watt transmitter, a mere toy in comparison to the present-day equipment of radio broadcasting stations. It was, however, much more powerful than amateur stations of the locality. Amateurs had hitherto had the air to themselves but now that KDKA was on the air every evening amateurs were seriously inconvenienced. A virtual feud speedily developed. Since the average amateur was equipped with a spark set, he was not without the means of retaliation. The Westinghouse band may have produced true harmony within its tent on the roof-top but squeals and squeaks and sudden thunder from amateur sharpshooters all too often accompanied the Westinghouse music in its circuit of the upper air. The receiving sets that were being offered to the public in the pioneering days of KDKA have thus been described by George H. Clark, Historian of RCA:

"These receivers had but a single circuit, for the Westinghouse designers figured that reception in the home must be simplified down to the utmost, if home-folks who could not even replace a burned-out fuse were to be able to operate the devices. No 'forest of knobs' here; no complicated table of settings; merely one circuit and one handle to vary it. I can recall the personal scorn with which this single circuit receiver was viewed by 'old-style' radio engineers, i.e., myself, for it was held that this was going back to the days of 1900. But later, we . . . I . . . realized that the new transmitters were so much more sharply tuned than the old spark sledge-hammers that a single circuit receiver was in 1921 actually workable! Little by little, actual use showed that for handling by people who knew nothing of radio's technicalities the single circuit was just what had been needed. It was

a bold psychological move in the struggle to bring radio out of the attic into the sitting-room, and it worked. How well it worked I can realize today, as I stroll home from the office at seven P.M. and find that, as I pass house after house, I am never out of touch with what Amos is saying to Andy."

*Sec. 119. RCA Absorbs International Radio Telegraph Company.*

It will be remembered that the agreement between The International Radio Telegraph Company and the Westinghouse Company had called for the payment of \$2,500,000 for certain shares of stock, complete payment to be made within two years. This agreement had been entered into on June 21, 1920. A year had now elapsed—a year of disappointment. The International Radio had discovered that it could never be international in fact—that the Radio Corporation of America had already acquired almost everything worth-while. It was true that The International Radio had made certain successful raids on patents not already captured by RCA, but such successes as they had gained were like guerilla operations of a defeated army—small comfort to the commanders of the defeated host.

To make matters more disheartening the Westinghouse sponsors had held back on their promises of funds. Their agreement gave them two years in which to pay \$2,500,000. Very well, they would take their time. For twelve months the International stock had remained in escrow, or nearly all of it, for in June, 1921, only \$300,000 of Westinghouse money had been paid over to the agents of The International Radio Telegraph Company. As previously noted, the Westinghouse officials were in reality using the communications corporation as a pawn in a contest for industrial equality.

It should be noted that Station KDKA, that was already attracting the attention of the scientific world, was owned and operated by Westinghouse Electric and Manufacturing Company. The International Radio could not claim any credit for this achievement. It is small wonder under these depressing circumstances that The International Radio should have been in a mood to surrender to the Radio Corporation of America. Surrender it did—and with the blessings of Westinghouse, since we find the following significant facts, unearthed by the Senate investigation of the merger of RCA and International.

On June 30, 1921, a sales agreement was drawn up between International and RCA,<sup>1</sup> yet the same was not formally executed and delivered until August 8th following. On the same day that the sales agreement was drawn, June 30, 1921, the Radio Corporation concluded a cross-licensing agreement<sup>2</sup> with the Westinghouse Company

<sup>1</sup> See Appendix, Exhibit "E."

<sup>2</sup> See Appendix, Exhibit, "F."

in which the RCA-International Radio merger was ratified. All the patent rights so laboriously acquired by Westinghouse were cross-licensed to RCA. Thus the last sections of Owen D. Young's famed jig-saw puzzle were at length fitted into place. On the dizzy heights of Olympus the financial gods had completed transactions that were to cost headaches to Senate investigators and wholesale heartburnings in various quarters.

No fair-minded person could question the necessity of following the consolidation tactics that Mr. Young had outlined. Critics maintained, however, that they had done the job altogether too thoroughly, had set up a complete and iron-clad monopoly of wireless transmission. Senate investigations will be set forth in the progress of this recital.

*Sec. 120. Pioneering in Radio Program Building.*

Since Station KDKA had been preceded by more than a year of continuous operation of Dr. Conrad's experimental station it was naturally in a position to blaze the trail for all other radio stations. After all, a radio audience needs to get beyond the novelty stage of broadcasting before the influence of its desires can be of much value to the managers of a radio broadcasting station. A phenomenon of the times no doubt aided Station KDKA immeasurably. The radio listeners were then so impressed by the magic of being able to capture voices and music from the air that they wrote letters freely. Anything and everything in a broadcast program affecting them favorably or unfavorably was sure to be commented upon in this fan mail. Thus those in charge of programs were kept on their toes, so to speak, to please, to enthuse the unseen audience out there in radio-land.

In December, 1920, the Westinghouse station in Pittsburgh, under the progressive administration of its station manager J. C. McQuisten, and Vice-President Davis, decided to undertake the hazardous venture of broadcasting a church service. They reasoned that if Lee deForest had succeeded in broadcasting grand opera ten years previously, at a time when broadcasting instruments were much inferior to their own equipment, there should be no question of the feasibility of their project. The U. S. Signal Corps had broadcast services of Trinity Church, Washington, D. C., August 24, 1919.<sup>3</sup>

It so happened that one of the Westinghouse engineers was a member of the choir of the Calvary Episcopal Church of Pittsburgh. The rector of the church, Dr. E. J. VanEtten, was consulted. Fortunately he proved to be a progressive man, broad of vision and impressed by the possibilities of radio broadcasting. He gladly consented to the plan. The date of the initiation of the service was fixed for Sunday, January 2, 1921.

<sup>3</sup> Private records, RCA.

An impressive and most recent photograph of King George and Queen Mary with the royal family, made at the Buckingham palace shortly after the return of the Prince of Wales from his tour around the world. From left to right, standing, his majesty the king and Princess Mary. Standing, left to right, the Duke of York, the Prince of Wales and Prince Henry.

## MILITARY FUNERALS FOR WAR VICTIMS

Bodies of Wilkesburg and East End Soldiers Arrive in Pittsburgh.

The bodies of three local world war veterans, who died while serving with Uncle Sam's forces in France, arrived in Pittsburgh yesterday. Arrangements have been completed to give each a military funeral.

The names of the soldiers are Private Howard B. Maxwell, son of Mr. and Mrs. William J. Maxwell of 1423 Coal street, Wilkesburg; Lieutenant Clinton V. Sutton, son of John A. and Annie Sutton of 3609 Millworth avenue, and Lieutenant Joseph J. Mason, son of Rev. L. Walter Mason of 5551 Avondale street.

Funeral services for Lieutenant Mason will be held at 3:30 o'clock this afternoon. Interment will be in the Homewood cemetery. Mason was an American aviator and was killed in France, July 19, 1918. He was a graduate of old Central High school, Cornell and the University of Pittsburgh school of economics. At the time of his enlistment at the outbreak of hostilities with America he was export manager of the McKelvin Company of New York.

Lieutenant Sutton was a member of American flying squadron in France and was accidentally killed August 14, 1918. A military funeral will be held tomorrow afternoon in the Shadyside Presbyterian Church, at 5:30 o'clock with interment in the Allegheny cemetery. Lieutenant Sutton was a graduate of the Shadyside Academy, where he was a member of the Delta Psi Society, manager of the academy football team and vice president of his class of 1917. Besides his parents, Lieutenant Sutton leaves one sister, Edna, and four brothers, Robert W., William S., J. Blair and Donald L.

Obsequies for Private Maxwell will be held at 2:30 o'clock Sunday afternoon from the family home. Maxwell enlisted in the regular army in May, 1917, and

## WIRELESS PHONE PROVES SUCCESS ELECTION NIGHT

Westinghouse Concerns Distribute Returns From East Pittsburgh Plant.

### PREDICT GREAT FUTURE

One of the interesting sidelights of the election this year was the great success of the wireless telephone broadcasting the returns. So convincing were the results obtained, it is predicted, that four years hence the radio method of sending news of the election will be almost universally used. Tuesday night the returns were received from press association wires by telephone communication and were sent out by wireless telephone from the station of the Westinghouse Electric and Manufacturing Company and its subsidiary, the International Radio Telegraph Company at East Pittsburgh. Wireless operators within the vicinity of several hundred miles were able to get the news promptly. In many cases the results were known some time before they were heard by means of the telegraph.

They underwrite the returns were received and bulletined in the street for the benefit of hundreds of people there, the bulletins being shown from 30 minutes to a half hour received over a special telegraph wire between Vandergriff and Pittsburgh. In addition, the wireless set was connected by a cable with the nearest telephone exchange, and the wire chief sent the news to subscribers who had arranged for the service. He also gave the returns to any person making inquiries.

### WIDE AREA SERVED.

At Latrobe the same methods were

## DUQUESNE DRIVE OPENS SATURDAY

Team Captains and Workers to Be Addressed at Dinner by Bishop Canevin.

The \$1,000,000 drive for Duquesne University will open Saturday night at 6:30 o'clock with a dinner for team captains and workers at Kaufmann's dining room. Willis F. McCook will preside, while the principal address will be made by Bishop Canevin. At this gathering full instructions will be given to the canvassers, who are to cover Pittsburgh and the 19 counties of the Pittsburgh diocese.

Chairman McCook, of the campaign committee, is gratified at the complete organization which has been built up in three weeks to give Duquesne university a much-needed new building. The priests of the diocese are organized and are working for success.

A committee of priests among the alumni of the school has established headquarters and is canvassing the graduates, determined to raise the \$1,000,000, which they pledged themselves to secure for the building fund. Two young priests have started the fund with contributions of \$1,000 each.

Following the recent address of M. J. Slattery at Bmswerth the Sacred Heart parish of that place secured pledges of \$4,000.

A business men's committee has been organized by Chairman McCook. It is headed by John J. O'Conner and an active canvass is to be made of manufacturing and business men, who, it is believed, will be glad to help.

Every Knights of Columbus council in Western Pennsylvania has organized the members into volunteers to help in the canvass. Frank T. Lausinger is chairman of 150 workers at St. Paul's Cathedral, while J. Frank McKenna reports 60 canvassers ready for work in the Sacred Heart parish, East End.

### City Plan Secretary

leave the sister, Edna, and four brothers, Robert W., William S., J. Blair and Donald L.

Obsequies for Private Maxwell will be held at 2:30 o'clock Sunday afternoon from the family home. Maxwell enlisted in the regular army in May, 1918, and shortly after arriving in France succumbed to pneumonia and influenza on October 16, 1918. Members of the Sergeant, David T. Rankin Post, Veteran of Foreign Wars, will act as an escort of honor and will provide a firing squad, a bugler, and a chaplain. The body will be borne to the Woodlawn cemetery on a gun carriage, while the services will be held in the First United Presbyterian Church with Rev. F. H. Elder officiating. In compliance with a proclamation issued by Burgess John G. Miles, business houses of the borough will display American flags during the hours of the funeral.

## Railroad Fined \$2,600 For Smoke Violations

Fines amounting to \$2,600 were imposed on the Pennsylvania Railroad Company yesterday by Alderman Charles D. Charlton, who heard testimony in 24 suits instituted by H. R. Moller, chief of the city bureau of smoke regulation. Each case was based on the charge that through carelessness

scribes who use methods were followed, enabling large crowds to get the messages early.

## WIDE AREA SERVED.

At Latrobe the same methods were followed, enabling large crowds to get the messages early.

At Irwin a large hall was filled to capacity to receive election returns, motion pictures being shown throughout the evening.

Not only in the immediate vicinity of Pittsburgh were the returns as sent from the Westinghouse plant heard, but throughout Ohio and West Virginia they were interpreted with equal clearness.

Also in Pittsburgh the radio method of sending returns was utilized in two ways. Persons having simple sets did not need to leave their homes. By means of apparatus installed in clubs throughout the city, large assemblages were able to have social functions while receiving the returns. At the Edgewood Club a sounding horn was in use, and persons all over the large ballroom could hear the voice of the speaker at East Pittsburgh through the radio apparatus.

In addition to the phonograph music, banjo quart selections were played during the intervals between of the election returns. The clear tone and loudness of all the music greatly astonished the gatherings.

canvassers ready for work in the Sacred Heart parish, East End.

## City Plan Secretary To Deliver Lecture

The second of a series of lectures arranged jointly by the citizens' committee on city plan of Pittsburgh and the University of Pittsburgh will be given in the Chamber of Commerce auditorium tomorrow afternoon. Frederick Bigger, executive secretary of the citizens' committee, speaking on "What the City Plan Means to Pittsburgh." C. D. Armstrong, president of the citizens' committee on city plan, will introduce Mr. Bigger, who will speak of the historical types of city plans, including those of Paris, London, Karlsruhe and Washington, and will apply the principles of these plans to Pittsburgh's problems.

# CAN YOU BEAT IT?

WE CARE  
TO SERVE YOU

What more  
may I say?  
I hope  
I hope

# Recollections of an "Old-Timer"

## One of the Broadcast Listeners of Days Gone by Compares "Yesterday and Today"

BY "ZERO L. B."

Back in the late 90's and early 1900's I was mildly interested in radio. It was in the days of coherers and electrolytic detectors, and it did not take long to satisfy my love of playthings in that direction. I did not pay much attention to radio after 1906, and was quite disappointed in 1910, when I casually visited the radio cabin of one of our New York boats, to find how seemingly little radio had progressed. The sparks sounded about as bad and wide as they did in 1906, and their interference was worse, because there were more of them.

### THEN CAME BROADCASTS

Other than being briefly interested to know the essential story about crystal detectors and tubes when they first appeared, radio was a dead letter with me until 1921, when I learned that radiotelephony was practically achieved, and broadcasting was actually in progress.

In February, 1921, I set up a crystal set, and at first only heard WBF and NAD on sparks that did not sound any better or less wide than similar sparks had in 1906. I also heard innumerable amateurs with less powerful but not any less breadth waves than their big commercial brothers. Truthfully, I was not impressed with the wonderful advances in radio I had just heard about. About the second or third evening that I listened, however, I heard some very faint squeaky phonograph music at about 275 metres, which being picked up with better success after the practice of two or three more nights, turned out to be from 1QR, J. C. Ramsey, Jr., of Brookline.

My interest was thoroughly aroused, and I lost no time in arranging a tube set (somewhat to the detriment of my

pocketbook, more so in 1921 than better apparatus would be today).

In referring to my old notes, I discover that on March 13, 1921, I listened to a Sunday afternoon concert from 1QR and that several times during March and April I heard the same station, also 1AB, broadcasting phonograph records.

March 30, 1921, was the date of the first regular concert from 1XE at Medford Hillside, and while fooling around with them I picked up KDKA for the first time. Genial Mr. Arlin was on the job that night, just as he still is, and said his pleasant "Good-night" just as he says it now (which many announcers have tried hard to imitate and can't). Right here I would like to pay a tribute to that same Mr. Arlin, having listened to him regularly since the date mentioned. He has never failed to announce in clear measured tones that are perfectly understandable. He never tries to be funny, I never heard him put over a cheap joke. Once in a while he injects a little touch of subtle wit that is as pleasing as it is unexpected, coming from him. He has apparently striven to maintain his announcing in strict concordance with the dignity and excellence of old KDKA. That he has succeeded and lasted unspoiled through five years of alleged funny man, popular idol competition from other stations redounds to his credit.

No voice is better known or more quickly recognized by the members of my family than his, and I am sure that if any one of us should hear him speak in person anywhere, we would involuntarily turn in pleasant recognition and say "Hello Mr. Arlin," forgetting that we have never seen him, and that he has never heard of us.

### Hears Dempsey Fight

Through that spring, 1XE broadcast on every Wednesday and 1QR almost every night for one-half hour, and I find that they, with KDKA, 1AB, NSF and NOM, constituted all the available entertainment talent on the air.

On May 6, 1921, I recorded for the same evening 2XQ, NSF, 1FF and 1AB, quite a successful night for those times. On May 6 I visited station 1QR on invitation of the owner, that prince of good fellows, James Ramsey, and had a most enjoyable evening. On May 11, I was similarly the guest of another good radio scout, Howard Tyzzer, at 1XE.

These visits increased my interest, and those two radio-wise engineers imparted to me tips on receiving hook-ups, which afforded pleasure in proportion to the nth power of the pocket-book decrement, which was easily of measurable magnitude.

On July 1, thanks to dope from Friend Furlong (1FF, that's what FF stands for), I hooked up on 1600 metres, and received WJY on its practice shot, preparatory to the big event next day.

July 2, WJY on Dempsey fight received in broad daylight on three tubes, one radio, two audio, a reception that I would have to score even today as nearly perfect. Our sport-loving family doctor was my guest, he even got almost excited as the important blows were announced. When the

the observer who chose the tune; because it was an easy one to recognize, not resembling modern cubist music in any particular.

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July 2, WJY on Dempsey fight received in broad daylight on three tubes, one radio, two audio, a reception that I would have to score even today as nearly perfect. Our sport-loving family doctor was my guest, he even got almost excited as the important blows were announced. When the fight was over, he rushed up town to where the crowd was watching the alleged up-to-the-minute ringside reports bulletined by the local paper, found they were two rounds behind, told to the crowd the true story of the rest of the fight, was laughed at by our local editor and others, only to see a practical repetition of what he had told bulletined through the succeeding 10 minutes, whereupon the let-him-tell-it-up-to-date-news-service-journalist was sore as a pup, for he had paid good money for the wire service. His friend, the good doctor, had for nothing heard the band and the bell and the blows, and had publicly turned the laugh on him and his paper.

#### DX Record

KDKA was received a few times through that summer.

In November frequent receptions of WJZ, KDKA, 1YC, 3ZO, 2XB and WBZ are recorded, and on Nov. 26, 1921, KYW was received. This was DX record for me at this time, and I have reason to believe it was for the station, as they mentioned it in a write-up in one of the technical papers.

On Dec. 7 and 10, KYW was again received, and the note on the second date says the reception was good. If I recollect correctly, it was the opera "Madame Butterfly," and one whole act came through perfectly on the loud speaker.

From Dec. 24 on, for nearly a month, the notes are chiefly taken up with accounts of almost flighty reception of a station in Cazenovia, New York, operated by C. B. Meredith. It had no call letters then, but subsequently became 8BSS and WMAC. Mr. Meredith was only using two five watt tubes, so it is a testimonial to the efficiency of his apparatus and his skill as a radio engineer that a duffer 300 miles away could pick him up night after night on a single tube and make the observations he directed by voice, not code, as he made changes in plate voltage, counterpoise, wave length, etc.

Mr. Meredith used to call me by putting on the phonograph record, "It's a long way to Tipperary," and he frequently used repetitions of the same record for me to make the necessary observations. Imagine my amusement a few days afterward, listening to a Third District station, ...

the observer who chose the tune; because it was an easy one to recognize, not resembling modern cubist music in any particular.

In January, 1922, 1QR began the experiments on short waves by going down to 140 metres. I built a set and reported to him on this, also on 8XK and 1HX. They, a little later, had gotten down to 100 metres, and on June 3, 8XK relayed KDKA on the short waves. What this pioneer work of Mr. Ramsey and Mr. Conrad led to, in the use of short waves for long distance broadcasts, is now common knowledge.

#### Sets Cut and Recut

The recollections of being a duly invited duffer observer on their tests are most pleasant, and I am indebted to both distinguished gentlemen for many most interesting radio experiences. It is quite probable that I am the first person who ever heard the human voice transmitted any great distance, at so low a wave length as 56 metres. There was no data available then on short wave sets, and more than once I have sat down and wound a new set, on the telephonic request of 1QR, to listen to him on some new wave length. I used mostly soft tubes in those days, and it was not always possible to make such tubes oscillate with any old combination which figured right in wave length. On short waves you cannot go on putting turns on the tickler indefinitely, so that my sets were often cut and tried and recut and retried before I could tell good old 1QR that he was coming in QSA.

Another interesting set of early 1922 observations were made on the KDOW-2XJ experiments. KDOW was the S. S. America and attempted to keep in telephonic communication clear across the Atlantic. I succeeded in hearing them when they were 1350 miles out. I never knew whether 2XJ heard them at that distance, they were not getting them at the time I was. Unskilled observations were also made frequently for Mr. Beale of 3ZO, who often shouted a merry salute to "Zero L. B." just as he did to "Uncle Johnny" night after night.

On July 30, 1922, Shepard Stores, afterward WNAC, was noted on the air, and there were hosts of other stations of about the same period. As this brings us down to a condition not dissimilar to the present day, I will

Westinghouse

MSS

424

Box 53

Folder 1

(H. P. Davis file)

**Harry Phillips Davis**  
**Enshrined in Broadcasters Hall of Fame**  
**Akron, Ohio on October 3, 1990**

**Harry Phillips Davis**  
**Enshrined in Broadcasters Hall of Fame**  
**Akron, Ohio on October 3, 1990**



IN TRIBUTE TO H. P. DAVIS

Charles A. Ruch, Westinghouse Historian

Broadcasters Hall of Fame, Akron, Ohio, October 3, 1990

It was the last day of September, 70 years ago, when H. P. Davis arrived at his office in the Westinghouse plant in East Pittsburgh. Two years had gone by since the Armistice ended World War I and life for H. P. Davis was considerably less grim. In the war years he had headed the war production activities of Westinghouse, and he had done that job well.

Despite the enormous quantities of shells and other munitions ordered by the government...despite short time limits..despite rigid specifications which changed with bewildering frequency...despite shortages of materials and lack of competent help, the war work of Westinghouse was done properly and on time. Every promise made by H. P. Davis to the government was kept.

Moving fast-forward to that day in September 1920, when Vice President H. P. Davis arrived at his office, his secretary sensed he was excited about something. In the same sentence he said, "Good morning," he added, "ask Frank to come in."

Frank, as you likely have guessed, was Frank Conrad, assistant chief engineer of Westinghouse. In the war years, Frank Conrad's special assignment was radio work, coordinating closely with the U. S. Signal Corps. By special license from the government, Westinghouse had been permitted to build and operate a transmitting station and a receiving station. One was located at East Pittsburgh, the other was above the garage at the home of Mr. Conrad, four or five miles away. With not much imagination, they were 2WM and 2WE.

When the war ended, Frank Conrad had continued to experiment from his transmitter station above his garage. After government restrictions on amateur radio operators were removed, Frank spent many evenings operating his radio telephone transmitter. When he grew tired of talking, he moved his Victrola to the microphone and played records. To supplement his own collection, he borrowed

from a local records store, the Hamilton Music Company. In exchange he mentioned the name of the store on the air. So here we have the Hamilton Music Company as the first "advertiser" on radio and Frank Conrad as the first disk jockey.

Fast-forward again to the last of September, 1920, with Conrad being summoned to the office of his boss at Westinghouse, H. P. Davis. The first words to greet him were: "Frank, I'm going to close your station." History does not record Frank's reaction. But we assume he noted a bit of a smile on the face of his boss as H. P. Davis pulled from his pocket a clipping from the last night's newspaper. It was an advertisement that said radio sets could be purchased in the basement of Horne's department store, in downtown Pittsburgh. Buyers of the sets, at \$10 and up, could listen to the wireless concerts sent out by Frank Conrad.

Dr. Davis then told Mr. Conrad of his vision. He saw that all the efforts being made to develop radio telephony as a confidential means of communication--which is what the military wanted--was all wrong. Radio telephony was an instant means of communication that could go everywhere. As Dr. Davis himself later was to say, "We had in our hands, in this idea, the instrument that would prove to be the greatest and most direct mass communicational and mass educational means that had ever appeared."

Ladies and gentlemen, I am not going to bore you by continuing with the early history of broadcasting. It is all spelled out here in a reprint of a talk made by Dr. Davis to the graduate school of business administration at Harvard in 1928. We have one of these booklets for each of you, a present from Westinghouse. You will have the very words of the man who set in motion the business of broadcasting, the man to whom each of you in the business may wish to make a slight bow every time you open your pay envelope.

Because the little booklet doesn't tell you a word about the background of H. P. Davis, let me say briefly that he was born in Summersworth, New Hampshire, on July 31, 1868. He died in Pittsburgh September 10, 1931, at the age of 63. He received his technical training at Worcester Polytechnic Institute. He joined Westing-

house 99 years ago and worked on what they called "detail apparatus" --the smaller items like controllers, which helped the big generators and motors to do their thing. He had 77 patents and was made head of the Detail Department in 1896. By rarest chance, we have found a letter telling him of his new salary at that point, a handsome \$300 a month, and any patents he developed in line with his work belonged to Westinghouse. In 1911, he was now Dr. Davis, he was made Vice President in charge of engineering and manufacturing; presumably, his salary increased somewhat.

I hope you will take the time to read Dr. Davis' address on the history of broadcasting. I might tell you that Jean Hartz will announce later the date on which you will all have a quiz on this. But for just a moment or two I would like to leaf through the booklet and give you a few anecdotes you won't find there.

Dr. Davis says the first broadcast was from a rough box affair, on the roof of one of the taller buildings at the East Pittsburgh Works. It was known as the K Building. When Westinghouse was assigned call letters for the pioneer station, it came out KDKA. This came from a roster of letters assigned to ships and marine shore stations. The relation to the K Building was merely a coincidence. If that ever comes up in Trivial Pursuit, you are ready.

As we look back to that first broadcast, we imagine there must have been a lot of excitement. Not quite. In fact, after going to all the trouble of setting up the broadcast, Dr. Davis began to wonder if anybody would be listening. He says in the booklet that they did pass around a few simple receiving sets to top executives of Westinghouse. They also took another precaution. A whole group of Westinghouse managers and spouses was invited--you might say encouraged--to spend the evening at a local community club to hear the broadcast over loudspeakers. Naturally, the company wanted to be able to say that "hundreds heard the broadcast." As it turned out, the audience was many hundreds, with cards and calls from as far away as Kentucky.

At East Pittsburgh, the approach to this historic occasion was somewhat low-key. No one thought to get a photographer. Most likely you have seen the picture of the four men in the makeshift studio. By noting the light from outside, you realize the picture must have been made the next day, when it suddenly dawned on someone, "We made history last night!" One of the four men wasn't available the next day. The man at the left is a sit-in; the other three, including the famed Leo Rosenberg, first announcer, are legitimate.

Later on, Dr. Davis tells about the announcers school they started. They even had a professional critic, Marjorie Stewart, whose handicap of being blind possibly made her even more astute in evaluating the spoken word. One old-time KDKA engineer, who now happens to be the oldest notary public in Pennsylvania, will never forget Marjorie Stewart. In the early days, announcing was no big deal, and the pay was not great, either. So anybody with a voice was pressed into service, particularly on weekends. That's when Herbert Irving got his chance. One Saturday evening he was going along nicely, reading the football scores, until he came to Yale 13, Dartmouth 7. He got a note from Marjorie Stewart and his announcing assignments tailed off after that.

It was a natural, I suppose, that after the death of Dr. Davis, Westinghouse would come up with an award in his name for outstanding announcers. It is a happy coincidence that the very first winner of this award is one of your members, and he is with us tonight-- Ken Hildebrand. And Ken has told me there's a story that goes with the presentation of that first award. As the widow of Dr. Davis made the presentation and handed Ken the award envelope, she whispered to him, "Don't be surprised that there's nothing in there. I left the check at home." We're glad that Ken later got the check.

It is also said that Mrs. Davis had a thing about saxophones. For several years, because of her aversion, no saxophones were played over KDKA. Fortunately for Rudy Vallee, he came along somewhat later.

When you read the booklet you may note that Dr. Davis took a bit of orator's license. He implies that the ad which triggered his

decision came early in the year 1920, but there is no doubt that the date on the newspaper was late September. We can assume that the idea of broadcasting service was in his mind early in the year, but it was the ad that sparked his action. You will also see in the booklet that the post-war call letters of Conrad's station read 8XX. Dr. Davis would have known this was 8XK, so we will assume a typographical error. Aside from this, you can believe in the gospel according to H. P. Davis.

As you would expect, Dr. Davis--being a self-effacing man--makes no reference to the fact that when the National Broadcasting Company was formed, he was its first Chairman. He held that position, along with his title at Westinghouse, until his death

It is evident that broadcasting--the infant to which he had given birth--became the life of Dr. Davis. Early in his career, he enjoyed playing golf. According to one of his golf buddies, after the broadcasting business began, Davis was no fun anymore. He would rush from hole to hole, just so he could get back to the business. So, if any of you folks have found that the broadcasting business has shortened your golf hours, maybe H. P. is watching.

From what you have heard about Dr. Davis, and the more you will know after reading the booklet, there can be no doubt that he would be tremendously proud of the honor you have bestowed on him tonight. For H. P. Davis...broadcasting was his personal "Field of Dreams." It would not surprise me...if somehow...he is in this room tonight, sitting in one of those few empty chairs. On the slight chance that this might be true, I would like to propose a toast:

To H. P. Davis, the Father of Broadcasting

Your vision went beyond by far  
The wireless link of man to man;  
Because your concept was so broad  
A great new enterprise began.

That enterprise still grows and grows  
Though few there are who know your name;  
From the day you made your dream come true  
Our world would never be the same.

God bless you, Dr. Davis! God bless you all!

Westinghouse

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Principles and Practices of Network Radio  
(Sarnoff)

Sarnoff testimony 1939

PRINCIPLES *and* PRACTICES  
*of* NETWORK  
RADIO BROADCASTING

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*Testimony of*

DAVID SARNOFF

PRESIDENT, RADIO CORPORATION OF AMERICA  
CHAIRMAN OF THE BOARD, NATIONAL BROADCASTING COMPANY, INC.

BEFORE THE

FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D. C.

November 14, 1938 and May 17, 1939



RCA INSTITUTES TECHNICAL PRESS

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## FOREWORD

Public Hearings before the Federal Communications Commission in Washington, D. C., in connection with an investigation and study of the practices of radio broadcasters in the United States, with particular reference to network broadcasting, were commenced on November 14th, 1938.

The first witness to appear before the Commission was David Sarnoff, President of the Radio Corporation of America, and Chairman of the Board of the National Broadcasting Company. This booklet contains the complete text of Mr. Sarnoff's testimony upon direct examination on November 14th, 1938, and his testimony upon cross-examination on May 17th, 1939.

Copies of three documents relating to the early development of broadcasting, which were introduced into the record of the first hearing, will be found in the Appendix.

TESTIMONY of DAVID SARNOFF

upon DIRECT EXAMINATION

November 14, 1938

*Mr. Chairman and Gentlemen of the Commission:*

I appear before you today as President of the Radio Corporation of America and Chairman of the Board of the National Broadcasting Company. I appear in both capacities because the National Broadcasting Company is wholly owned by the Radio Corporation of America. RCA itself—and, consequently, NBC—is owned by a quarter of a million stockholders. No single stockholder, whether an individual, a corporation or a financial institution, owns as much as  $\frac{1}{2}$  of 1% of RCA stock.

The By-laws of the Corporation provide that at least 80% of the voting stock shall be held by American citizens. Approximately 95% of all the outstanding stock of RCA is held in the United States.

*RCA and NBC Welcome Investigation*

Speaking for both the companies and the stockholders I represent, we welcome this hearing and the opportunity it provides to review and appraise network broadcasting in the United States. Proud of the tremendous developments in radio during the nineteen years since the RCA was formed, we welcome this occasion when the government, the industry, and the public may jointly take stock of the present, and chart the course into a vast and unexplored future.

The questions you have presented to the National Broadcasting Company covering the specific items of this investigation will be answered factually and in detail by the executives and operating officials of NBC, who will appear before you.

Let me say at the outset that I am not here to advocate a "status quo" of broadcasting, or to oppose changes in a changing art. I do not come here to say that broadcasters are infallible, that no improvements are possible, that we have no problems, or that the Commission cannot help in their solution. I am here to aid this investigation in any way I can. I propose to describe briefly the objectives of the Radio Corporation of America which led to the formation in 1926 of the National Broadcasting

### *Early Days of Broadcasting*

When the Radio Corporation of America was formed, nineteen years ago this fall, its immediate object was to provide an American-owned system of international communications—organization, personnel, research and technical facilities.

Soon after the formation of RCA, broadcasting made its start, and we pioneered in this new field. It captured the imagination of the public almost overnight. The devices and patents which made it possible for RCA to operate an international communications system also were required to make home receiving sets and broadcast transmitters. Experienced radio engineers were needed, and these too were available in the RCA organization.

Following the historic election broadcast in 1920, by Station KDKA in Pittsburgh, radio stations were established rapidly in other important cities. The public sat up late at night to capture the faint, elusive call letters of distant stations. It was the thrill of listening to far-off places that gave radio broadcasting its first impetus—a thrill, by the way, which reached another dramatic climax only a few short weeks ago when history was being written in Europe.

In those early days of broadcasting various organizations entered the field for the incidental advertising that could be obtained—flour mills, department stores, music shops, and even garages. Newspapers, too, were early entrants, foreseeing new possibilities for speedier communication.

RCA, and its associates in the electrical field, had a broader purpose—that of pioneering an art which would create markets for new types of radio equipment, new services, and new avenues of employment for labor and capital.

It soon became evident that the growth and permanence of radio broadcasting depended primarily on the quality and variety of programs. The novelty of tuning in distant call letters quickly wore off. It was not enough for the listener to hear a solitary piano tinkling away in a make-shift studio. Second-rate musicians began to pall, and amateur singers wore out their brief welcome.

The operation of a broadcasting station, at that time, was a matter of expense with no corresponding revenue. There was nothing to induce station owners to employ expensive professional talent, or to improve studio and station facilities for better transmission and reception.

During those early years of broadcasting, RCA operated local

broadcasting stations, of which the most important was WJZ, in New York City. RCA also experimented with various station hook-ups, using telegraph lines.

After five years of hectic development, broadcasting stood at the crossroads. The alternatives were either to evolve a basis of support by private enterprise, or to seek a government subsidy, with an attendant tax on receiving sets and the natural consequence: government broadcasting.

### *Creation of Networks*

Fortunately for the United States, the democratic answer was found by private enterprise. In 1926, RCA purchased Station WEAJ from the American Telephone & Telegraph Company, arranged to lease AT&T wire lines for interconnection with other stations, and organized the National Broadcasting Company. NBC then took over the experimental program service which the telephone company had instituted, and extended it to a group of independent stations, which—with WEAJ as the key station—became the Red Network.

Network broadcasting provided greatly improved programs by tapping the talent centers of the nation and syndicating these programs over telephone lines to local, independent stations. Not only did the network system appeal to the listeners and the independent station owners, but it also attracted the business interests of the nation to use the radio broadcasting as an advertising medium. The economic support thus developed met the needs of the three parties whose interests were at stake: the public, the station owner, and the advertiser.

To the public, the network brought a new world of ideas, of music, of enjoyment centered in the home. It turned the page to a new chapter of America's social history.

For the station owner, the network provided programs—both commercial and sustaining—of a quality he could not individually afford, and with talent not physically accessible to his station. It brought him revenue from national as well as local commercial sponsors.

To the advertiser, the network furnished a large circulation spread over a wide area. Such circulation justified, over and above the cost of station time, the talent expense of high-quality programs. It is worthy of remark that the enterprise which broadcasters have displayed in building the American system of broadcasting has been paralleled by the enterprise of the

business men who so quickly recognized the advertising power of the new medium.

### *Why the NBC was Formed*

I cannot better describe the reasons which led to the formation of the National Broadcasting Company than to read excerpts from the announcement of its creation by RCA, published as a newspaper advertisement on September 14, 1926:

"The Radio Corporation of America is the largest distributor of radio receiving sets in the world. . . . It is more largely interested, more selfishly interested, in the best possible broadcasting than is anyone else.

"The market for receiving sets in the future will be determined largely by the quantity and quality of the programs broadcast. Today the best available statistics indicate that 5,000,000 homes are equipped, and 21,000,000 remain to be equipped. . . . Any use of radio transmission which causes the public to feel that the program is not the highest, that the use of radio is not the broadest and best use in the public interest, that it is used for political advantage or selfish power, will be detrimental to public interest in radio, and therefore, to the Radio Corporation of America.

"To insure, therefore, the development of this great service, the Radio Corporation of America has purchased for one million dollars Station WEAJ from the American Telephone and Telegraph Company, that company having decided to retire from the broadcasting business.

"The Radio Corporation of America has decided to incorporate that station, which has achieved such a deservedly high reputation for the quality and character of its programs, under the name of the National Broadcasting Company, Inc. The purpose of that company will be to provide the best programs available for broadcasting in the United States. The National Broadcasting Company will not only broadcast these programs through Station WEAJ, but it will make them available to other broadcasting stations throughout the country so far as it may be practical to do so, and they may desire to take them. It is hoped that arrangements may be made so that every event of national importance may be broadcast widely throughout the United States.

"The Radio Corporation of America is not in any sense

seeking a monopoly of the air. If others will engage in this business we will welcome their action, whether it be cooperative or competitive. The necessity of providing adequate broadcasting is apparent. The problem of finding the best means of doing it is as yet experimental. The Radio Corporation of America is making this experiment in the interest of the art and the furtherance of the industry."

I would call your attention particularly to two sentences in this announcement, written twelve years ago:

*First*, "The National Broadcasting Company will not only broadcast these programs through Station WEAJ, but it will make them available to other broadcasting stations throughout the country."

*Second*, "The RCA is not in any sense seeking a monopoly of the air. If others will engage in this business we will welcome their action, whether it be cooperative or competitive."

### *Growth of Networks*

As soon as our formation of a national broadcasting company was announced, independent station owners, local civic organizations and community leaders from every section of the United States wrote, telephoned or called in person to ascertain how soon network programs would be brought to their communities. To meet the popular demand represented by these requests, NBC rapidly expanded the experimental hook-ups of the Red Network into a regular service arrangement, providing programs to leading cities of the United States.

It quickly became apparent that a single network service was not enough to satisfy the demands of the radio audience for diversified programs of national interest and importance; that if broadcasting were to be popularized to all, there should be more than one type of program simultaneously available to listeners. Other station owners, particularly in the cities where their competitors had made program service arrangements with the Red Network, pressed for network affiliations. Therefore, in less than two months after the first NBC network began service, we created a second network—the Blue—with WJZ, New York, as the key station. As the networks were expanded, stations in remote, thinly populated areas, that could not be expected to bring the NBC a profit, were added, in the interests of a truly comprehensive national service.

through his failure to cherish and protect the institutions that would have kept him free.

In this time of world crisis, it is of vital importance that every American citizen should recognize, in the freedom of our American system of broadcasting, one of the essential guarantees of his own personal freedom.

### *Regulation of Broadcasting*

The creation of this American system of broadcasting, however, has not been achieved without difficulties and problems. The problems that touch the public interest are of two kinds: those relating to technical facilities, and those relating to programs. With respect to the regulation of facilities, the powers of the Commission are adequate, clearly expressed by law, and understood by broadcasters.

When we consider the technical development of radio we must remember that radio has never ceased to be a pioneer. The day may come eventually when its pioneering work is over, but it is a day I do not expect to live to see. Whenever we seem to have learned to extract the utmost usefulness from one portion of the radio spectrum, another part of the band looms up—first in theory, then as a subject for experiment, and finally as a practical medium of public service.

If wave lengths were now available for an unlimited number of broadcasting stations, the only limitation would be that of public acceptance. The same holds true of networks. As radio science learns to employ new channels in the ether—to use waves measured in centimeters and millimeters—the day will come when there will be more wave lengths available than stations and networks to use them.

The time is coming—and it may come sooner than anyone expects—when the present-day facilities and services of radio will prove small in comparison with the unlimited technical and artistic achievements possible in this young and swiftly-moving industry. Television, to name but a single example, stands today where sound broadcasting stood 18 years ago. With all that we have learned, is there any man who would say that television will not go farther in the next 18 years than sound radio has gone up to the present day?

With whatever technical controls broadcasting is clothed, they must be kept as flexible, as capable of expansion, as the industry itself. The situation is like that of a growing boy and his breeches.

The breeches have got to have wide seams, so they can be let out when they get tight. Otherwise something is going to give way, and it seems to be a law of Nature that it won't be the boy. He just keeps growing.

When we turn to the realm of program service, however, we meet a broader question than is involved in the regulation of technical facilities. Here we deal with a vital force, a great servant of mankind when used properly, but, when abused, capable of destroying human rights. It is the social impact of radio which has raised the all-important question of social responsibility.

The Communications Act provides that your Commission shall have no power of censorship over radio programs, and that you shall adopt no regulation which interferes with the right of free speech. Therefore we must find within the broadcasting industry itself a solution which will adhere to American traditions, and at the same time meet this social responsibility.

The broadcasting industry was gratified to hear Chairman Frank R. McNinch state so clearly in his nationwide broadcast last Saturday evening—and I quote his words—“Obviously the power of censorship and selection must be lodged somewhere; and the broadcaster is the one to exercise this power and answer to the public for the manner in which he exercises it.”

### *Recommendation for a Voluntary System of Self-Regulation*

The record of network broadcasting in America proves the efforts that have been made here to safeguard public interest, to advance culture, and to provide unbiased news and wholesome entertainment. In spite of its youth and the great complexity of its problems, the industry can take pride in its accomplishments in this respect.

In the National Broadcasting Company we have our own code of program policies, formulated over a period of twelve years. It is based not only on our own operating experience but also on the wisdom and advice of the Advisory Council of NBC. This council is composed of public-spirited men and women of high standing and wide experience. They represent education, religion, social welfare, music, labor and industry. The Council was formed at the time of the organization of the company, and has been in existence ever since. In following this code, the NBC has had to face objections from groups and individuals whose

ideas and wishes ran counter to its standards. Living up to the code has also entailed the sacrifice of commercial revenue.

Other networks, and individual stations as well, have program codes of their own. The National Association of Broadcasters has a Code of Ethics adopted in 1935.

But the time has come for more positive action.

The fate of broadcasting in other nations and the attacks on democracy throughout the world clearly indicate the necessity for finding a democratic solution for the problems of the American system of broadcasting,—a solution which on the one hand, will enable us fully to meet the social obligations of radio, and on the other, will protect our traditional freedoms.

I would therefore like to take this opportunity to advocate to the broadcasting industry that it establish a voluntary system of self-regulation in its field of public service, and that it take the necessary steps to make that self-regulation effective.

My recommendation is that the experience of the different groups within the industry should now be combined and correlated. An industry code should emerge that advances beyond all previous standards. Such a code should be an act of voluntary self-regulation on the part of the entire broadcasting industry in the United States.

In writing this code, the industry should gather the views of broadcasters, of groups representative of public opinion, and of this Commission. After the code is formulated the public should be made thoroughly familiar with it. All broadcasting networks and stations should be invited and encouraged to adopt it. The code should be subject to periodic review by the industry, and kept up to date. It should be administered by a suitable agency representative of the entire industry.

I make this recommendation in the belief that such self-regulation is the American answer to an American problem. In every consideration of radio broadcasting, the "public interest" we are pledged to serve is that of the entire nation. This public interest is reflected directly by the 27,000,000 receiving set owners who represent an overwhelming majority of the country's homes. By their control of the nation's radio dials they give approval or disapproval to radio programs, and decide the ultimate fate of the broadcaster. Here we find legitimate censorship by public opinion.

It is the democratic way in a democratic country.

## TESTIMONY of DAVID SARNOFF upon CROSS EXAMINATION

May 17, 1939

By Mr. WILLIAM J. DEMPSEY

GENERAL COUNSEL, FEDERAL COMMUNICATIONS COMMISSION

*Question:* Mr. Sarnoff, you are the chairman of the board of the National Broadcasting Company, are you not?

*Answer:* I am.

*Question:* And you are the president of the Radio Corporation of America?

*Answer:* Yes, sir.

*Question:* And just so as we may get this complete at one place in the record, the National Broadcasting Company is wholly owned by the Radio Corporation?

*Answer:* It is.

*Question:* And what is the primary business of the Radio Corporation, is it a holding company?

*Answer:* No. The business of the Radio Corporation of America extends to practically all fields of radio, among its activities are those of research and development, manufacturing, communications, broadcasting, and related fields.

*Question:* Mr. Sarnoff, I do not want to spend too much time on this. Does it do these things directly or through subsidiaries?

*Answer:* It does most of them through subsidiaries and some of them directly. For example, it is in direct charge and control of the research work, of the patent work, of prosecuting patents, and administers the licensing department which grants licenses to competitors, and also handles the financial operations and policies of its organizations.

*Question:* How many subsidiary corporations are there?

*Answer:* There are the R.C.A. Manufacturing Company, R.C.A. Communications, the National Broadcasting Company, the Radiomarine, and the Radio Institute.

*Question:* Will you briefly state just what each of those corporations does?

*Answer:* The R. C. A. Communications Company is engaged in the field of communications by radio across the oceans and also with about a dozen important cities within the United States. It is a public service organization, handling telegraph communications, and communicates with more than 50 foreign countries of the world.

The Radiomarine Company is engaged in ship-to-shore and ship-to-ship radio telegraph communications. It installs apparatus on shipboard and operates coastal stations that communicate with ships.

The Radio Institute is a training organization that teaches the technical and practical side of radio communications and radio operation.

The National Broadcasting Company is engaged in the broadcasting field and operates a number of stations which it owns itself and also the Blue and the Red networks, and as a service organization, developing and furnishing programs and talent.

*Question:* All of those corporations are wholly owned by Radio Corporation?

*Answer:* All of those corporations are wholly owned by the R.C.A.

*Question:* How about R.C.A.-Victor?

*Answer:* That is the R.C.A. Manufacturing Company. R.C.A.-Victor is a trademark but not a company.

*Question:* And the manufacturing company is also wholly owned?

*Answer:* The manufacturing company is also a wholly-owned subsidiary.

*Question:* Has R.C.A. any interest in any other companies other than these wholly-owned subsidiaries?

*Answer:* It has no controlling interest in any other company, it has a financial interest in some other companies. Among those interests are: a stock interest in the Radio-Keith-Orpheum organization, which is a motion picture and theatre organization, and it has an interest in some subsidiaries in South America, the Argentine, Brazil, and Chile, but those, in turn, are wholly-owned subsidiaries of the R.C.A. Manufacturing Company. It has some small financial interest in Europe and in some subsidiaries there which are engaged primarily in furnishing equipment to theatres, but I should say that foreign investments were a very small percentage of its total capital structure.

*Question:* That is loud speaker equipment, and so on, is it?

*Answer:* Reproducing equipment for theatres, yes.

*Question:* To what extent does R.C.A. participate in the management of Radio-Keith Orpheum?

*Answer:* At the present time it does not participate at all in the management. It has on the board two directors, General Harbord and Mr. Yandell, but the company, as a matter of fact, has been under 77-B for some years and is just about emerging

under the reorganization plan. The R.C.A. does not manage, control, or operate the R-K-O.

*Question:* Under the plan of reorganization, what percentage of the stock will you have, or just what will be R.C.A.'s interest in R-K-O?

*Answer:* The exact amount is not quite definite yet, but I should estimate that it will be somewhere between 12 and 15 per cent of the stock of the company. And in that connection, if I may add, stockholding was, until recently, under option to the Atlas Company, the purpose of the Radio Corporation having been to dispose of all of its holdings in that company. That option not having been exercised and having lapsed, we are still in possession of that stock.

*Question:* Are you still looking for an opportunity, Mr. Sarnoff, or is R.C.A. looking for an opportunity, to dispose of its holdings in R-K-O?

*Answer:* If there are any buyers here this morning, I am ready to trade.

*Question:* I take it that you mean that you are willing to dispose of it if you can get a reasonable price? Is that the only element?

*Answer:* That is right.

*Question:* Mr. Sarnoff, with respect to the National Broadcasting Company. How actively do you, or does anyone else who is connected with R.C.A., participate in the management of NBC?

*Answer:* So far as I am personally concerned, being the chairman of the board of the company, my actions are confined almost exclusively to contacts with the president of the company who reports to the board of directors, and during the period between board meetings, of course, reports to me. I have a general familiarity with the policies of the company, but so far as actual operations are concerned, those are wholly in the hands of the officers directly employed by the National Broadcasting Company. They determine the day-to-day operation of the company, the kind of programs that they would accept or reject; they have the direct contacts with the affiliated stations; they make their own arrangements with those affiliated stations, and I should say that all of the operations of the company, normally part of any operating organization, are wholly within the jurisdiction and authority of the officers of the National Broadcasting Company.

*Question:* The board lays down general policies, and they execute them?

*Answer:* That is right. And as to the general policies, of course, the board is guided largely by the recommendations of the operating officers of the company. Mr. Lohr as the president and Mr. Trammel as executive vice president are also members of the board of directors of the National Broadcasting Company, and the president recommends to the board such policies as he wishes to have adopted and the board acts upon his recommendations. But those policies do not generally relate to program content or anything of that sort. Largely, the actions of the board relate to the usual executive functions of a board, financial matters, the expansion programs, if any, and financial commitments for construction, and similar matters.

*Question:* Mr. Sarnoff, would this be, in your mind, a matter of policy for the board, the question of affiliation with stations where there was little, if any, real prospect of any immediate profit? I remember, in your statement that you read at the first day of the hearing, that you said that the networks were expanding and that they took on stations in remote areas without any expectation of profit. Now, the reason that I am asking this is because Mr. Witmer and Mr. Hedges testified to the effect that they could not and would not take on any station unless that particular station would bring in a profit, or at least they hoped that it would bring in a profit before they affiliated; in other words, that it would not involve a loss. Now, to what extent is it the policy of NBC to affiliate with stations in the more remote areas?

*Answer:* It has been the policy of the National Broadcasting Company, particularly during the early and formative stages of the company, to affiliate or to render service on a national basis, and it has taken on affiliations and has made commitments in areas where it knew in advance that it could not earn a profit. I think that the record of the company in the operation of the stations would disclose that a number of affiliations and a number of station contracts have been in existence, and are in existence, over a number of years, where the net result has been a loss rather than a profit standing by itself, but has been charged to the general policy of operating a national service.

Answering your question, I should say that under normal circumstances, affiliation with another station, where no financial commitment was involved in the way of a capital expenditure, but where a loss might ensue over a period of years' operation, the management of the company has, itself, executed such con-

tracts and has reported such operations to the board. But it was not a matter for deliberation by the board, as a whole. There may have been other instances where, if the loss were regarded substantial, it would come before the board. As a practical matter, however, that character of operation falls more within the sphere of management than within the sphere of the board's policies.

*Question:* But it is the purpose of NBC to render a national program service, is that correct?

*Answer:* It is, and always has been.

*Question:* And to reach all of the country, if possible?

*Answer:* Yes, sir.

*Question:* And, as I understand it, even if it is at the expense of taking a loss on a few stations?

*Answer:* Yes, that is the policy in the interest of a rounded national service.

*Question:* Mr. Sarnoff, with respect to the competitive aspect of chain broadcasting and network broadcasting, is it your opinion that competition between networks is desirable or is not desirable, so far as the listeners are concerned?

*Answer:* It is my opinion that competition is desirable.

*Question:* To what extent? Maybe I should make that a little clearer. My recollection is that the testimony, so far, has indicated that probably the present maximum of national networks is about four, because of the physical situation in a limited number of stations in certain key cities that, necessarily, would have to be covered. As between those four networks, to what extent do you think that there should be competition?

*Answer:* I think that between those four networks there should be active competition, and I think there is active competition between these four networks.

*Question:* Counting the Red and Blue as separate networks?

*Answer:* Yes.

*Question:* In what way would you say the competition between networks is not the same, is different from competition between grocery stores or department stores, or between, say, General Electric and R.C.A. Manufacturing Corporation?

*Answer:* I should define "competition" in the network broadcasting field as competition for the listeners' attention primarily, and competition for the advertising dollar. I think that the present situation, and the situation for some time, has given ample evidence of the very active and vigorous competition that goes on between these four networks for those competitive



elements, that is, advertising dollar and listeners' attention. I think that the question of ownership of any particular network is not the element that determines for competition. If there are no listeners there are no advertising dollars, and if there is no service there are no listeners, and if two networks were given the same type of program, or the same program, simultaneously, obviously a large percentage of the listeners would be looking elsewhere for variety. And, further, the growth of these four networks is evidence of the competitive elements that exist.

*Question:* Well, let me ask you another question. Would you say that competition between the networks would still exist if NBC owned all four of them?

*Answer:* I would not recommend that ownership—

*Question:* I am not asking you as to a question of policy. I mean, would you say that it would still be a competitive situation.

*Answer:* Yes. I would still say that it was a competitive situation so far as the listener is concerned, and the probabilities are that if you had the four networks owned by the same organization you would have competing sales staffs, competing program staffs, and all of the rest, each of whom would be primarily interested in making the best showing on the network for which it was directly responsible; and that is precisely what is going on now with respect to the two networks of the NBC.

*Question:* Do I understand you correctly to say that NBC now has two separate staffs, one running the Blue and one running the Red networks?

*Answer:* It has a number of departments in the company that are common to both, and that is one of the economic advantages of operating the two networks, and also is one of the elements that makes possible a larger public service. But it also has men directly responsible to the vice president and to the president for the net results of the Blue network and the net results of the Red network, and there is eternal strife and competition for the business on these networks. I believe that sometime ago Mr. Lohr organized a Blue selling staff whose function was to go out and solicit business for the Blue network, whereas others were soliciting it for the Red.

*Question:* Do you know of any other staff in NBC that works only on Blue or only on Red, except that separate selling staff?

*Answer:* I do not, personally, but I imagine that Mr. Lohr or some of the officers may know.

*Question:* I do not want to attempt to trap you at all. As I remember the testimony, the only people in the National Broadcasting Company who worked only on the Blue were certain salesmen, and as I remember the tenor of Mr. Witmer's testimony that was because the Red was practically filled and they wanted to sell more time on the Blue, that it was not in the sense that they were competitive. As a matter of fact, the definition of what was the Blue and what was the Red network was never found in all of the several months of testimony on NBC.

*Answer:* Well, it is found very easily in the figures that disclose the net results of operations of the Blue and the Red networks, and the selling efforts of those who were seeking accounts for the Blue were for more reasons than the fact that the Red had been sold out, or nearly sold out. As a matter of fact, no network is sold out. The major networks of the country at the present time have sold on a commercial basis, somewhere between 30 and 40 percent of their time; their remaining time is on a sustaining basis.

*Question:* Well, I say "sold out", but as I remember he said that substantially all of their desirable option time on the Red network had been—

*Answer:* In the first place, we find some difficulty in discussing the Blue and the Red networks in referring to them as comparable networks. As you probably know, through the testimony that has already been developed here, there is a basic Red and a basic Blue, and there are supplementaries or "supps" as they are referred to, which can be attached to either the basic Red or the basic Blue. In selling time to clients, there is involved not merely the element of vacancy on any basic network at any particular hour but also the opposite numbers. For example, if you have got 8 to 9 available on Network "A", the prospective buyer is interested not only in that but also in what are the three other programs between 8 to 9 on the three remaining networks. The whole business of selling time now involves a competitive element, not only as to your own network but as to every other station and every other network broadcasting at the same time. But the final test is the listener interest. Each of these programs, as you know, is rated, and the buyer of the time looks at the rating of these programs. Now, if any one program on any one station at any one time falls in its rating, why, that is the thing that gives the competitive urge or the com-

petitive spur. So there is every reason for having the best programs at all times.

*Question:* Mr. Sarnoff, you define the Red and the Blue as the basic Red and the basic Blue?

*Answer:* Yes.

*Question:* And that is as listed, I suppose, in the rate card. Those two divisions are easy enough to make, but beyond that the Red network can only consist of the basic stations and the Blue network consists only of the basic stations, for the purpose of this discussion of yours? Is that correct?

*Answer:* Yes.

*Question:* When you spoke of competition for the listeners' attention and then spoke of competition for the advertisers' dollar, do you think that they are essentially the same thing or different things?

*Answer:* I think that essentially they are the same thing, because the advertiser is not interested in advertising if he can't get listeners to listen.

*Question:* In the competition for the advertiser's dollar, you are dealing with a strictly business proposition, are you not?

*Answer:* A strictly business proposition plus the responsibilities of broadcasting, as a whole, in the field of public service.

*Question:* In so far as it is a business proposition, do you consider two businesses competitive if they have a common treasury and if all of the expenses are paid for both of them indiscriminately out of the revenue taken by either one?

*Answer:* Yes, I can conceive of any number of competitive situations under common ownership. Different trademarks, for example. Some of the bitterest competition that goes on in the merchandising world is between competitive brands owned by the same organization. You have different advertising, different sales staffs. It so happens that in broadcasting the element of public service, which is, I imagine, the final determinant of all this rather than the element of competition for the sake of competition, is advantaged rather than depreciated by common ownership of more than one station or more than one network because you have a flexibility that you otherwise could not have. For example, we could not give a number of the sustaining programs which are now on the Blue network and are attracting listeners, if we only had the Red network. We would not have the time for it, in the first place, and we would not have the incentive for it, in the second place. Such programs—

*Question:* How about the money for it, in the third place?

*Answer:* Well, that is also an important element in the situation, because, finally, the advertising dollar is the only source of revenue that there is. Such programs, as for example, the Metropolitan Opera, that are run for three hours are pretty costly affairs. We pay \$100,000 a year to the Metropolitan for the mere privilege of being able to broadcast these operas without saying anything about the cost of carrying them for three hours, and sometimes more, every Saturday afternoon. We have the Farm and Home Hour on for five hours a week, which has been on for more than ten years. The whole development of the NBC Symphony Orchestra and the bringing over of Maestro Toscanini—all of those programs, plus the Town Hall of the Air, plus a number of others that are doubtless in the record already, are the kind of sustaining programs which are really competitive in that they are competing for listener interest. They not only compete for listener interest, but they develop a new interest in radio reception, and, moreover, they raise the general cultural level of broadcasting.

Now, if I may complete the thought I have in mind with respect to these activities, I would say: True, the R.C.A. is the owner of the National Broadcasting Company, and the National Broadcasting Company operates two networks but the major interest of the R.C.A. is not in owning two networks. The major interest of the R.C.A. is in the maximum development of radio, because we are interested, after all, in the manufacturing and selling of radio apparatus; we are interested in having our competitors manufacture and sell radio apparatus because they pay us a royalty on the patents which we license them to use, and we are interested in people being radio-minded so they will send messages through the air instead of by other methods. So that whatever financial advantage there may be in owning two networks as against one is, by the force of circumstances, a small element in the broader picture of the R.C.A. whose function it is, and whose purpose it is, to develop radio to its maximum.

If, for example, the ownership of the Blue network by someone other than R.C.A. would make more people listen to radio and would make more people satisfied with radio programs, I suspect that we would do better by not owning it than by owning it. But we do not feel that way; we believe that the flexibility that we have, through the ownership of both the basic Red and the basic Blue, is a flexibility that makes for the maximum service and for the best programs and for a larger number of

sustaining non-commercial programs of the kind I have mentioned. And all of that is without regard to the history which brought these two networks into existence and about which I testified when I was here the last time.

*Question:* Mr. Sarnoff, just one more question, because I am anxious, when we are using these words, that we are not talking about different things. Going back, again, to the word "competition." If one competitor uses his profits to build up another competitor, would you say that that is the ordinary competitive situation, having in mind, for example, the Red network paying for the Metropolitan Opera on the Blue network to build that network up? Is that the ordinary thing you would expect to meet in a competitive situation?

*Answer:* I should say that if the Blue network was not owned by the same organization there might not be that incentive to have the Metropolitan Opera on it, or to build it up. I do not think of individual ownership of the Blue network, as such, if you can assume ownership of a network—and I can't even assume it, because I do not know what it is; we don't really own the network. A network, as you know, is an affiliation of stations who come to the network voluntarily through contractual arrangements. But if you could assume individual ownership of the Blue network, I could not imagine that any other individual ownership could afford to give the kind of sustaining programs on that network that we now give. It just would not be possible, commercially.

*Question:* Mr. Sarnoff, I do not know whether it was intended as a definition of a network, but you said that it consists primarily of an affiliation of stations through contractual relationships with another organization. Now, what would you say is the primary service of a network? Is it a program service, or is it an advertising agency service for the stations, or just what is it?

*Answer:* I should say that the primary function of a network is to deliver a radio program, nationally, if it is a national network, so that it may be heard throughout the nation. Now, in order to do that it must have affiliation with a number of stations that would take its programs, and which, in turn, might also furnish programs to it. It must also be able to develop programs, to scour the country and the world for talent, and to make that talent available. It must have worldwide organizations for bringing over news, for making con-  
It must be able to do the kinds of things which a network

per se. I do not know offhand how many stations on the Blue network the NBC actually owns, but I suspect that it is not as many as a half a dozen.

*Question:* The primary function of a network, from the standpoint of the listeners more than anything else, is to furnish national program coverage. Is that correct?

*Answer:* Yes.

*Question:* And that means certain high-type programs, and so on?

*Answer:* Coverage and service.

*Question:* Well, is there any other service than program service, as far as listeners are concerned?

*Answer:* I should say that if you take the technical facilities on a national basis and programs of a national character that that covers it.

*Question:* Now, from the standpoint of the advertisers, you furnish an advertising medium that reaches most, or a large proportion, of the people of the whole country. Is that correct?

*Answer:* That is correct.

*Question:* From the standpoint of your affiliated stations, you furnish them both programs and money, generally; is that correct?

*Answer:* I would say, generally, programs rather than money.

*Question:* Well, they are in the business of selling time, are they not?

*Answer:* We furnish them sustaining programs, and we are, practically, their agent in selling their time to commercial clients. If that is what you mean by "money", yes.

*Question:* Yes. Then, the network organization, itself, is in the business of furnishing programs to its affiliated stations and acting as their agent to sell time commercially; is that correct?

*Answer:* That is right.

*Question:* Is there any necessity for the network organization, as such, to own any stations, itself?

*Answer:* Oh, I should say that there is a necessity to own at least a reasonable number so that at its key points it would be assured of having outlets for a national program and not to find itself overnight, as it might otherwise be, without any facilities. Also one of the primary functions of a network, in addition to being able to furnish national programs and national coverage, is to furnish means of inter-connection. And, as you know, it must make very large financial commitments for wire services that inter-connect these stations, a commitment which no indi-

vidual broadcasting station could undertake; and so there must be some element of stability and some element of certainty about it before it could make these commitments.

*Question:* With respect to these wire commitments, you are familiar with the fact, are you not, which I think is in the record, that WGN and WOR underwrite all of the wire charges on the Mutual network?

*Answer:* I do not know about their arrangements, nor do I know whether they are satisfied with that arrangement.

*Question:* But they are apparently doing it, according to the testimony? This is just as to their ability, now, to underwrite these charges.

*Answer:* Unquestionably, if the record says they are doing it, they are doing it, but whether it is a practical thing for any one or two local stations to underwrite, on an annual basis, wire facilities costing millions of dollars a year and be able to sustain it over any such period as NBC has sustained it, the future and not the present record will determine.

*Question:* But you would say that WEAFF, for example, is as good a station, from a financial standpoint, as WOR, approximately?

*Answer:* I should hope that it was better.

*Question:* With respect to these wire charges. I was not quite clear as to the connection between the payment of wire charges and the ownership of stations.

*Answer:* What I meant to say, Mr. Dempsey, was that a network makes a commitment to the telephone company for wire services that inter-connect a number of stations throughout the country. Now, that is a serious financial undertaking without which there could not be national networks. The network is able to undertake that commitment and to discharge that commitment because it operates on a national basis. The local station would be unable to do it.

*Question:* Your commitments with the telephone company, Mr. Sarnoff, are all subject to a 30-day cancellation, are they not?

*Answer:* With the telephone company?

*Question:* Yes. And they are not long-term contracts running over a number of years?

*Answer:* I am not familiar with that provision of the contract, but presumably it is there. However, such a provision is theoretical, at best, because I do not know what we would do

*Question:* But you are not required to make long-term commitments in order to get these telephone wires?

*Answer:* That may be so at this moment, but my recollection is that we were required at the beginning, I think, for a series of years.

*Question:* With respect to the other reasons for network ownership of stations, you said that the stability of the network required ownership of certain stations; is that correct?

*Answer:* That is correct.

*Question:* Now, what particular stations must it own, and what stations can it operate without owning? That is a rather general question, I recognize; but in terms of localities or markets, or whatever way you want to discuss it?

*Answer:* I should say that if any network could be certain that its affiliated stations in the key points, the key market points of the country, were to be with it permanently or for a long period of time, then ownership of stations will become a secondary matter. But one can't be certain about that in a developing art; also, as these contracts expire, the contracts that the affiliated stations have with the networks, there is competition for the better stations in any event, each network seeking to get the best stations in the key points. And, therefore, ownership of at least a minimum number of stations in the major key points is an assurance of the continuity of the networks, which, otherwise, would not be the case. It furnishes some element of stability, but not the whole element of stability.

*Question:* As I understand, if reasonably long-term contracts, firm contracts, were in effect, that element would become secondary. Is that correct?

*Answer:* If you had reasonably long-term contracts—

*Question:* What would you consider reasonably long-term?

*Answer:* I would regard the term reasonable only on a basis where you owned some measure of self-protection, like owning some stations. I should say there, that a five-year contract was for a reasonable term. But where you owned no stations and you had no measure of self-protection, why, I should regard the longest term that could be obtained as a reasonable term, because, after all, the investment lies not merely in the bricks and mortar of the station but it lies in the entire organization that is being developed. It is quite conceivable, as you know, that any network that would lose even a dozen important stations, while it may list 100 or 125 stations or more on its network, all it would have to do would be to lose a dozen, or possibly even less

of the more important stations and it would cease to be, in fact, a competitive network.

*Question:* Mr. Sarnoff, I take it then that you regard the chance of losing an affiliation with a station as more serious threat to the stability of networks than the license term would be?

*Answer:* I would not regard it more, because in one case you might lose a leg or an arm, and in the other you lose your head and you can't live after that.

*Question:* Well, does one station represent the head, the leg, or the arm?

*Answer:* The license represents the head.

*Question:* For a particular station—

*Answer:* I thought you were referring to a combination—

*Question:* I say, with respect to any particular station, the length of the term, you regard as the contract term, has as great an effect on the stability of the network as the length of the license, because if Columbia gets the station, you lose it just as completely as if the station loses its license, do you not?

*Answer:* Yes, but I would still put the license as No. 1, because if you lose the license you just can't go on so far as that station is concerned; whereas, if you lose an affiliated connection, you might still have some hopes of negotiation, or getting it back, or doing something of some kind or another.

*Question:* Of getting another station, perhaps?

*Answer:* Of getting another station, perhaps. From another standpoint, while "A" loses the license, "B" may still have the station. I mean, while "A" may lose the affiliated contract, "B" may still have the station, so from an overall radio picture the service is still there; and from its larger aspects that I have tried to outline, the injury is lessened to that extent; whereas, if you lose the license, assuming that the loss means the non-continuance of the station, why, radio, as a whole, suffers from it.

*Question:* In summarizing the last few questions: If NBC could get long term contracts with the stations that are now affiliated with it, including the stations that it now owns, leases, or has licensed to it, the loss of the ownership of those stations, or the licenses in those stations, would be a secondary or primary consideration for the network?

*Answer:* I say that it would not be as important as it is at the present time. It would still be a matter of importance to the company, but not as important as it is under existing conditions.

*Question:* Now, just wherein would the importance lie?

Would it lie in the difference between the income to the company from the stations that it owns and the stations which it has as affiliates, or would it lie in the stability prospect, to count on those stations always as an affiliation?

*Answer:* I would say that the importance would lie, primarily, in two directions: First, where you own a station yourself, you have a larger measure of control; in fact, you have the whole control of the operations of that station; whereas, as to an affiliated station, the situation is different, it is owned and controlled by the fellow who owns the station. The second, and perhaps even the more important aspect is, that I do not view radio in its present state as the radio of the future. I believe that in five or ten years from now we will look back upon the radio structure of today, whether it will be in the broadcasting station or whether it will be in the receiver in the home, and will hardly be able to recognize the present day structure. I think the changes that are coming in the radio art will come with greater rapidity from now on than they have come even during the past decade because of the developments which are now reaching a point of ripeness and calling for expression in the field and in the markets. Thus, if you own a station, you can continue to experiment and to develop not only the broadcasting of sound but the broadcasting of sight, the broadcasting of facsimile, and a number of other services and activities that may become a part of the broadcasting station of the future. So that, experimentally and in the development of such new services, the ownership of a broadcasting station is more desirable than an affiliation with another's broadcasting station.

*Question:* I see it from those standpoints, but they are not strictly network activities, are they, Mr. Sarnoff?

*Answer:* Not today, but they may become network activities tomorrow.

*Question:* And you have no prophecy to make with respect to the change in this network structure that you discussed in so far as its effect on networks is concerned?

*Answer:* Well, I have some ideas. I do not know whether it is proper to prophesy—

*Question:* I was wondering whether that would also effect the stability of networks—

*Answer:* I am willing to speculate, if you want me to do so, I believe, for example, that the notion that the nation can only support four networks at the present time—

*Question:* I do not believe that there is any testimony to that

effect, Mr. Sarnoff. Excuse me, for interrupting you. I think the testimony is that there can only be four networks because of the limited facilities available in the cities which must be on any national network.

*Answer:* But there are no limitations in other parts of the spectrum. I mean, not the same limitations. And there is no warrant for assuming that network operations must necessarily be within the present limited band of frequencies. Now, all the pressure comes from those who would like to move their vehicles within the same narrow street.

*Question:* What pressure is that that you are talking about?

*Answer:* Well, I may be wrong about it. I hope I am, but I suspect that there has been some pressure here against the idea of NBC having two networks, for example. I assume that there are others who have felt that if we had one that they might have the other. Now, I do not think that the network problem of this country is going to be solved by confining the art to the present narrow band of frequencies. I can see the day when there will be more networks possible, technically, than people to use them. There is no reason I can see why there can't be a dozen, or two dozen, or several dozen national networks, but in order to have them it is necessary to develop waves in that part of the ether which may now be characterized as wasteland. And by permitting those who are functioning in the art at the present time, to continue their development and their research and their experimentations, you will expand, rather than narrow, competition in the radio field.

*Question:* Mr. Sarnoff, another limitation that exists today on a number of networks would appear to be in the fact that the networks make exclusive contracts with stations. If you have a station with an exclusive contract with NBC, for example, that station can't take programs from any other national network, and, consequently, so far as that station is concerned, one network completely blocks all others. Now, what is your opinion with respect to the advisability of that kind of a limitation on the number of networks?

*Answer:* My opinion with respect to that limitation is that it is in the interest of the listener, that it is in the interest of the public and that it is the basis of the American system of network broadcasting. Destroy that provision, and you will have destroyed the American system of network broadcasting. There is no complaint that I know about, coming from the public, on

ing, so far as I know, from the stations affiliated with the networks. There may be some individual instances, but by and large the testimony I have read has supported that provision. It has been supported by these independent broadcasting stations. Obviously, if a network spent money, as we are doing, to develop the popularity of an individual broadcasting station in some territory, if we gave them sustaining programs and they attracted a listening audience and they built up circulation, and then some other organization came along that did none of these things, but just had a commercial program, and asked that broadcasting station to take their program and put behind it the good-will and the circulation and the pioneering that had been done by whoever built that station up, of course, that somebody would have a temporary advantage, but American broadcasting would have a loss.

*Question:* Mr. Sarnoff, with respect to the way in which networks may build up stations, is it your opinion that the stations are under some continuing obligation to the networks, or do you think that the ordinary agreements between networks and stations provide pretty much a pay-as-you-go policy and that the station pays the network fully for all it does for the station?

*Answer:* I think that the contract provides all the obligations that there are between the parties, but the contract is based upon a philosophy of co-operation between these stations and between the networks, and that philosophy, I think, is sound.

*Question:* Do you think it equally sound to say that the network ought to obligate itself to the station to render service exclusively to that station in the area which is served by that station?

*Answer:* I think so, except where it is known to be rendering service to another station, where it is known in advance that it does so; but, by and large, I should think that that obligation ought to be reciprocal, yes.

*Question:* To what extent, Mr. Sarnoff, do you think there would be any change in the present system of network broadcasting if the exclusive provisions were eliminated from contracts?

*Answer:* I think that there would be great confusion, that there would be a demoralization of the whole system of network broadcasting, that it would be a grab as grab can and catch as catch can, every fellow would go out and try to make any kind of an arrangement, any kind of a commercial arrangement that he could, and I think that there would be a diminution of sus-

taining programs; there would be no incentive on the part of the major networks to build up the position of their local stations.

*Question:* You think that that would be true even though the contracts contained a provision for a definite option on certain hours?

*Answer:* Yes, I think so, because if the hours were not of a kind that suited a local station there would be continuous irritation and pressure. You would transfer the local station from an institution—and by local station I mean the station affiliated with the network, the independent station. You would transfer it from an atmosphere of stability, where it is part of a network, knowing in advance what it may or may not do, or what it can or can not do, with respect to its time, to a free-for-all situation where it would continually be tempted by every network to take its particular program or to give an hour because it would increase its outlet or increase its income.

*Question:* Maybe I did not make the question quite clear.

Assuming that the contract did provide for a definite option on certain hours, but as to hours other than those optioned there was no restriction as to other network affiliation. Do you think that type of contract would be difficult to make?

*Answer:* I think that type of contract would upset the present system of network broadcasting, because, in the first place, a local station affiliated with a network at the present time takes on something of the character of that network; the network feels a certain sense of responsibility to that station and the station, in turn, to the network, for the character of its programs. Whereas, if that local station were free to connect with any network that it wished to connect with and take any kind of programs that it wished to take, I think the atmosphere would change and the network, itself, would suffer, as well as the local station, from the net results of that situation.

*Question:* Do you think that, by and large, network programs are comparable as to quality with non-network programs?

*Answer:* I should say that by and large network programs are superior. They, necessarily, have to be in order to gain national importance and national audiences.

*Question:* If that is true, and the stations now in their non-option time put on non-network programs, don't you think that it might be that the quality would go up rather than down if they were putting on network rather than non-network programs

grams only. I suspect that the time of this inter-connection between the local station and the other network would be for commercial programs. I mean, after all, the urge would come from some network wanting to have more stations for a commercial outlet, and, therefore, that would decrease the time for sustaining programs which now have national interest for programs strictly limited to commercial character and in all probability commercial programs which may be denied, at the present time, access to the major networks, I think the net result would be downward.

*Question:* As I recall a statement made by Mr. Witmer, about the only difference in his opinion between commercial and sustaining programs was that, by and large, commercial programs are better.

*Answer:* Of course, if we enter into a discussion of what constitutes better programs, we will be in a field of debate. If by "better", Mr. Witmer or anyone else means more popular, why, I have no doubt but that a great many commercial programs are more popular than a great many non-commercial programs. But if by "better" we mean the constant effort to lift the standard of music appreciation, the standard of culture, the standard of education, and so on, then I think we must look more to the sustaining types of programs, not because they are better but because of their difference.

*Commissioner Brown:* At this point, we will recess until 11:15.

(Pursuant to the taking of a recess, the hearing was resumed at 11:15 o'clock, a.m.)

*Commissioner Brown:* You may proceed, Mr. Dempsey.

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, I think that we touched on this briefly, but I want to be sure to have your position clear with respect to it. Is it your opinion that the motive of the individual stations or of the network, which is primarily, so far as they are personally concerned, to make money, has the effect of resulting in the best program service to listeners?

*Answer:* Yes, I should say that the motive of profit which is inherent in the operation of either networks or local stations is unquestionably a stimulant to providing the best service.

*Question:* And do you think that that desire to get profits, on the part of the stations or the networks,—or rather that the best way for stations or networks to make a profit is to render a good public program service?

*Answer:* I have no doubt about the accuracy of that over a period of time for those who intend to remain in business and to help build up the art and industry of which they are a part. Of course, there is always the opportunity for a brief moment for somebody to make more profits by forgetting for the brief moment the element of public service, but in the long run I have no doubt but what the station that will be the most successful commercially will be the one that will render the best service to the public.

*Question:* To what extent are your affiliated stations—I do not mean all of the details, but generally—free to govern themselves with respect to their program policy, operating policies?

*Answer:* I think that they are free to a very large extent; perhaps, freer, in the case of our networks, because the affiliation contracts provide a substantial portion of station time during which the local station is free to handle local programs of either sustaining or commercial nature, and that time is staggered over a considerable period of the day. They are, as a matter of fact, free to accept or reject any program that we offer them on the network. They don't have to take it, if they do not want to.

*Question:* Isn't that largely a theoretical proposition, their freedom to reject network programs, that is, network commercial programs?

*Answer:* It is theoretical to the extent that there is no warrant for their rejection. I mean, so long as they haven't any desire to reject it, as is the case, the practical result is as if they did not have their rights. But it would soon move out of the realm of theory into one of reality if they exercised the right which they have. I think there have been one or two such cases.

*Question:* Yes. I remember one instance that Mr. Hedges, I think, testified to when a newspaper which owned a radio station affiliated with NBC refused to take, I think, Little Orphan Annie because the competitor-newspaper carried that comic strip. I think that was the only one he remembered.

*Answer:* I think that there was one on the Pacific Coast sometime ago where there was some question because of some political program. That, incidently, is one of the other reasons for the necessity of owning at least a minimum of stations in key points, because there are times when the affiliated stations do not wish to carry some particular program, and unless we had some coverage, we could not put it on at all.

*Question:* Do you mean that they refuse to carry commercial programs for the network?

*Answer:* Well, they are more likely to refuse to carry a sustaining program.

*Question:* Well, there is no obligation on them now to carry sustaining programs, is there?

*Answer:* No, there is no obligation, but from a standpoint of public service it is desirable that important sustaining programs get the maximum coverage. On the whole, I think they respond reasonably, but the opportunity to put them over your own operated stations is an opportunity that makes for expanded service.

*Question:* Mr. Sarnoff, do you think it would be desirable for the network to include in its relation with affiliated stations any obligation on the part of the station to carry sustaining programs or a certain number of sustaining programs in the same way that it is required to carry commercial programs?

*Answer:* Well, while it might be helpful to the network, I should not recommend it. I think that that takes on the element of compulsion.

*Question:* I am not quite clear as to what the difference in compulsion would be if it were just the same way as it now operates with respect to commercial programs?

*Answer:* Well, the element of compulsion would reside in the fact that under such a provision the local station would be compelled to take that program, whereas, today it is free to reject it.

*Question:* But to that extent there is compulsion to take commercial programs?

*Answer:* Well, a commercial program is a matter of contract for specified time. You have the right to sell that station's facilities for a given period of time, and to the extent that the station has pledged its time under that contract, of course, to that extent it is compelled to take that program, yes.

*Question:* Mr. Sarnoff, in just one view, it is not accurate to say that your sustaining programs are in the nature of NBC advertising, is it?

*Answer:* To the extent that any activity of the NBC is looked upon with favor by the public, why, to that extent, of course, it advertises the NBC, and it is helpful to the NBC; yes.

*Question:* And it is to attract listeners for NBC programs?

*Answer:* Yes.

*Question:* Do you think that there would be anything to prevent a contract of affiliation requiring the station, as it now



requires in certain other respects to advertise the National Broadcasting Company, to carry certain sustaining programs as part of that advertising?

*Answer:* Yes, I think that it would be objectionable, because, in the first place, when you get into the sustaining programs you get into the element of controversy, whereas, in the commercial programs, by and large, they are entertainment programs designed to institutionalize the client or to sell his products, but the whole range of controversy lies within the sustaining field.

*Question:* Without regard to the controversial field. I do not assume that you would say that the Metropolitan Opera program is within that particular category. Programs of that type, would there be any objection to requiring the station to carry it?

*Answer:* There would be no objection from our standpoint, if you could define the particular kind of programs, but I suspect that one would find great difficulty in arriving at that definition, and also if it did not cover the large body of sustaining programs it would not amount to very much. But even in the case of the Metropolitan and the NBC Symphony Orchestra, you would be surprised at the amount of persuasion that is necessary to exercise in order to get some stations to carry those programs.

*Question:* Mr. Sarnoff, your own stations don't carry all sustaining programs, do they? They take local advertising, local commercial programs, do they not?

*Answer:* Yes.

*Question:* But are they required to take certain particular programs?

*Answer:* Yes.

*Question:* Sustaining?

*Answer:* Our own stations, yes.

*Question:* You do not have any difficulty in determining which ones they must take and which ones are optional with them as against a chance to sell time locally?

*Answer:* No, we have no difficulty within our own organization. Usually, these programs and these activities are the result of group action, minds meeting around the program table and deciding on a course.

*Question:* I am having some difficulty in following your statement that there would be any improper compulsion, and, by that, a compulsion of a different character between the requirement that a station take sustaining or give a certain number of hours for sustaining to NBC and the option on time for

commercial programs. For example, in your contract, would you think it improper to say that a certain number of hours on Sunday or a certain hour each night in the week should be held open for sustaining programs to be furnished by NBC subject to the same limitation as the commercial programs are?

*Answer:* Well, let me try and clarify it, if I can, by a definition. As regards all programs, my understanding is that in the final analysis the affiliated station is free to accept or reject even though we have a contract which gives us a certain allotment of time for commercial programs. If that station refuses a commercial program for reasons of its own, it has that right to do it.

*Question:* I do not understand that the contract provides quite that. It is my understanding from the testimony so far that if the station feels the program is not in the public interest that it may refuse to accept it, but that the station would not be free to arbitrarily refuse a program unless there was some basis for that refusal.

*Answer:* I think that that is correct. I have addressed all of my observations to the basic end of public service, but there might be a difference in view between us and the local station as to what constitutes the public interest in a commercial program, and, in that event, the affiliated station would be free to determine on the basis of its judgment. Now, as a practical matter that happens seldom, if ever, because there is no basic difference between our understanding.

But when you come to sustaining programs, it is really the other way around; that is, it is the network that furnishes a sustaining service to the local station. We create these programs, and we make them available to our affiliated stations. Now, in the sustaining program comes this whole field of debate and argument, politics, Government, and whatnot, and if we said by contract to the local station—or if any network said—"You have got to take that program whether you like it or not," I think that it would introduce an element of compulsion which would become the subject of argument, and in practical results it would not amount to very much because if you retain for the affiliated stations the ultimate judgment of what may or may not go over its station on the basis of its definition of public service, you would arrive at about the same result plus the new debate that would start.

*Question:* Now, let me ask you another question. As I understand your policy on the discussion of controversial subjects,

you generally try to present both sides of the subject, or all sides of it if there are more than two points of view. Let's suppose that you have Senator Jones on Monday night discussing the merits of a pending bill and that you are going to have Senator Smith on Tuesday night answer. Under the present system the local stations, the affiliates, might all take Senator Jones, if it happened to be an hour which was free to them, not option time, and if Senator Jones happened to be fairly popular, but they would be free, all of them, to turn off Senator Smith and put on a local commercial in its place. So the policy of NBC, with respect to controversial subjects would be entirely nullified by the action of the affiliates so far as a national carrying-out of that policy is concerned, would it not?

*Answer:* Well, there is that element of uncertainty in the situation, but the test is what has actually happened. And efforts are made by the networks—certainly, they have been made by our networks—to give equal opportunity or substantially equal opportunity, which means about the same number of stations and about the same time, to those who have contrary points of view on subjects of national or public interest. Here and there, there might be a slip or a failure, but on the whole it has worked very well. And if a local station, an affiliated station, made a practice or a habit of accepting one side of a controversy, on a sustaining basis, and rejecting the opposite side, on a sustaining basis, why, sooner or later, that local station would find itself marked as one which was not functioning in accordance with the rules of the game.

*Question:* But under your present system for putting it on, that local station might find it very difficult to present both sides because it might have other commitments for the second night, or for the answer to the question, and it would have to, or may have to, arbitrarily throw those off or not present the question. All that I am suggesting is that if you had certain definite hours that the station had to hold open, you would not have any problems of that sort.

*Answer:* Well, you would still have the problem, even though you had certain definite hours open, of the local station saying: "I do not want this side, and I do want the other side," unless you wrote into the contract the compulsion that it must have both sides, or all sides, of the controversy. Now, the minute you did that on any contractual basis, you would, of course be running into the element of censorship and control by the network

of what the local station may or may not do within its own free time.

*Question:* Generally, do you feel that your program policies are superior to that of the average station?

*Answer:* Modesty compels me to answer that question with some qualification. I feel that being the pioneers in the broadcasting field, having started it, that, perhaps, we have a larger experience, and I feel that we give a wider service than any other organization. I think that, perhaps, we spend more money on sustaining programs than any other organization. But I am also appreciative of the many excellent programs that are given by competitive networks and competitive stations—

*Question:* I am not now discussing competitive networks, but non-network programs of stations.

*Answer:* Oh, you are referring to non-networks as against networks?

*Question:* That is right. Do you think that the network program standards are higher, the program quality is better, than non-network? I think that you said that you did, a while ago.

*Answer:* Yes; that, I do.

*Question:* To what extent do you try to get your affiliates to come up to your standard, even in their non-network programs?

*Answer:* Continuous effort is being made in that direction. That is true, when we have a program, for example, such as the National Broadcasting Symphony Orchestra with Toscanini, or the Metropolitan Opera, and there may be a number of stations that will say: "Well, we would prefer to have a commercial program during that time." Our representatives are in touch with them and showing them why it is to their interest to build up their local stations with these superior programs. We do not always succeed, but, by and large, I think that the response has been gratifying and it has been proportional to the excellence of the National programs.

*Question:* Do I understand that a failure on the part of an affiliate to conform its non-network programs to the standards of the network programs affects your renewal of that contract?

*Answer:* Well, if it fell below what we regard as a decent standard, I think that when time for renewal came along we would look with disfavor upon renewing it. I think, in any event, that is likely to occur in the less-important stations; it does not occur in the more-important stations.

*Question:* What type of efforts would you make, simply to persuade them to raise the standards or would you attempt to

exercise compulsion through a suggestion that their contract would not be renewed?

*Answer:* I am not speaking from direct experience, you understand, because I am not the man who has direct contact with these local stations. I have no doubt that some of our men who have been doing that character of work could speak with a greater knowledge of—

*Question:* I mean, just generally, your knowledge of the policy.

*Answer:* Generally speaking, as a policy, I would say that our efforts are directed by personal contacts—we always have men traveling around contacting these affiliated stations—by meetings that we have; by literature that we send out to them, brochures and whatnot; by local activities that we stimulate in their own localities for better music and educational programs; but if over a period of years we came to the conclusion that there was nothing that could be done to stimulate a particular station in that direction, that its interests lie wholly in what it can do commercially and that it is not imbued with the broader spirit of public service and, therefore, bringing down the level of our network, why, our policy would be to get rid of that station, and if that policy has not been exercised, in any general sense, it is because there has been no occasion for it and because I think that we have been fairly successful, particularly with the more-important stations.

*Question:* This is somewhat a different question. With respect to the provisions in your contracts, generally, and the policy underlying them, for optioning certain hours on the stations, do you think that the policy of the networks should be to option roughly the amount of time it expects to be able to sell, or to option, generally, all the most desirable hours even though only a small portion, relatively, can be sold?

*Answer:* So far as the network is concerned, unless it had the definite hours over the affiliated stations, and the important hours as well, it could not develop an important commercial business. It would undermine the entire system of American network broadcasting. So far as the remainder of the time is concerned, that is, under option, I think it should be long enough and wide enough really to afford the local station the opportunity to render a local service, because there will be many programs of a local character that have no national interest or national significance, which do not lend themselves to network broadcasting. A local station ought to be able and free to give

that local service. I think that the present optional time, under our contracts with affiliated stations, provides for that latitude and even more.

*Question:* The present contracts, as I understand it, provide for the optioning of the most desirable commercial time.

*Answer:* Yes.

*Question:* And that means the time, usually, when there are the most people listening. Isn't that true?

*Answer:* From a commercial standpoint, that is true, yes; but even in those hours, I think there is free station time for the local station, even during the more desirable hours.

*Question:* Mr. Sarnoff, as a matter of policy, what proportion of the more desirable hours do you think should be left open for local as distinguished from network operations?

*Answer:* Well, I think that our present contract—I am not quite clear on the hours—provides something like 5 or 6 hours of optional time during the various periods of the day and also, I think, somewhere between 7 and 7:30 there is an optional period. I know, with respect to the evening hour alone which we voluntarily made an optional period for local programs, that we have done that at a cost of millions of dollars, annually, because that is an hour that could be sold.

*Question:* What hour is that?

*Answer:* I think between 7 and 7:15 or 7:15 and 7:30 there is an optional period.

*Mr. Hennessey:* I think it is 7 to 7:30.

*The Witness:* 7 to 7:30. All right.

*Mr. Hennessey:* New York Time.

*By Mr. Dempsey:*

*Question:* Just to what extent do you believe that the local stations, your affiliates, lose their identity and become part of the network as distinguished from independent local stations?

*Answer:* I do not think that they lose their identity at all. I think the local station has become, perhaps, the most important element in the local community. It depends to a large extent on the exploitation abilities of the local manager, his standing, and so on, and so forth. But they continue to announce their station with their local name, in their advertising and in their contacts, and I do not think they lose their identity. And during the period that they have a network program, they increase their importance in their local community.

*Question:* Now, with respect to the stations which are owned and operated by the National Broadcasting Company. Do you

think that the necessity, or the advisability, from the standpoint of network in operating those stations, is because of the commercial problems involved or the program service, the sustaining programs?

*Answer:* I think that it is on both grounds.

*Question:* Just what extent is it on the sustaining programs?

*Answer:* On the sustaining programs, it is to the extent of enabling the company to make its facilities available for sustaining programs, and, that, itself, acts as a stimulant to an affiliated station to take those programs. If we had no stations at all upon which we could put sustaining programs, and in each instance had to apply to the affiliated stations, I am sure that there would be less sustaining programs. The fact that we put them on at key points or important stations gives them a certain base to begin with.

*Question:* You mean put them out over the air?

*Answer:* Yes.

*Question:* And not just put them on a line?

*Answer:* Oh, no, I mean over the air.

*Question:* From the commercial standpoint, I understand, it is a question of stability?

*Answer:* A question of stability, yes.

*Question:* If your contracts with your affiliated stations were for, say, a year instead of five or more years, do you think that that would materially affect the stability of the networks?

*Answer:* Yes, I think not only materially but seriously.

*Question:* Well, now, just how? When the contracts expire I suppose that there would be competition with the other networks for that affiliation?

*Answer:* There would be competition for the stations, competition between the networks, and since a network, in order to exist, must have certain stations on its network the local stations would then deal with the highest bidder, and other questions would become subsidiary to that, and there would be a continuous battle back and forth to obtain the more desirable stations on these networks. That would throw the whole structure into a state of confusion. A year does not mean very much. The listener also has become accustomed to dialing to his favorite station on a certain network, and he would continually find that he would have to dial elsewhere. The competition, it seems to me, is in the program end, rather than in the facility end, and this is as it should be.

*Question:* From the standpoint of the stations and the affil-

iates, do you think that it would be more or less desirable to have short term contracts?

*Answer:* No, I do not think that it would be more or less desirable, and I do not think that it would be desirable at all because the local station in the final analysis will gain more from a stabilized industry than from a confused industry. While in any one given situation, at a given moment, he might drive a harder bargain, in the long run, I think that he would not benefit, because, after all, the present situation is one of a five-year period only. At the end of that five-year period the station has an opportunity to switch if the other network bids for its facility, and it takes anywhere from a year to two, and sometimes more, for a station to mesh into a network. It is not merely a physical connection of lines; it requires a human connection between the personnel of the station and department heads, and so on and so forth, in the ways of doing business, and a year to year shift, I am sure, would upset the structure.

*Question:* Well, are you sure that the making of the terms of the contract for one year would mean a year to year shift?

*Answer:* Well, it would, at least, be an incentive in that direction, because at the end of the year there would be bidding for the station by the networks, and if a network had to have a certain station in a key point, didn't have a station of its own, it would be more or less at the mercy of their bid, or would have to abandon giving service in that locality.

*Question:* Do you think that putting the local stations, or the affiliated station, in what I gather would be a better bargaining position would seriously affect network operations?

*Answer:* I think putting them in the position that you have indicated here would seriously affect them. I think the local station today has a pretty good bargaining position. As a matter of fact, the networks are becoming, to a large extent, program producing agencies; they create these programs and hire wires from the telephone company, making them available to the local stations. The risks in the business today are in the networks and not in the local stations, and those risks are substantial. When we, for example, make a rental contract, as we did in Radio City, for studios large enough and modern enough and adequate to render these services,—we had to make that rental contract for a period of 21 years. Now, you invest in studio facilities, you invest in organization, you invest in plant, and all the things that go with it, and your final dependence is upon the affiliated stations connected with that network. It is true

that they, in turn, also depend upon the network for these programs, but from a physical standpoint the local station today controls the physical agencies of broadcasting to a much greater extent than any network or the combination of all networks.

*Question:* Well, the investment of the network in studios and other facilities is all made on a 21-year basis or a long-term basis on the theory, I assume, that by doing that it can get something more to offer the stations, and through them the public, cheaper than if it did it on a one-year basis or a six-months basis?

*Answer:* Quite true. It does all of those things on the basis that it intends to be a permanent part of an industry that renders a public service every day in the year.

*Question:* And to that extent it is in a better competitive position with other networks, the more it puts in, if it is wisely invested, the more it has to sell?

*Answer:* Yes, but that is all on the assumption that when the independent station is faced at the end of each year,—and I am addressing my remarks to this short one-year period only—with varying bids for its facilities, and in some cases showing an immediate profit over a long-term period, the decision, in each instance, would have to be made on the basis of an immediate higher profit versus a more stabilized situation over a long period, and I think that it is too much to expect all human nature to respond in the same way. There would be some who might be interested in the immediate advantage rather than in the long-term stability.

*Question:* Do you feel that you can give the local stations, the affiliates, a better contract because it is a five-year contract than if it were a one-year contract?

*Answer:* Oh, yes, without a doubt. We can assume commitments, make plans in the program end, knowing that we have got five years to develop their value. Even a program put on today, however good it is, may not be immediately popular. It often takes six months or a year before a program reaches a point of national interest. Now, just about that time you might lose the station.

*Question:* Mr. Sarnoff, you mentioned some prospective developments. Is it your opinion that in the immediate future there are any developments which will materially change the present network structure?

*Answer:* My opinion is that there are developments ahead which are bound to affect the whole radio structure. How imme-

diates those effects will be is a matter of speculation, because I think they depend on three elements. They depend: I should say first and foremost, on the work of the laboratory, what the engineers and the scientists who are at work in these new fields can perfect and develop; they depend also on the financial and economic situation, the ability of these organizations that are carrying on these scientific developments to finance them in new fields, and they depend also upon the attitude, if I may respectfully submit, of this Commission and the Government, generally,—as to what the attitudes of our Government and our regulating bodies are going to be toward these new developments. And I say that, not with any criticism, because I have no fault to find with the attitude of this Commission towards the development of radio, but I am speaking of the future, and, of course, I do not know what their attitude in the future may be.

Those three elements together, scientific development, financial capacity, and Governmental encouragement, will determine the rate at which these effects will take place.

Now, to be more specific as to the kind of developments I have in mind.

You will, perhaps, permit me to say that I have been in this art and industry since I was knee-high to a grasshopper. I started in 1906, and for 33 years I have watched and participated in the development of this art. I have seen technical revolutions take place in this art almost with five-year regularity. Beginning with the early days, there was the spark system of telegraphy, ship-to-shore, and that spark system gave way to continuous waves generated by tubes. Then, you had the tube system of communication. That was a revolution, changing the apparatus that was then in use, and the methods, and the space occupied in the ether by undamped waves as against damped oscillations, and so on. Then came the development of the wireless telephone, about the War time, which was another revolution, in that, the human voice as well as the code signals could be transmitted through space. And, then came the development of transoceanic communication which, for the time being at least, subordinated in importance, all the other methods of radio communication, and that represented another technical revolution. The waves were generated by alternators and long waves of the order of 12,000 to 20,000 meters were employed. Then, just about the time these transoceanic facilities were established, at great expense, in one case at Port Jefferson, Long Island, we built a station with seventy-two 400-foot towers and

10 square miles of land with eighteen 200-kilowatt alternators at a cost of about \$10,000,000 and by the time the final paint was on the buildings, it was obsolete because short waves came into existence. Where once they were regarded as ineffective methods of transoceanic communication, they became the most effective method.

I can remember, as a wireless operator, in the days of Marconi, in 1908 and '09, I was a wireless operator at a little station called Seagate in Coney Island and at another one, Siasconset on Nantucket Island, and we then had two methods of signaling, one was short-wave called Tune "A" and the other was long-wave called Tune "B". Tune "A" used waves of 100 meters and below, and Tune B", 350 meters and above. This was ship communication. Everybody had assumed, then, that the Tune "A" waves could communicate at a range of about 50 miles and no longer, because short waves could not travel very far. If you wanted to cover distance, you had to use Tune "B". Well, out of this Tune "A"-Tune "B" business arose these 12,000 to 20,000 meter waves on the theory that the longer the wave, the better chance you had to negotiate the longer distance. We now find that if you want to cover a very long distance, you want to use a very short wave; so that it is easier today to communicate from New York to Australia with a wave length of around 14 meters than it would be with a wave length of 14,000 meters. In fact, you could not do it at all with the latter. And these big alternators, big towers, and big buildings have gone their way; they have been interred, but somebody had to pay the price of that development.

Now, we come to broadcasting. At the present time, the waves give to broadcasting a limited capacity. The average person thinks of a broadcasting station as one that can reach the entire nation. I have had ever so many people ask me, in referring to this latest development of television, for example, when we say that the station has a range of about 50 miles: "Well, what good is a 50-mile range? You have got to have the range of a station that is able to reach from New York to California." Now, their mental impression is that the present sound broadcasting station reaches California, and, of course, we here all know that it does no such thing. The average range of a broadcasting station today, its useful range, is really not much greater than that of an average television station, 50 to 100 miles. It is when you are inter-connected with another station that you give it that additional range. And so, within this limitation of

the band, I think that broadcasting, as we know it today, has reached about the limit of its technical capacity. I do not mean that there will not be refinements and improvements, but I think that the art in its present space has reached, more or less, saturation; and yet I believe that radio, the radio art itself, is a long, long way from saturation; in fact, that it is still in its infancy. Waves that were once thought useless are daily becoming more and more valuable.

The problems faced by this Commission, the problems faced by the Government, and the problems faced by the industry, after all is said and done, can be summarized in one word: "technology" or "science".

If we could have all the wave lengths that you and I want, a great many of these problems which we must now properly discuss and deal with would disappear. There might be other problems, but they would not be primarily of a technical nature. In other words, if it were as easy for an American citizen to establish a broadcasting station, or if he were as free to establish a broadcasting station as he is free to establish a newspaper or a magazine, assuming that he has the wherewithal, then this whole body of regulation and this character of question would take on a different aspect.

Therefore, the problem is, and the solution must be, to expand the usefulness of radio, to find new means of communication, to make 2 or 100 or 1,000 blades of grass grow where only one grows today.

Based on my experience in the past, based on my observations of what is going on in the art, and my contacts with our scientists and engineers, I have no hesitation in saying to you that in my opinion the number of channels for radio communication which it is possible to develop into useful channels are many, many times the number that now exist. In fact, they may be a hundred-fold or a thousand-fold as great. We now speak not in terms of long waves or short waves, we refer to ultra-short waves, to centimeter waves, to millimeter waves, and we talk of modulating these waves through frequency modulation, through amplitude modulation, through phase modulation, or a combination of these methods.

*Commissioner Brown:* Are you speaking of broadcasting or radio services as a whole?

*The Witness:* I am speaking of all phases of radio, including broadcasting, Mr. Commissioner. I can foresee a network by radio which can carry not only broadcasting but also telegraphy,

telephony, multiple communications, facsimile, television, and the like, all on one network and at the same time. I can see the possibilities of developing systems of inter-communication, both for sound broadcasting and for television, that will not depend upon wires at all, where you can carry these signals and these images by means of a radio line instead of a wire line or even of coaxial cables—by utilizing radio relays.

When those developments are perfected, as I believe they will be, in time, given those three attributes that I referred to at the beginning, you will have more technical facilities available for use than there will be people to use them.

And so it is important, it seems to me, that, in any appraisal of the problems of radio, that present-day limitations be not employed as the standard for tomorrow's Governmental regulations. The worst possible thing that could happen would be to put radio technique in a legislative straight jacket, because if that were done there would be a complete negation of the purposes of the Radio Act which in the very preamble refers to the development of radio to its maximum capabilities. I may not be using the exact language, but I am referring, I am sure, to the sense of that language.

Those are the developments, Gentlemen, that I see in radio. I think they will come with greater rapidity now than they have come before, because, first, there is greater knowledge today about the radio art and industry than there was in the past, and second, there is greater necessity. The legend that "necessity is the mother of invention" still holds true. The best way to get additional networks functioning, the best way to get additional stations on the air, is not by taking from "B" what he has today and giving it to "A", who may want to go there, but by stimulating both "A" and "B" to carve out a new lane in the ether so that science, itself, may provide the opportunity for additional networks or additional stations. That can be done.

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, in your statement, I think you made the suggestion that the limitations of today should not provide the standards for tomorrow. But the limitations of today certainly must be taken into account if providing the standards and regulations for today, do you not think?

*Answer:* I am completely in sympathy with the efforts of this Commission, and always have been, to apply standards and to regulate the art, and certainly there is need at the present time, in the present state of the art, to regulate the facilities, but

I am referring to tomorrow. I am referring to the kind of a tomorrow when even those who have spent their lives in the art are unable now fully to visualize the direction in which that art is traveling. All that I plead for is that there be maintained a maximum of liberty for the development of that art and that no regulations be imposed of a character which would be likely to retard or to stifle these new prospects. In saying that, I am not addressing myself at all to any motive or objective, because I know that this Commission has no more desire to stifle this art than I have, but objective, itself, is not the only test; it is the result of regulations rather than the purpose of regulations that must,—and often do—determine developments. Never was—

*Commissioner Thompson:* Pardon me. You would recognize that if what you envision for the future should come to pass that there would be a definite requirement for regulation?

*The Witness:* I should say, Mr. Commissioner, if what I visualized for the future should come to pass, that there would be less requirements for regulation than there may be today on anything except the physical aspects of the art.

*Commissioner Thompson:* Well, you speak in terms of networks—you spoke, possibly using the word "network". Would you believe that such a power should be vested in one individual or one small group of individuals in such a situation?

*The Witness:* I am not pleading for or suggesting a monopoly, but what I am trying to say, Mr. Commissioner, is that I can envision, and do envision, the day when radio development will make it just as possible for anybody to get into the radio transmission business as the press situation today makes it possible for anybody to get into the publication of a newspaper, and under those conditions my conclusion, which I urge, is that there is and there would be no more warrant for regulating radio than there is for regulating the press.

*Commissioner Thompson:* Well, is there not this distinction: that one operates under a license and the other operates under certain—

*The Witness:* I am not pleading—

*Commissioner Thompson:* I notice that you speak constantly of the permittee of the radio stations rather than use the term "licensee". There is a very wide distinction between control of the air waves belonging to all the people and a private enterprise of one particular individual, such as a newspaper. That is my view at least.

*The Witness:* I am not pleading for any control by any one individual, and I am not addressing myself to a state of the art where one individual would control it. I am trying to indicate the possibility of developing the art to a point where any number of individuals would have opportunity to utilize these agencies, and under those conditions—Perhaps, you will permit me to read just one little paragraph here, quoting President Roosevelt, I think about a week or two ago, where he made a public statement which was broadcast by transcription, and where he referred to this particular question. He said: "Government restrictions on the press amount to little more than laws to prevent the printing of obscene matter and articles calculated to incite rebellion. The press is as free as it cares to be, or as its economic condition permits it to be, but now, in our own time, there has come into being another great institution for the general diffusion of knowledge, the radio. Still in its infancy, it already rivals in importance the schools and the press. The Government, as the people's agent, has had, and has now, a still different relation to radio from that towards the schools and the press. It has encouraged and aided development, on the one hand, and on the other it has set up such controls of its operation as are necessary to prevent complete confusion on the air. In all other respects, the radio is as free as the press." I would emphasize that last sentence.

*Commissioner Thompson:* I agree with that, Mr. Sarnoff; there is no difference there. You spoke constantly though of the network control as you envisioned the control of not only radio but all forms of communication and reproduction, and you spoke of it in terms, not of the freedom that the President referred to, but as a network control which would bring it not to freedom of individual licensees but only such freedom as the network might exercise or control through the assignment of time.

*The Witness:* I spoke, Mr. Commissioner, of the possibility of there being more networks, not a network, but of the possibility of there being more networks available than people to engage in the network business. I am envisioning a number of networks, perhaps as many networks as there are newspapers if there is economic justification for them.

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, in your speculation about the future of radio, it seems to me, as you described it, there would still be a necessity for assignment and allocation of frequencies to various types of radio service. Am I correct in that?

*Answer:* Yes, that is correct.

*Question:* And that means that the available useful spectrum, whatever it might develop to be, would have to be divided into different categories for use for different purposes?

*Answer:* That is right.

*Question:* And I assume that you would think that the Federal Government would have to undertake that division.

*Answer:* I would assume that even under those conditions I have described, Government regulation of the physical facilities and the allocation of wave lengths would be necessary and essential.

*Question:* In determining how much space in the spectrum to allocate for such things as broadcasting as distinguished, we will say, from ship-to-shore or aviation purposes, the value to the public of the particular service would be the determining factor, don't you think?

*Answer:* Yes.

*Question:* So that in deciding whether to allocate a band of 1,000 or 10,000 or 100,000 kilocycles wide for broadcasting, which would mean taking it away from other service to some extent, the relative importance to the public of the different services would have to be the decisive factor with whatever body was authorized to make that allocation?

*Answer:* Of course, my thesis is addressed not to a restrictive type of art but to an expansive type, where there will be enough wave lengths to do the work of the day, whatever they are. If you want to have marine communications, you should have enough wave lengths to carry on there. The kind of Government control that I really have in mind is that if you have a network, for example, or a station that broadcasts not only sound but also broadcasts facsimile, which is type matter or news, and broadcasts television, you arrive at a situation where radio makes contact not only with the opera and the concert stage but is, in a sense, making contact also with the newspaper, upon which it will depend for news to transmit to the home in the form of a radio-newspaper and with the movies upon whom it must, in a measure, depend for pictures to televise. Therefore, you will there see the possibility of a development of radio which will touch news and intelligence transmission, telegraph and telephone communications, the movie, the press, and so on. At that point in radio development, the degree of Government control must be as zealously guarded by the citizenry as the degree of monopoly must



be guarded by the Government, because at that point censorship becomes a very dangerous neighbor.

*Question:* Before we get quite to that point, the uses of radio are expanding almost as fast as the useful spectrum is expanding today, do you not think?

*Answer:* Well, it is expanding very rapidly, yes.

*Question:* For example, radio transmission of energy in the laboratory has been perfected to the extent that demonstrations have been put on of lighting a home, running a washing machine or an oven by radio rather than direct wire connections with a generator. So as the spectrum is widened, it will also be a requirement that things, for which now with a limited spectrum no frequencies can be allocated, will be permitted to come into the picture. I had that in mind in suggesting that there will always be a considerable demand for frequencies, sufficient to require some regulation to allocate frequencies to particular services. If that is correct, and that I do not imagine that you would suggest wouldn't be true for at least the next ten years, there is going to be some necessity also to see that the frequencies are used for the purpose to which they are allocated or assigned, and that they are assigned on the basis of what the public interest demands. If it demands more frequencies for point-to-point communication they, perhaps, could be taken away from the amateur band or the broadcast band or some other place in the spectrum. But if they are taken away and turned over to non-Governmental agencies to operate and those agencies do not operate them, the purpose for which they are licensed, then the whole plan of allocation breaks down, does it not?

*Answer:* I would not quarrel at all with that statement. I think that you are entirely correct.

*Question:* To what extent in the transmission of intelligence, the broadcasting of intelligence, we will say, eliminating the point-to-point telephone and telegraph services, do you think that it is necessary to see that the licensees do use the frequencies for the transmission of intelligence to further the public interest?

*Answer:* I do not know that I exactly understand what you mean by "to what degree". I should say that if the Commission today grants a license to a station to engage in the field of public telegraphy or public telephony or marine communications that it is a proper function of the Commission to see that that function was exercised by the licensee, and similarly with broadcasting. I have offered no objection, and I never have, to that character of regulation or to that character of control by the Commission.

The only thing that I have in mind, to which I have addressed my observations, is the program, itself, the content of the thing that goes out.

*Question:* Let's take an example. Supposing that a station was licensed for the use of police radio and the frequency is assigned, the transmitter is licensed, and so on, and it is used continuously for the broadcasting of music, do you think that that license should be taken away?

*Answer:* I should think that the licensee would not be fulfilling the function for which he secured the license, and, instead of saying that I would take it away, I would, under those conditions, require the licensee to fulfill the purpose; and, then, if he failed to do it, of course, there is no alternative except to cancel his license, under the conditions you specified.

*Question:* Well, I was assuming, of course, that the Commission could not require him to send some particular police messages, and that the only way in which you could operate would be to find out what he is doing and if he is not doing that for which his license were granted you would revoke the license. Now, the reason that certain frequencies are allocated for police service is that the public welfare demands police-department function. Why do you think that a band is allocated for broadcasting?

*Answer:* I think that a band is allocated for broadcasting in order to render a broadcasting service, and a broadcasting service consists of a number of elements, entertainment, education, information, news, discussion of questions of public interest, and all the elements which constitute programs.

*Question:* Would you say that the element of quality enters in that at all?

*Answer:* The quality of the programs?

*Question:* Yes.

*Answer:* Why, of course, I should say that the element of quality of the program is the element that determines the popularity of the station and the number of listeners that it has.

*Question:* Well, were the station licensed to broadcast and it broadcast programs of inferior quality, and did not give entertainment, information, education, and so on as you have listed them, do you think that its license should be revoked?

*Answer:* Well, I would have to reach an agreement with you first as to what you regard inferior quality before I could answer that question.

*Question:* You define it.

*Answer:* Well, I would leave the quality of the programs to the listeners to determine; I would not leave the quality of the program to be determined by a regulatory body excepting only those elements of a program which are properly outlawed, obscene language, libel, and all those sorts of things. You could not get agreement, Mr. Dempsey, on the quality of an orchestra. There are people today who would regard one orchestra as inferior to another one, but nevertheless they both give music.

*Question:* And you think that the listeners should really determine the quality of the programs?

*Answer:* I think that the listeners are the people who determine the quality of the programs, and they are more vocal in the radio broadcasting field than in any other comparable field, by the letters they send, by the protests they register, by the commendations they offer. Radio, after all, operates with the privacy of a goldfish in a bowl. Nobody can put a program on the air without exposing it to public attention. There is, therefore, the listener as a leveling influence, and then there is the commercial advertiser upon whose revenue the station depends because as the station loses listeners the advertiser will not patronize the station. So you have both the listener and the advertiser operating as natural incentives to maintaining the best programs.

*Question:* Do you think that the Commission would be justified, for example, if they had an accurate poll of the listeners in the area supposedly served by a particular station and they, by an overwhelming majority, indicated that that station was not rendering a satisfactory service, under those circumstances do you think the Commission would be justified in revoking the license?

*Answer:* No, I do not. In the first place, I think that the taste of the majority varies from day to day and from year to year. I think that if you would look over the programs of the last ten years that you would find, from their range, that what were popular once are in the dog-house today, and vice versa. Also, I speak with no intended criticism but with very earnest apprehension towards a situation which would deposit in the hands of any Governmental agency the power to cancel or withdraw licenses from a station based on its programs. All you have to do is to look abroad to see the results of that. Now, it may be true, here and there, in isolated instances, there may be abuse of present privileges, there may be an inadequacy of service, but, after all, one has to approach the subject from the standpoint of

and from its overall picture.

*Question:* Now, the listeners in those isolated instances probably feel just as much aggrieved as though the whole nation were getting unsatisfactory service, do you not think?

*Answer:* Well, the listener, in the first place, has the opportunity there for more than one station. I do not know of any places in the United States—there may be one or two, but I do not know of them—where any listener is compelled to listen to just one station and has not the choice of program.

*Question:* Well, don't you think that where a listener has two stations, for example, he ought to have the choice between two satisfactory services and not one good and one unsatisfactory?

*Answer:* Well, I would assume that if there are two stations and one gave inferior quality and the other gave superior quality that in time the superior station would have all the listeners and the other fellow would shut up.

*Question:* And those listeners would have only one station, in effect?

*Answer:* Well, I suppose that when the second fellow could not continue to serve them, because he would not have any revenue, somebody else would come along and make application for a license and not repeat the fallacy that lost him his business.

*Question:* Well, how would he fall by the wayside, how would he lose his license?

*Answer:* If he lost his listeners, he would lose his revenue, and if he lost his revenue and his listeners he no longer would have any purpose in being on the air.

*Question:* It is your opinion then that the economic force of unsatisfactory service will eliminate inferior stations?

*Answer:* I think, by and large, these two forces, the listeners' interest and the economic force, will not eliminate all unsatisfactory programs, but will exercise that measure of control over the situation which will result in what has, in fact, resulted: an American system of national broadcasting superior to any other in the world, plus the freedom which it enjoys.

*Commissioner Thompson:* Mr. Sarnoff, may I just add that I was impressed a moment ago with your expression of apprehension, that no Governmental authority should have any control whatsoever of what is the final essence of radio, and that is the control of the air waves. Would you think that an individual or a small group of individuals controlling networks would be in a better position to determine that than the Government, itself?

*The Witness:* Of course, Mr. Commissioner, I have not

objected to the control by the Government of air waves. I have objected to the control by the Government of programs, the things that go over these air waves. Now, if you ask me—

*Commissioner Thompson:* In the last analysis, the element of intent in the construction of a radio station is an insignificant factor in the license to operate a radio station; the real essence of a radio license is the control of a frequency. Now, that frequency appears at the present moment to belong to the people of the United States, or the people of the world—various frequencies. I judge, from your statement, that you felt that those who hold licenses should have complete freedom without any Government interference whatever rather than any supervisory control by the Government of those frequencies. Is that correct?

*The Witness:* No, sir. I am sorry that I have not made myself clear, because that has never been my position and it is not now.

I have said, or tried to say, that I believe, that in the present state of the art, and even in the future of the art as I have tried to envision it here, that it was perfectly proper and necessary that the Government should have the control and the regulation and the allocation of these waves to these various services. Where I would like for the Government to stop is in any effort to control the programs which go over these frequencies. Now, whereas, you say that the real importance of a station is the frequency, perhaps you will permit me to say that the real importance of a station is the program, because a frequency without a program has no value.

*Commissioner Thompson:* I was not speaking in the terms of the service rendered on the frequency, I was speaking of the value of a frequency as compared with the money cost of the equipment to utilize a frequency. That is very different.

*The Witness:* I am addressing my remarks exclusively to the program which goes over that frequency or that station or whatever you wish to call it. Now, you have asked me whether I think that it is better, or safer, to have some group of individuals, or some individual, control the thing that goes out of the station than the Government. I have tried to answer that, first by saying that even today there is no such control in the hands of one individual or even a small group of individuals; there is competition, and a lot of competition in broadcasting today. Secondly, I have tried to indicate that as the art develops there will be more opportunity and more room for competition than there is today, and, therefore, less reason, if there be any reason, for Govern-

*Commissioner Thompson:* Well, at the present moment I think that there must be considered this fact, that where a corporation, a partnership, or an individual is licensed to operate a station and is assigned a frequency, and in a very short time—and it is common now to large proportions—that licensee makes an assignment of time to a network, in some cases 100 per cent of the time, and, thus, we find that consideration for the granting of that license, which takes in many aspects of local interest as well as national interest, the licensee has been placed in the position where he, in some cases, can not conform to the conditions upon which a license is granted without asking the permission of some official of the network. We, thus, come not to one individual or a small group of individuals but to several small groups where through this assignment of time the actual control of that station is transferred to other than the licensee.

*The Witness:* In that situation, Mr. Commissioner, one has to look first to the basis upon which the American system of network broadcasting can operate. Now, if there is a way to have the network system of broadcasting with affiliated stations, where each affiliated station is free to do anything it wants at anytime, without the kind of regulations or contracts that now exist, I do not know that system.

*Commissioner Thompson:* Of course, there would be a limitation as to time, rather than 100 per cent or, some, approximately 100 per cent of the time either under contract or reserved.

*The Witness:* Of course, you can have limitations. The question, however, is whether the kind of limitations that are proposed will result in a better system of American broadcasting. Now, I have not heard of any such suggestions, but if there are any they ought to be examined very carefully. Who is doing the kicking at the present time? The public is not kicking about American broadcasting. They are getting the finest service in radio that any public in the world is getting, and they are getting the freest service.

*Commissioner Thompson:* We could presuppose that attention can be given to many problems under the Federal Communications Act that do not properly or necessarily arise from any complaint or claim. I would assume that the Commissioners should give some consideration to certain basic mandates in the statutory regulation of radio. On that point, do you think that the networks should themselves be brought under control of the Commission as well as the individual licensees?

*The Witness:* No, I do not.

*Commissioner Thompson:* Well, here is a case at point: A station, a licensee, is cited for something that he carried on a network chain. In a situation such as that, would you regard the licensee as the party that should be cited? If a licensee makes an assignment of time, and within that assignment of time there may be some violation important enough for the Commission to cite the licensee, is he the real one that should be cited if the issue on which he is cited originates elsewhere and is carried on that station during the time that he has assigned? What would you suggest there to meet a situation such as that?

*The Witness:* Well, I should think that if a man takes out a license and fails to conform with the provisions of the license to an extent where the Commission feels that he has violated that license that he, the licensee, is the fellow to deal with. Now, if he has any recourse against the network, why, that is for him to do. My objection, Mr. Commissioner, to licensing networks is not based on any individual case of violations, it is based on the philosophy of it, because I think that control of networks, per se, giving the Government the right to license networks as distinguished from licensing the station facilities that carry the frequency, would be the first and the most serious entrance into the whole field of Government censorship of programs.

*Commissioner Thompson:* Well, why would that be censorship, Mr. Sarnoff? That question does not contemplate any censorship, and I do not see how it could be so interpreted, as suggesting censorship. Censorship is a restriction that prevents a person from expressing his opinion, or is such as to delete from what he says, otherwise, the ordinary suppression of public opinion. Now, there is nothing in the suggestion made by me as to some form that would not hold responsible a licensee for something beyond the control of the licensee in that a violation may have arisen during a period of time that he had assigned or sold, and, therefore, in such a situation, as I view it, there is no responsibility exercised by the station in the matter, and if you cite the licensee, you cite the wrong party, I would think.

*Commissioner Brown:* The Committee will now recess until 2:30.

(Whereupon, at 12:37 o'clock, p. m., the hearing in the above-entitled matter was recessed until 2:30 p. m. of the same day.)

## AFTERNOON SESSION.

*Commissioner Brown:* The hearing will be resumed.

*Commissioner Thompson:* Mr. Chairman, as we adjourned the question of censorship as compared with or as confused with regulation appeared into the discussion and as I went by my office I saw a press release in which Chairman McNinch is quoted as saying this:

"I am unalterably opposed to government censorship of broadcasting in any manner, shape or form. The government should neither directly nor indirectly dictate what shall or shall not be said or who shall or shall not speak over the air."

That's the end of the quotation. I can only speak as one individual member of the Commission but I am in hearty sympathy with the Chairman's statement, and from my association here I really believe the Chairman speaks for the other members of the Commission. I quote this in the record at this point so as to seek to clarify the difference between censorship and normal regulation of an industry. That's all.

Whereupon,—

DAVID SARNOFF,

the witness on the stand at the adjournment resumed the stand and was examined and testified further as follows:

## CROSS EXAMINATION (Continued)

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, in your direct testimony you—

*Mr. Hennessey:* May I interrupt at this point?

My recollection is that there was a question hanging fire when we recessed that Commissioner Thompson had asked Mr. Sarnoff.

*Commissioner Thompson:* You go right ahead, Mr. Dempsey.

*By Mr. Dempsey:*

*Question:* In your direct testimony you discussed the need and desirability of self regulation in the broadcast industry. Just to what extent would you suggest the advisability of self regulation?

*Answer:* I would suggest it to the extent that I stated it in the hearings before this Commission when I made that recommendation. My understanding is that since that time the N.A.B., the National Association of Broadcasters has taken up that suggestion and has acted upon it and is still in conference on the subject.

Yesterday I was shown by Mr. Hennessey, or by someone in our organization, a resolution of the board of directors of the

N.A.B. dealing with that subject. It is a one-page resolution and if there is no objection I would like to state it for the record.

*Mr. Hennessey:* No objection.

*Commissioner Brown:* All right, you may state it for the record.

*The Witness (reading):*

"President Miller reported that as the result of various speeches by Chairman McNinch of the FCC and the testimony of Mr. David Sarnoff at the Monopoly Hearings, it was felt that the NAB should develop a standard on procedure and practices pertaining to the broadcasting industry. He, therefore, appointed a committee consisting of Edgar Bill, WDW, Tuscola, Illinois; E. B. Craney, KGIR, Butte, Montana; Edward Klauber, Columbia Broadcasting System, New York, N. Y.; Lenox Lohr, National Broadcasting Company, Inc., New York, N. Y.; Paul W. Morency, WTIC, Hartford, Connecticut; and Theodore Streibert, Mutual Broadcasting System, New York, N. Y.

"The Committee met in New York on Monday, December 5, with Mr. Miller. Mr. Bennett, special attorney, Mr. Kirby and Mr. Spence from Headquarters Staff were present. The Committee discussed at length the question of procedure and standard practices and the following motion by Mr. Bill, seconded by Mr. Craney, was passed.

'RESOLVED, that the Committee on Procedure recommend to the Board of Directors that a committee be appointed to review the NAB Code adopted in 1935; that this committee secure from stations and from networks copies of existing statements of program policies and standards of practice; that the said committee draft a suggested inclusive statement of Standard Practices for NAB member stations; that the committee in drafting this suggested statement of Standard Practices consider, among other subjects, the following, namely: religious broadcasts, controversial public questions, political broadcasts, children's programs, commercial programs, news broadcasts, commentators, gossip columnists, propaganda, non-partisan Forums, and educational programs; that it also consider the method of enforcement; that this statement of Standard Practices when approved by the Board, be submitted to the membership of the NAB prior to its next annual meeting and the said statement shall be presented to the membership for consideration

'It was further recommended that a program of education be undertaken for the purpose of informing the membership of the problem and desirability of such self-regulation as contemplated in the said statement of Standard Practices; that the Board appoint a standing committee for the purpose of considering, at regular intervals, the interpretation of, the enforcement of and the compliance with the said statement of Standard Practices; and that machinery be set up at NAB Headquarters for the purpose of giving advisory opinions to the membership.'

"It was moved by Mr. Damm, seconded by Mr. Gillin, that the Board adopt the recommendation of the Committee."

And it was passed.

"On March 23, 1939, a meeting of the Committee on Program Standards was held at the Hotel Ambassador, New York City. The following were present."

I will omit the names and I will give them to the secretary. It is a long list.

(The names omitted by Mr. Sarnoff in the reading of the resolution are as follows:)

"Edgar L. Bill, WMBD, Peoria, Illinois; E. B. Craney, KGIR, Butte, Montana; Walter J. Damm, WTMJ, Milwaukee, Wisconsin; Earl J. Clade, KSL, Salt Lake City, Utah; Herbert Hollister, KANS, Wichita, Kansas; Edward Klauber, Columbia Broadcasting System; Lenox Lohr, National Broadcasting Company; Paul W. Morency, WTIC, Hartford, Connecticut; Samuel R. Rosenbaum, WFIL, Philadelphia, Pa.; Theodore C. Streibert, Mutual Broadcasting System; Earl O. Wyler, KTSM, El Paso, Texas; Gilson Gray, Columbia Broadcasting System; Gomer Bath, WMBD, Peoria, Illinois; John Royal, National Broadcasting Company; Niles Trammell, National Broadcasting Company; E. W. Craig, WSM, Nashville, Tennessee; Neville Miller, National Association of Broadcasters; Edwin Spence, National Association of Broadcasters; Edward M. Kirby, National Association of Broadcasters."

*The Witness (continuing reading):*

"In a three-day meeting, the Committee considered a digest submitted by the Headquarters staff of all the information compiled as a result of the survey made of the industry of every station's Code of Ethics and Standard of Practice. Since that time, the staff is in the process of digesting still further the viewpoints expressed at that meeting, and a preliminary

Code is in the process of being drafted and will be submitted to the committee for final revision on May 31, 1939. From that point on, it will be sent to each broadcaster for his individual observations and considerations, and then will be introduced at the annual NAB Convention in July, 1939, for final adoption by the industry.

"The Code also calls for the setting up in the NAB of an enforcer whose duty it will be to interpret the Code to individual stations, networks, agencies, advertisers, and groups of the public which are affected."

By Mr. Dempsey:

*Question:* Mr. Sarnoff, just to get this thing entirely clear. I understand by self regulation in broadcasting you mean regulation by the licensees of broadcast stations?

*Answer:* Yes, sir.

*Question:* And that is the group which you mean to comprehend when you use the word industry in this connection?

*Answer:* Yes, sir.

*Question:* Now—

*Answer:* Well, those users may be interested in the matter. I think that in my original recommendation I have said among other things that before the Code was adopted that it should be submitted to advertisers, to public spirited men and women for their suggestions and consideration, so that it might represent a cross section of the country.

*Question:* I think this is a quotation from which you said: "In writing this Code the industry should gather the views of broadcasters, of groups representative of public opinion, and of this Commission."

Now the industry and the broadcasters are the same thing, are they not?

*Answer:* Yes.

*Question:* And do you know to what extent in the formulation of this Code this committee has attempted to get the views of groups representative of public opinion?

*Answer:* I do not know.

*Question:* Now the Code, as I gather from your schedule which you read, deals primarily with programs. Is that correct?

*Answer:* Yes.

*Question:* Entirely with programs?

*Answer:* Yes. . . . do you think it is necessary for the indus-

try to adopt any set of regulations internal or external with respect to programs?

*Answer:* So as to put the programs on the highest possible level of good public service.

*Question:* Do you think in order to bring that about some sort of joint action of all the licensees is necessary?

*Answer:* I think it is highly desirable. For example, today you find one system of broadcasting declining certain business and others accepting it. We have just compiled in the National Broadcasting Company a pamphlet setting forth the policies upon which the NBC has operated and continues to operate bringing it up to date. In it we state the reasons, for example, why we accept certain business and why we reject others. I don't say that this particular Code which guides us and which has been the development of the company's experience from the date of its inception including its management and board of directors and national advisory council necessarily is complete or necessarily applies in all instances, but it does represent a guide. Now if the industry as a whole can agree on certain standards of program below which it will not fall I think it would be helpful to the American system of broadcasting.

*Question:* It would have at least one primary effect, and that is in the competition between stations which conform to certain standards and others which do not would be put on a more even plane, would it not?

*Answer:* I think it would be on a more reasonable basis as regards fundamental standards. There still would be left a wide area of competition.

*Question:* I am not suggesting that competition would be eliminated, but at least it would be competition on the same plane rather than on different levels?

*Answer:* As to basic standards, for example, if one station accepts patent medicine accounts and another station refuses to accept patent medicine accounts I don't really regard that as competition between the stations. It is just a matter of policy. Now if both stations will agree to decline to accept patent medicine accounts, why I think that the sum total of the broadcasting service will be improved thereby.

I merely happen to mention patent medicine. I don't want to emphasize that as against any other.

But there is doubtless a code of basic principles that could be developed for the guidance of the industry as a whole and to

which no reasonable station owner or listener could take proper exception.

*Question:* Do you think that the adoption of such a code of standards would be beneficial from the financial standpoint to the stations which are now adhering to substantially that code?

*Answer:* Yes, I think it would. I think it would be beneficial to the stations that adhere to such a code because anything that stabilizes radio and maintains the good opinion of the public about radio service is good ethics as well as good business for the stations that are rendering service.

*Question:* And the stations which now have high standards, or the National Broadcasting Company which I understand operates on standards which you are suggesting be more widely adopted feels that in adopting those standards it is operated from a more intelligent business viewpoint than if it did not have the standards?

*Answer:* We feel that way, although at any one moment we may have to make sacrifices for the good of the whole or for the good of the long future. And doubtless some stations who would conform to whatever code the NAB finally may develop would have to abandon certain practices they now engage in, and while temporarily they might suffer something in financial revenue, in the long run I am sure they would be better off, because anything that would stabilize the industry would be better for them.

*Question:* Well even now there isn't any set of standards applicable to all stations or which are applied by all stations. Do you think the stations that have the higher standards are operated to that extent at least as better business propositions than the others?

*Answer:* Yes, I do.

*Commissioner Brown:* Mr. Sarnoff, is this proposal an effort to bring up to date the NAB Code adopted in 1935?

*The Witness:* It is an effort to do that and to expand upon it in the light of the discussions which have been had and in response to the suggestions which I made before this Commission.

*Commissioner Brown:* Well don't you think that if all the stations licensed by this Commission had lived up to the Code adopted in 1935 there may have been no necessity for an additional code?

*The Witness:* That is probably true. It is doubtless true to the extent that stations have departed from the code that was in effect some years ago, to that extent

there has been room for revision, and I assume there always will be because a few years' additional experience have also brought to light the need for some additional standards.

*Commissioner Brown:* There are somewhat over 700 stations licensed by the Commission at the present time. If a revised or what might be termed a 1939 or 1940 model of the Code should be adopted, what revisions would you suggest to make all stations comply with the new model of the Code?

*The Witness:* Well, I have not suggested, Mr. Commissioner, in my original statement any element of compulsion. I have suggested persuasion, logic, education, and all these elements which indicate to a person why the right thing should be done. I recognize, of course, that that may fall short of producing a 100 per cent result, but I think it is a better way to proceed.

*Commissioner Brown:* I notice one of the subjects here that it is suggested be considered. It is the subject of political broadcasts. Do you know what they have in mind?

*The Witness:* I am not sure that I know what they have in mind but I suspect that in the recent developments some political discussions may have crept in during commercial hours, where as a matter of policy it is intended that political discussion should be held during sustaining hours. And the question of where the line begins and ends is one for judgment and for the development of such standards as would serve as a guide to most stations.

*Commissioner Brown:* And in that category would be comments by paid commentators?

*The Witness:* I should assume so; yes, sir.

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, what I am trying to get at by these questions is this: Since this is a code which you are proposing or recommending to be adopted by the industry as an industry, is its object the better business in the industry, the increase in profits to the various units in the industry? In other words, is it a business proposition in the industry, that you are recommending, or is it intended to promote public service not as an adjunct to more profit but something distinguished from the making of profits?

*Answer:* Well, I should like to answer your question by saying that I regard any effort to improve public service as good business and ultimately translatable into profits for the industry. Obviously if a wider public service is rendered, a higher standard is maintained, there will be more listeners and more satisfied listeners and those in turn will stimulate the clients to a greater

more and to advertise more consistently. So that I do not think that improvement of service or improvement of standards are necessarily in conflict with better business. Instead of regarding them mutually exclusive I should regard them as supplementary.

*Question:* Well let me ask the question in a little different way. Have you a code in the manufacturing business of radio receiving sets?

*Answer:* There is a code I believe of the National Manufacturers Association and the Radio Manufacturers Association, certain codes of standards, but those codes are on a little different basis than any code referred to here.

*Question:* Just what is the difference between the code in an industry of that sort and a code in this industry?

*Answer:* Well a code in those industries would relate to proper practices within the industry as regards equipment, merchandising practices. For example, giving secret rebates and that kind of thing. They are industrial codes of a character generally adopted by a trade association. They go as far as it is proper to go within the limitations imposed by law.

The codes referred to here relate to programs, ideas, methods, conduct, ethics, all the elements which constitute a service of culture, education, information and entertainment.

*Question:* Well in the code in your manufacturing industries you also have a trade association trying to get public opinion to the point where more of the products will be consumed, don't you? You try to improve your public relations there, too, by public service, more than those codes and associations are engaged in in doing public service?

*Answer:* Well I might perhaps illustrate it by using the patent medicine analogy. If one who practices the art or profession, or racket of patent medicine, whatever it is, wants to buy a radio set for his office there is nothing unethical about selling him one or a dozen radio sets, he can buy as many as he wants from the manufacturers, but if he wants to sell his ideas or his products over a radio system there is involved in that effort a kind of conduct which this code would presumably seek to prevent.

*Question:* Mr. Sarnoff, do you say, or would you say that the primary purpose of this code is the benefit of the industry in terms of profit, mutual benefit of the units of the industry, which I understand is the purpose of most trade associations? I would say that the primary purpose of this code is

as in conflict with the other two or with each other. First, I should say that the purpose was to have a higher grade of public service or as high as can consistently be developed. Secondly, I would say that by adopting a code of self regulation in the industry, one would minimize the possibilities of the government imposing codes upon the industry, which ultimately would lead to censorship regardless of what the original objective might be.

In other words good behavior on the part of a citizen requires less operation on the part of the policeman.

The third objective is that any code which would improve the standards of broadcasting, satisfy more listeners, and eliminate the need for restrictive regulation would give the industry as a whole direct financial benefit, so that it would be both profitable and stabilizing.

*Question:* Is it your opinion, Mr. Sarnoff, that the possibility of censorship, which as I understand your view is inherent in regulation of programs, is such a danger that the industry should adopt self regulation to prevent regulation by government?

*Answer:* I think that is one of the reasons. The danger comes not from anybody desiring the government to censor programs. It comes from pressure groups, from complaints and the like. Now to the extent that those complaints, particularly justifiable complaints, can be reduced by a code of proper standards or by better programs, to that extent you eliminate the dangers and the hazards of censorship.

*Question:* Is there any censorship inherent in your scheme of self regulation?

*Answer:* No, there is no censorship inherent for two reasons. First, it would be a voluntary act on the part of the industry and the stations who would cooperate in the development of that code and to which they would voluntarily subscribe, and secondly I have not recommended a compulsion in it. I have recommended a system of education.

*Question:* There would be no sanction in the way of penalty or anything of that sort for any member of the code who violated it?

*Answer:* I am personally recommending none. I don't know whether there is any penalty contemplated by the NAB, but I would not recommend it. My feeling is that if you have 700 broadcasting stations and 650 or so conform to this voluntary code that a recalcitrant here and there would be punished by his own conscience and by social exclusion by the rest, and he after all would stand out by his difference. And that generally is the



experience. I don't mean to say that here and there there won't be some station that will violate the code, but on the whole I think it would be respected if the stations themselves cooperated in bringing it about and volunteered towards its adoption.

*Question:* Just what would be the difference in your opinion between the stations agreeing to adopt a certain code with respect to programs and that same code being written into legislation?

*Answer:* Why I think there would be all the difference in the world between the two. In the first place, I think that when you write it into legislation it has the element of compulsion instead of the element of persuasion. Secondly, codes of conduct and codes of ethics written into legislation are but the beginning, they are never the end. There is continuous modification and continuous amendment and change. That is one danger. And the other danger is that there is no amendment and no change to conform with the development of an art itself. It lacks flexibility. It becomes a rule with which the other fellow must conform or be punished.

*Question:* Mr. Sarnoff, I find it a little difficult to follow you there. You say that it will either lack flexibility or it will be too flexible. Now why wouldn't it be flexible enough?

*Answer:* It would lack flexibility if it were not modernized to keep pace with the developments of the art and it would have not too much flexibility but too much punishment if it became a political instrument instead of merely a voluntary code of ethics. After all legislation is often the result of pressure groups rather than because of the need of the moment. The legislators themselves are not always able fully to express in the law what they would like to have done or not done.

*Question:* Well now do I understand that you are not quite satisfied with our present form of government?

*Answer:* No, I don't see how you could read that into anything I say. I am so satisfied with our present form of government that I wouldn't like to see it changed, and I think that censorship is a change in the present form of government.

*Question:* Now wait. Censorship is your suggestion. I am asking you: You say there is no censorship in this code, and I asked you if it were enacted into law what would be the objection. Now I don't see how it would be censorship in one case and not censorship in the other.

*Answer:* Well the difference is that one is a voluntary act to

compulsion to which the citizen must adhere whether he likes it or not. And where you deal with programs, there is inherent in that the element of free speech and censorship. And therefore, any attempt to write into the law a censorship code governing programs would to my mind change our present form of government, in which I believe.

*Question:* Now just where does free speech come into this picture?

*Answer:* Well, free speech comes into this picture in a number of ways. In the first place it is necessary in dealing with freedom to begin at the beginning. Someone, I think some great economist once said: "He who controls that which is necessary to my life also controls my life." Now if the government controls the right of a station to exist at all by its ability to grant or to deny a license and then on top of that controls the program which may go over that station either through a legal code or through some other means of compulsion, it is not difficult to see that from there on the government controls the life of the station and the property of the owner of the station, and his response might be to the government rather than to his own conscience or what he regards his freedom of speech. And so he begins to play safely in refusing access to his facilities if the speaker engages in orations of a character that may be objectionable to the authorities. Now that,—I want to be very clear about it,—has not happened up to the present time. So far as the interests which I represent are concerned I have stated publicly and am glad to repeat on this occasion, that I don't know of a single instance where any compulsion has been brought by the government upon the National Broadcasting Company or its stations to accept or to refuse to accept programs. But I also say that under the present situation if the government brought such compulsion upon us we would resist it and we would feel that we had a right to resist it under the existing law. But if you wrote a code into the law we couldn't resist it, we would have to abide by it. And the code which the government would write might not necessarily be the code which the industry itself recommends.

*Question:* Well that might be quite true, Mr. Sarnoff, but I would assume that the code which would be enacted into law would be what the people of the United States would want to be the law.

*Answer:* Well I don't think it could be practically assumed that the people of the United States themselves are in a position to write a code to govern radio programs. They are in a position

to criticise radio programs. They are in a position to express their opinion or to express their approval or disapproval.

*Commissioner Thompson:* Would not the representatives of the people in the Congress have such a right, and such an understanding?

*The Witness:* I hope that they would, but I should doubt whether the congressmen themselves would be willing to undertake the responsibility of writing a code to govern broadcasting programs, but even if they were I would still say that if they undertook to write that program today and we granted that they had a right to write a code governing programs, then they certainly establish censorship by the government in direct violation of freedom of speech.

*By Mr. Dempsey:*

*Question:* Now that is the point that I would like you to explain a little bit, Mr. Sarnoff. Just what is violated in terms of freedom of speech? What provision of what law, where?

*Answer:* Well, as I understand the Constitution it gives the citizens the right to freedom of the press and freedom of speech.

*Question:* Mr. Sarnoff, the Communications Act of 1934 says it is a felony punishable by a \$10,000 fine and I think two years in jail if you speak over the air without a license.

*Answer:* Yes.

*Question:* Well that seems to violate the Constitution as you interpret it.

*Answer:* No, I regard that license, as authorized by Congress, to give the Commission the power to regulate the facilities because of the limitations of wave lengths. I do not regard that license as giving the Commission the power to regulate programs.

*Question:* Without regard to whether the Commission can regulate programs, you certainly regard the statute as preventing free speech or any kind of speech over the air without a license, don't you?

*Answer:* I regard the statutes as prohibiting the erection and operation of a station and the utilization of a frequency without the power of a license granted by the government, but I do not admit that once that license is granted that there is a denial of freedom of speech.

*Question:* How about the people who don't get licenses? Aren't they denied freedom of speech over the air?

*Answer:* Well, I don't think so because there is no such thing as freedom of speech over the radio for 130,000,000 people.

*Question:* That is right to the point. Don't you think that

the Constitution when it talks about freedom of speech means 130,000,000 people?

*Answer:* Yes, there is nothing to prevent any one of a hundred and thirty million people to have some broadcasting by having a soap box on a corner and saying anything they like within the law.

*Question:* And that is what the Constitution protects, isn't it?

*Answer:* Protects it, yes.

*Question:* But it doesn't protect 800 people the right to broadcast over the air as a part of the free speech guaranty?

*Answer:* Well, the guaranty of freedom of speech or freedom of the press provided by the Constitution gives the broadcaster, as I understand it, the right to have programs of his own selection over his station after that station is licensed, just as it gives the newspaper owner the right to print anything he wants in his newspaper, short of libel and sedition and so on, taking his own responsibilities for what he says or does. And the newspaper must also have a license, as a matter of fact. The newspaper is required to make application to the government if it wants to have a second class mailing privilege. Now the government because it grants the newspaper a second class mailing privilege and practically subsidizes it, doesn't at the same time say, "Well, we will determine what you may print in your paper," or, "We will adopt a code by Congress setting forth what your editorial policy may be or what your news policies may be." I plead for the same freedom in radio. I see no distinction.

*Question:* Mr. Sarnoff, isn't one distinction that anybody with money enough can go into the newspaper business?

*Answer:* Well I think that is a theoretical statement which in practical effect doesn't mean much. It is true that anybody with—

*Question:* It was true at the time the Constitution was enacted, wasn't it?

*Answer:* Well I don't know whether it was true then or true today. The practical situation is that you have some 700 broadcasting stations and I testified this morning to the possibility of having 7,000 or 70,000 broadcasting stations as this art develops.

*Question:* Well suppose we let the regulation of seven thousand go until we get them, and now talk about the seven hundred or eight hundred we have.

*Answer:* Well I think seven or eight hundred broadcasting stations are probably more in number than seven or eight hun-

dred of the important newspapers in the country. I don't know how many newspapers there are, but you take New York City as an illustration. There are more broadcasting stations in New York City than there are newspapers today.

*Question:* Well Mr. Sarnoff, it is your idea that the Constitution intended to permit the government through an agency such as this Commission to select some seven or eight hundred people and say to them, "You have the freedom of the air." And say to the rest of the hundred and thirty million people, "You shall not speak over the air except with permission of these people." Is that your idea of what free speech means under the Constitution?

*Answer:* No. I think I am bound to say in response that when the Constitution of the United States was written radio was not contemplated at all. It didn't exist and therefore nobody—

*Question:* Nobody even speculated about it?

*Answer:* —nobody even speculated about it.

I think that what the framers of the Constitution of the United States tried to do, and wisely in my judgment, was to preserve certain principles. Now those principles are not altered because in one case an idea comes off the printing press and in another case it comes off the microphone. Those principles I think remain just as sacred. It so happens that in the course of our own generation there has developed a new system of communication which has all this tremendous power and influence, and all the rest which has been discussed. But I read to you this morning a quotation from the President of the United States who goes on record to say that he perceives no difference between the press and the radio excepting only with respect to the need for regulating physical facilities.

*Commissioner Thompson:* Mr. Sarnoff, do you understand the President to indicate that he would like to see a one-man or a small group of men control all the social communications, control all the newspapers, or was he speaking of the radio as an individual instrument under certain regulatory body?

*The Witness:* The President made no such statement and I make no such statement. We are not discussing who should control a broadcasting station. As I understand it, the question directed to me is whether there should be a curtailment of freedom of speech over the air through legislation or whether there should be a regulation of physical facilities useful in radio communication, and the retention of freedom of speech over the air.

ment that he favors control by any one person. He doesn't and I don't.

*Commissioner Thompson:* Well you introduced the subject. Now I will ask this question: Is it your interpretation that one of the bases upon which licenses are granted in the public interest is solely confined to the question of the mechanical plant to use the frequency, or is it contemplated something beyond that?

*The Witness:* Of course it contemplated something beyond that. It contemplated a rule of reason, and it contemplated judgment, and it contemplated discretion all of which the Commission brings to its deliberations, but at the same time the law also expressly prohibited that which in my judgment would be created by permitting the Commission or Congress to write a code governing programs.

*Commissioner Thompson:* Well, is it your view that control of frequencies should solely be controlled by the licensees, or, as you speak of it, the industry?

*The Witness:* I have not recommended that the frequencies be controlled by anybody except the Commission.

*Commissioner Thompson:* You speak of free speech again. Is it your thought that free speech is to be controlled by a group of broadcasters controlling the air waves or free speech be subjected to some control by the Congress of the United States?

*The Witness:* I have not recommended that free speech be controlled by any group. I have recommended that each licensee operating a broadcasting station be free to exercise his own judgment with respect to the matter of free speech. I further recommended that all broadcasting stations should endeavor to produce and adopt a voluntary code of conduct which would produce the maximum of free speech, the best kind of programs and the best kind of service, but on a voluntary basis, not on a basis of regulation of programs by law.

*Commissioner Thompson:* Well would that have the effect of substituting the licensees for the government itself?

*The Witness:* No, any more than—

*Commissioner Thompson:* In the control of air waves?

*The Witness:* No, with all due respect it would have no such effect because it has no such effect today. After all, this question, it seems to me, can be best resolved by looking at the realities of the situation rather than the theories.

You have in this country freedom of speech, as I have tried to define it, now in existence on the part of broadcasters. You

have in foreign countries control of broadcasting by governments. Now, what is the record? Is the public getting a larger measure of free speech in Italy and in Germany and in Russia, or even in England and France than it is getting in the United States? And abroad, the governments control broadcasting.

*Commissioner Thompson:* Well, would you make a comparison between that form of government and the government under which we live?

*The Witness:* Certainly I make the comparison in favor of our present government. But if you go on writing regulations controlling programs, then this form of government will change in my judgment and resemble the kind of government that I don't like on the other side.

*Commissioner Brown:* As I understand, Mr. Sarnoff, your proposal is that Congress should not invade any further than they have in the present Communications Act in the curtailment of the right of free speech?

*The Witness:* That is my suggestion.

*Commissioner Brown:* Well, in the present Communications Act with respect to political broadcasts, that right is already curtailed somewhat, isn't it?

*The Witness:* Well, that right is specified by law. I don't regard it as a curtailment of free speech necessarily.

*Commissioner Brown:* So far as the licensee is concerned. I wasn't finished there. The licensee has no control whatsoever over that portion of speech on his broadcast station, has he?

*The Witness:* Yes, sir, he has control and the right to refuse the station to all political candidates.

*Commissioner Brown:* But if he permits it to one political candidate then he has no control over what may be said over his station?

*The Witness:* That's right.

*Commissioner Brown:* And likewise there is a curtailment of free speech or license, if you wish to put it that way, against profane, obscene or indecent language?

*The Witness:* Quite so and properly so.

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, going back again to the Constitution before we leave it for the afternoon. I think there is a difference between freedom of the press and freedom of speech, so maybe if I was a little bit more specific it would be easier. Freedom of the press guarantees that the man who publishes a newspaper or a magazine or a book or a leaflet or a handbill or whatever other form

he may take, can print what he pleases, write what he pleases, and disseminate those written or printed papers. Freedom of speech means a man can say what he pleases in any appropriate place.

*Answer:* Well even that latter is circumscribed. There is no absolute freedom. Justice Holmes once said: A man isn't free to shout "fire" in a theater.

*Question:* But except for things of that sort, that is the essential difference isn't it between freedom of speech and freedom of the press: one the right to talk and the other the right to write it down and pass it around?

*Answer:* I recognize no distinction between freedom of speech and freedom of radio, excepting—

*Question:* No, I am talking about freedom of speech and freedom of the press.

*Answer:* What is your question again?

*Question:* Freedom of speech means freedom to say what you want within certain appropriate bounds. Freedom of the press means freedom to write what you want to write within certain appropriate bounds, and to prevent other people from writing on the same piece of paper and getting you to distribute it. That is about what the two things stand for. And it is a right which every one of a hundred and thirty million people in the United States has and it is protected in every one of that hundred and thirty million by the Constitution.

*Answer:* Yes.

*Question:* Now freedom of radio, as I understand your definition of it, is the freedom of the licensee to put what he wants on the air and keep what he doesn't want to go on off the air as far as his transmitter is concerned, and that is a right that by license from this Commission is vested in only about 800 people, and that you think is comparable with the right that a hundred and thirty million people have, and is entitled to the same kind of constitutional protection in the democracy?

*Answer:* Well I think in the first place that freedom of speech and freedom of the press are not the same things.

Therefore—

*Question:* I thought I differentiated them.

*Answer:* But you are now, in comparing freedom of radio making a comparison between freedom of radio on the one hand and freedom of speech and press on the other.

*Question:* Well, compare it with either one.

*Answer:* All right. Now, as compared with a hundred and

thirty million people I think neither the press nor the radio afford physically that measure of freedom that the individual has in speech.

*Question:* Well, Mr. Sarnoff, you understand, do you not, that under the Constitution you can go out of here and print a newspaper, you can typewrite and make a dozen copies and pass them around, and that is protected by the Constitution under the provision on freedom of press.

*Answer:* Yes.

*Question:* You don't have to have a newspaper plant. You might not get your information spread as widely as a newspaper but your right to print what you want to print and disseminate that is guaranteed just as much whether you own a newspaper plant, or not.

*Answer:* Well, all right. Now dealing with freedom of speech, I recognize that a hundred and thirty million people who were able to speak and who have freedom of speech can speak. I realize also that in the case of newspapers the mere right that a man has to start a newspaper provided he has enough money and he has enough circulation and so on is also a right of freedom, but as a practical matter while he may not have it in radio today because there are 700 broadcasting stations I don't think that you can assume that there will necessarily have to be less broadcasting stations than there are newspapers in this country if the limitation is imposed because of technology.

I tried to say this morning that—

*Question:* Yes, but again, Mr. Sarnoff, if you are talking about the future, we are unfortunately faced with the problem of dealing with the present before we get to that.

*Answer:* Yes. I don't think that it is unfortunate. I am talking about the future because you are talking about legislation for the future. Now the minute you use the present situation upon which to base legislation to govern the future, you are talking about the same thing I am talking about.

*Question:* Well, how far in the future? I suppose when future events come to pass and change is necessary the statutes can be changed. They have been.

*Answer:* Well, of course anyone that enters the field of prophecy enters a hazardous field, but so far as my own opinion is concerned the kind of things I am talking about are within the next few years, five years, perhaps 10 at the most. Now if there were a situation in this country at the present time that public feeling that there is a denial

of opportunity for people to get their various points of view across to the listeners I should be sympathetic with the need for immediate legislation to correct those abuses, but I submit, and there is plenty of testimony to back up that statement, that there is a larger measure of freedom today for the expression of practically all points of view in the United States than there is any other country of the world or that there ever has been here. Now where are these abuses or where are these limitations—

*Question:* We are not discussing abuses, Mr. Sarnoff. We are discussing the question of whether the amount of freedom which should be allowed is entirely a matter of individual personal preference with the licensee.

*Answer:* Well, I think when you discuss that, Mr. Dempsey, I think it only fair to say that when you compare the existing situation and call attention to certain of its limitations, whether that be because of physical limitations or otherwise, and compare it with a non-existing situation, all of us are apt to fall into the error of comparing the limitations of the things we know with the virtues of the things we don't know.

Now if you are going to compare the present system of American broadcasting, which is as free as the present law permits, with a new system which will have regulations imposed upon it by law, then it is the net result of that comparison that counts. And I submit with all sincerity and with all earnestness that the minute that you get the government writing codes governing programs and saying who may go on the air or who may not go on the air, that regardless of the best intentions in the world, regardless of the desire of the Commissioners and Congress to avoid censorship by the government, that you will then destroy the present American system of broadcasting, that you will have censorship galore, that you will have dictatorship of the means of communication and that you will shake the very foundations of our democracy.

*Question:* Mr. Sarnoff, what troubles me about your suggestion is this: Assuming all the evils that you impute to the government selecting who shall talk over the air and who shall not be permitted to talk over the air, and assuming that it would be impossible to appoint qualified people to make that selection, how can we be so sure that this Commission can select licensees who will have that necessary good judgment?

*Answer:* Well, all you can do is to rely upon the best judgment that the Commissioners have upon their performance and

upon how the pudding tastes when you eat it. Now you have 13 years of experience with the American system of broadcasting. If that 13 years had developed serious abuses, if it had developed restrictions, if it had denied opportunity for various points of view to reach the American people, then I would say it has been a failure. But the exact opposite has been the result and the record. And therefore I think the American system of broadcasting has been a success.

*Question:* Well by the same argument that you use, Mr. Sarnoff, for 13 years this Commission and its predecessor have operated without ever attempting to bring in any of this vicious government interference with free expression over the air.

*Answer:* That is why they have been successful.

*Question:* Well, do you think that they will change all that?

*Answer:* If they bring in these vicious things that I am talking about, then yes, they will change it.

*Commissioner Walker:* Let me ask a question: Who is suggesting these things that you keep recounting here, that somebody is going to take over your programs and tell you what to put on the air and what not to put on the air, where do you get that suggestion?

*The Witness:* All this discussion, Mr. Commissioner, arose out of the question put to me as to whether I would object to having Congress write this code as against the industry itself writing the code.

*Commissioner Walker:* Well, what code?

*The Witness:* The code of standards governing the programs of broadcasting stations in the United States.

*Commissioner Walker:* Well, has anybody here suggested that Congress write a code telling you what kind of programs to put on the air and what kind not to?

*The Witness:* Yes, that was inferred in the question; yes, sir.  
*By Mr. Dempsey:*

*Question:* I don't think you quite understood the question, Mr. Sarnoff. I don't understand that your code says by name or by description the people who shall be permitted to talk over the air, nor does it say what they shall say or what they shall not say. It provides that certain opportunities will be given for the expression of different points of view. It provides also, as I understand it, that high quality programs of an entertainment kind will be put on, and that certain advertising which is not believed to be the best thing for radio transmission shall not be accepted.

Now I don't see anything in that code,—maybe I am not familiar enough with it,—which indicates censorship, whether it is written as a government regulation or an industry agreement.

*Answer:* Well, the code is pretty formidable. I would hesitate to undertake to read it but I would be glad to.

*Question:* Well, then perhaps you had other things in there that shouldn't be there that go too far in controlling the station.

*Answer:* They are not too far if they are self imposed.

*Commissioner Thompson:* May I interrupt there to ask this question:

Presume some man wants to make a speech. He goes to a program manager and he is denied the right. He was willing to pay for it. The National Broadcasting Company says "No time will be available; we will not permit it." Do you feel that that should be definitely left to that decision, or should that man who sought to speak on your chain have any right of appeal to his government?

*The Witness:* Why I think in the first place it would do him no good to have a right of appeal to his government because the government couldn't make it possible for every one of the hundred and thirty million people in the United States to buy time on the air.

*Commissioner Thompson:* Well, that is an extreme presumption that a hundred and thirty million people want to do so. I sought to make a rather definite point whether or where a licensee should decline to accept pay for time, should that denial rest right there or should he—

*The Witness:* Yes.

*Commissioner Thompson:* That denial should rest right there?

*The Witness:* Yes. I submit that—

*Commissioner Thompson:* Then a citizen would be censored without any appeal to his government, would he not?

*The Witness:* Yes, if you put it that way, but it doesn't work out that way because in the first place—

*Commissioner Thompson:* That would be the effect of it though, wouldn't it Mr. Sarnoff?

*The Witness:* No, no, the only thing that would create that effect, Mr. Commissioner, would be if in the final analysis that man was unable to get his story across. Now if he comes to the National Broadcasting Company and the National Broadcasting denies him the opportunity to speak, he still can go to Columbia or the Mutual or to local stations if he wants to. Furthermore,

the major broadcasting networks refuse now to sell time for controversial matters.

*Commissioner Thompson:* It might not be a controversial matter.

*The Witness:* Well, if it isn't then the network doesn't sell time either but makes time available under a sustaining basis. Now what is the record? Has any group of people here or any institution failed to have an opportunity to get its voice heard by the people of the United States? Every congressman, every senator, the head of every educational institution, and so on and so forth, you know as well as I do, has had more than ample opportunity. As a matter of fact the people of the United States think there is altogether too much talk on the air now.

*Commissioner Thompson:* Of course that is outside.

*By Mr. Dempsey:*

*Question:* Why don't the broadcasting stations do something about it, Mr. Sarnoff?

*Answer:* Well, they are doing the best they can to get the most interesting speakers to balance their programs. I don't say that they have arrived at perfection. They do something about it, and the minute they do there is a holler.

*Commissioner Thompson:* One more question.

It was your thought in this voluntary code that there would be some man chosen to be the arbiter or the referee, whatever term you may give him. Is that right?

*The Witness:* Yes.

*Commissioner Thompson:* By whom would he be paid,—the industry?

*The Witness:* Presumably by the National Association of Broadcasters.

*Commissioner Brown:* I notice in the last paragraph of the two-page memorandum which you submitted, it states: "The Code also calls for the setting up in the NAB of an enforcer whose duty it will be to interpret the Code to individual stations, networks, agencies, advertisers, and groups of the public which are affected." Don't you think that "enforcer" is somewhat of a misnomer?

*The Witness:* I think so, yes. I didn't write that. I think it is a bad word, in the light of my philosophy.

*By Mr. Dempsey:*

*Question:* Supposing they should set up an enforcer, Mr. Sarnoff?

*Question:* Supposing they should set up an enforcer, what would you think about that?

*Answer:* Well, I would think he couldn't get away with it if he wasn't the United States Government.

*Question:* So that no one could really compel any adherence to these standards?

*Answer:* No.

*Question:* And you think that the standards should be adhered to?

*Answer:* I believe they should and I believe they will in the majority of cases.

*Question:* But you don't think anything should be done, or not?

*Answer:* Well, I think every effort at education and persuasion should be made, but I assume that nothing will ever be a hundred per cent perfect.

*Question:* Mr. Sarnoff, did I understand that you said this morning in answer to a question from Commissioner Thompson that as far as the public is concerned the service rendered by broadcast stations is a program service?

*Answer:* Yes, sir.

*Question:* The purpose for which they are licensed, in other words, is to render a broadcast service, the purpose for which frequencies are set aside in the broadcast band which provide for that broadcast service. Is that right?

*Answer:* Yes, sir.

*Question:* Now, what do you think the Commission's problem should be in considering whether or not to grant a license? Should it go into the question at all of whether this man, the applicant or the corporation, whatever it may be, has any prospect of rendering a good program service?

*Answer:* Are you referring to an individual station or a network?

*Question:* An individual station.

*Answer:* Why yes, I think that is one of the elements that should be taken into account.

*Question:* You think that it would justify refusing it if it appeared reasonably that the applicant did not possess qualifications in that regard? In other words, that he didn't appear to offer reasonable prospects in offering to the public a good program service?

*Answer:* Why I think it would justify the refusal provided the facts were clear and there was no reasonable doubt about it,

particularly if it involved taking a license away from one and giving it to another.

*Question:* Let us just take the case of a new application for facilities not now being used.

*Answer:* Well, I should be inclined to have a liberal policy towards a man who was asking for a wave length not now being employed, I would give him the chance to try it out and then if he failed I would deal with him upon renewal.

*Question:* What would you do, deny the renewal?

*Answer:* Well, if at that time I had a clear record of his failure, yes, I would deny the renewal, particularly if that same wave length would be more usefully employed elsewhere. If it was a wave length that was not being used at all and if he wasn't doing any harm or damage, maybe not doing as good a job as he ought to but not profane or obscene or objectionable, why I would be inclined to be liberal there, too.

*Commissioner Brown:* What elements would you take into consideration in determining whether or not he had been a success or failure?

*The Witness:* Well, I should say the record as a whole, the arrangements of his programs in so far as one could get them, the standing in the community, letters that he receives, and so on. Before I arrived at the point of refusal I should want to make a pretty exhaustive study particularly if I were refusing a man who was doing no harm and asking for a wave length that wasn't otherwise employed.

*Commissioner Brown:* But you would take into consideration the programs that he had been putting over the air?

*The Witness:* I would take into consideration the public service which he renders, not from the standpoint of anything except the net result of his public service.

*Commissioner Brown:* Taking it as a composite?

*The Witness:* As a composite thing, yes.

*Commissioner Thompson:* Then you believe my views as expressed a moment ago, while we disagree that in the public interest the Federal Communications Act of 1934 means more than the mere question of supervision of the transmitter and antenna?

*The Witness:* I don't think, Mr. Commissioner, that you and I would be in disagreement at all if we had the same attitude toward the result. If the attitude is getting the largest measure of public service with the maximum freedom from government censorship, why certainly we couldn't maintain the proposition

for a moment that the Commission shouldn't take into account the character of service which was being rendered by a station. But if—

*Commissioner Thompson:* Just a minute now. You keep referring constantly to censorship. Have you seen any evidence of censorship? I want to be sure that the word censorship is not used as confused with the question of regulation, for censorship and regulation are two very distinct and different things. A few moments ago I put into the record, immediately after we convened after luncheon, a statement of the Chairman which expressed my own views and I indicated I thought the Chairman expressed the views of the Commission, but you refer to censorship. Where has there been any evidence of censorship, in the offing, or is censorship at the present moment being used as a red herring to draw away from the picture the question of regulation? I think that is very important, that you ought to give some definite statement of whether any effort has been made of censorship at this particular moment and not confuse it with the mere question of regulation; either by the government of something belonging to the people, and under which Congress certainly must have some power to control and regulate.

*The Witness:* Well, Mr. Commissioner, I think you have made a very fair statement and observation and I want to be equally fair and frank in my response, if you will permit me. I am not certain at this moment whether the difference between you and me, if there be a difference, arises out of a difference of definition or whether it arises out of a difference of attitude. Now it may be that if the difference arises out of definition, that is, if you, and I are talking about two different things, then I think we can get together without having any question of censorship involved. To illustrate my point: Before this morning's session adjourned you asked me the question of whether I would object to a licensing of networks and I immediately used the word censorship. Now I am sure that you did not have in mind censorship when you asked me that question.

*Commissioner Thompson:* Not at all.

*The Witness:* But I am equally sure that licensing of networks will result in censorship. Therefore it doesn't make much difference whether the motive is laudable if the net result is evil.

*Commissioner Thompson:* Well I think the point was raised by me, so that since the word censorship should not have been injected or confused by citing a possible situation. Where a licensee has assigned 100 per cent of his time and given an option



on 100 per cent of his time and in that period of time the network probably furnishes the licensee with something that arouses complaint, probably that consideration should be given to this licensee as to renewal of his license, when in reality due to the present existing situation at the time the license is passed in effect out of control of the licensee? I question whether or not in such a situation it would not be proper for the networks to come under some measure of supervision or control of the Communications Commission, for unless it is obviously so, so it seems to me,—I don't make too arbitrary a statement about it,—that when this Commission grants a license to a corporation or individual to operate a radio station, assigns them a frequency, and in turn that licensee assigns his time, he then assigns the essence of that license to someone outside the control of this Commission. Although he proposes to sell that station or to sell the stock in that station before the consent is given for such transfer, the Commission very industriously, very carefully investigates the standing, the financial and the moral standing of the proposed transferee. We do not have any such opportunity, although the effect may be classified as the same. Where the licensee enters into an agreement to transfer all the time or give option of all the time to someone else, it raises the proper question that in such situations whether or not the one authority,—it may not be the best authority, its personnel may not be the choice, but it is the only authority there is,—whether they should not have some voice in that question of transfer of the frequency to someone else not under the control of the Commission. I would like to make clear what is in my mind. And there was no element direct or indirect or by implication any question of censorship involved at all.

*The Witness:* All right, sir, I will try to undertake to answer that.

I should like first to call your attention to the fact that up to this time I have not answered that question because other questions were submitted to me.

Secondly, I should like to say that I am thoroughly certain in my own mind that you did not have and do not now have any idea about reading censorship into that thing.

Thirdly, I would like you to believe that I am equally sincere in saying that it would result in exactly censorship.

Now then, I think having made that statement clear, I should support that statement with such observations as seem clear to me.

*Commissioner Walker:* And while you are doing that will you

explain why there would be any more censorship with licensing a chain than there would be over an individual station through the licensing of that individual station?

*The Witness:* Yes, sir, I will do that.

First, I should like to say to you that speaking for the company I represent, there is no station on our chain which is obligated under contract to take any program whether it be on sustaining time or commercial time that it does not want to take. It has the right to reject.

Secondly, I should like to say that all the stations on our chain have optional station time equal to at least 50 per cent of the total time that they are on the air. During that 50 per cent of the optional time they are free to do anything that they like locally with their own stations, put on any programs that they wish, either commercial or sustaining.

In the third place, I should call your attention to the fact that the minute a person takes control of a microphone and stands before that microphone that the control of that station is in the hands of that person. He is utilizing that frequency. And so it is no different when a congressman speaks or a senator speaks or an advertiser buys that time there is a transfer in fact of the benefits of that frequency to the person who is using it for the time and during the time that he is using it, if I may be permitted to complete that analogy.

Now, if you are going to license the organization which creates and produces the program in addition to or as distinguished from the physical agency which sends out that frequency you are introducing a new philosophy into the radio licensing structure of the United States. What you are then saying in effect is that you are going to license the program creating agency which may be doing nothing but creating programs. To carry that analogy further you ought to be licensing the program department; you ought really to be licensing the individual who uses that frequency at the time that he uses it. Now I recognize of course that that is not your intention, but I do say that the minute you give to the licensing authority the power to regulate the program-creating agency, you are regulating the entertainment field and the educational field and the news field and the picture field. You are not merely regulating a radio frequency emanating from a radio transmitter.

Well, the minute you have that character of regulation in your hands and you have the power, I am not suggesting any desire for abuse but I am submitting with all due respect that there then

resides in the hands of the regulating body almost unlimited power to license everything from the beginning to the end. You might then well say, "Well, the National Broadcasting Company is owned by the Radio Corporation of America, therefore we ought to license the Radio Corporation of America, too, since they own the networks and we ought to bring them in, under the regulation of the Commission." And so on ad infinitum.

Now, the minute a government regulating body has the legal authority to regulate every step of operation then it has in fact the power of censorship because censorship must not be mistaken as limited to the blue pencil. There is censorship before the speech and there is censorship after the speech, and you can regulate them in a dozen different ways which would make the station operator subject to the most rigorous type of government censorship.

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, I understood you to say a while ago it was your opinion that the Commission should refuse to renew a license or refuse to grant one if there was a clear indication that a good program service would not be rendered. I think you indicated that the best evidence would be what kind of service had been rendered, but if bad program service had been rendered a renewal should be denied. Now, am I right in saying that was your view?

*Answer:* If it was a clear case of—

*Question:* Well, just as you say it takes judgment to run a broadcast station, I think you will probably concede it would take a little judgment to determine those questions if granting or denying licenses, on the part of the Commission.

*Answer:* Well, I shouldn't like to read new words into the present law, but I am perfectly ready to admit that it is within the power of the Commission now to refuse a license to a station that fails to serve public interest, convenience and necessity.

*Question:* And the service of public interest, convenience and necessity is program service as you have said?

*Answer:* Must include it as one element, yes.

*Question:* And you think it then not only perfectly proper but the duty, I suppose, of the regulatory agency or this Commission or any other agency that would be set up to license broadcast stations to consider whether or not a licensee has rendered a good public program service in determining whether or not to grant a renewal?

*Answer:* Yes.

*Question:* And that that is a proper consideration?

*Answer:* I think so, yes.

*Question:* Well now, do you think that entails censorship, involves censorship?

*Answer:* I think as exercised by the Commission to date it has not involved censorship. One of the reasons has been the present law, because public interest, convenience and necessity after all is a general term. It has been defined liberally. There is an express provision in the law against censoring programs and all the like, and so the cumulative effect of the language used in the present law has resulted I think in no censorship, as I have testified.

*Question:* All right. Now, Mr. Sarnoff, there has been considerable, I don't know whether to call it complaint or criticism, but there have been a number of suggestions as I understand emanating from the industry that they would be in better position if there was some clarification of minimum standards of good program service so that they would know with respect to a particular program whether they were taking a chance on being held to have rendered a bad program service if they put those programs on. So that if it was perfectly plain and clear not with respect to the language of a speech or anything of that sort but just general standards it would have to be complied with.

*Answer:* This is the first time I hear that anybody in the industry has recommended that the government set program requirements, but whoever did it, I want to disassociate myself from that part of the industry.

*Question:* You think it is better to leave it without clarification and as a matter for consideration in an individual case as to whether some of the program service has been good or bad.

*Answer:* Yes.

*Question:* And you think that these standards in your proposed code or the proposed code of the NAB do nothing more than define what good service is as compared to bad service. Is that correct?

*Answer:* Well, I haven't yet read the code of the NAB and so I am not really in a position to comment on it, but I understand the purpose of that code to be in the direction you have just stated.

*Question:* You think it would be impossible to write such a code?

*Answer:* No, I think it is quite possible to write such a code.

*Question:* And you think it possible to do it so that merely the clarification of what good program service is was defining

certain limits beyond which program service could be held to be bad?

*Answer:* Yes.

*Question:* Without going into the question of censorship?

*Answer:* I think it is quite feasible as you will see from this NBC document that I am presenting here.

*Question:* Well now, on that basis if the statute were clearer or if the rules of the Commission were clearer or if it made rules on this point which did not attempt to dictate a particular program but indicated the general level which would have to be reached, for example an advertising content as to what products or what type of products should not be advertised. Do you think that would be censorship?

*Answer:* I should prefer to see just what was said and just what language was used before I expressed an opinion about it.

*Question:* Well, do you think it possible to devise language that would not involve censorship?

*Answer:* Well, offhand it is difficult for me to see how the government could write a code which would say, "Don't say this in an advertisement" and "You may say that in an advertisement" and still avoid the element of censorship.

*Question:* Supposing it said no drugs shall be advertised that haven't been approved by the Pure Food and Drug Administration.

*Answer:* Well, that might be all right. As an isolated instance. I don't know of any objection to that kind of a statement.

*Commissioner Thompson:* Would you classify that as censorship?

*The Witness:* No I wouldn't if it was limited to that.

*Commissioner Thompson:* If as I notice there were pending in the Congress a bill asking the committee to bar certain commodities from being advertised, would you call that censorship?

*The Witness:* Well, I should say that any law which said that things that are outlawed as articles of commerce should not be advertised over the air, I shouldn't think that was censorship, no.

*Commissioner Thompson:* Well this wasn't a thing barred, wasn't a commodity barred by the law. This was probably where Congress may have reached out, involving some moral question. I asked the point there, do you think that would be censorship. Congress said, "No advertising of this particular type shall be broadcast." Would you call that censorship?

*The Witness:* I would want to know what particular type before I answered that question.

*By Mr. Dempsey:*

*Question:* Well, there is a bill pending on alcoholic liquors. Do you think that is censorship?

*Answer:* Well, if Congress passed a law that there should be no advertising of alcoholic liquor,—I can't imagine that it would pass that law and confine it to radio. I imagine that if it would pass that law it would also apply it to the press.

*Question:* Magazines, too?

*Answer:* And magazines, too. Now if Congress wants that nice little job, why—

*Question:* Assuming that Congress would, would you say that was censorship?

*Answer:* Well, I wouldn't say that was censorship of the radio if it also applied to the press. I wouldn't say that was particularly censorship of the radio.

*Question:* Well, if it would be censorship of both it would be censorship of either, wouldn't it?

*Answer:* Well, I should say that the mere act of Congress in saying that you may not advertise liquor, I am not a lawyer, please understand that I am not able to discuss the law, but I should question whether that was a constitutional thing for Congress to do. It would be another form of Prohibition. We just got through with Prohibition a little while ago.

*Commissioner Thompson:* Let us elaborate a little on that, Mr. Sarnoff. Suppose Congress should determine, as was indicated by the committee, that alcoholic liquor would be prohibited from being broadcast and they applied that rule in no other form whatsoever. Would that be interpreted by you as censorship?

*The Witness:* Well, it would be interpreted by me as unfair legislation, yes.

*Commissioner Thompson:* Well, it might be unfair legislation, but would it be censorship?

*The Witness:* What difference would it make if once it was the law what I thought about it? If Congress passed that law, I would have to abide by it on the radio.

*Commissioner Thompson:* Well, let us carry it a little farther. The Government of the United States, or the Congress of the United States doesn't own any press associations, does it?

*The Witness:* The Congress of the United States doesn't own any radio station.

*Commissioner Thompson:* Well, the government, I mean. The Government of the United States doesn't own any press association transmitting news, does it?

*The Witness:* I think the government does a little transmitting of news, yes, sir.

*Commissioner Thompson:* No, I am trying to develop a point. The question is, does the Associated Press, the United Press, the International News Service, the Universal News Service, does the Government of the United States own any press association?

*The Witness:* No, I don't think so.

*Commissioner Thompson:* Does the Government of the United States own the air waves?

*The Witness:* Well, if you mean the people of the United States, the answer is "Yes." If you mean the government, the answer is "No."

*Commissioner Thompson:* Well, I interpret the government as the people of the United States.

*The Witness:* Well, the government doesn't own the property of the people of the United States.

*Commissioner Thompson:* Well, let us say the people of the United States don't own a press association, but it does own the air waves. Now where does it control it? Does the government control the air waves?

*The Witness:* Well, I have said during my previous testimony today, that I think it entirely proper for the government to regulate the air waves in the sense that the present law gives the government the power to regulate them.

(Discussion off the record concerning time of adjournment.)

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, going back again. You believe it is the Commission's duty, one of the, I would assume, important elements in determining whether or not to renew a license or to grant a license, to determine whether or not the licensee is qualified and would in all likelihood render a good program service. Now, as I understood you in answer to Commissioner Walker's question you said that some 50 per cent of the time of affiliated stations is optioned to the National Broadcasting Company. And I understood you to say further that if bad programs came over that station, the station rendered poor program service, that it was the responsibility of the licensee and that he should bear the brunt of the denial of his renewal and that there should not be any extension of the Commission's authority to the National Broadcasting Company or any other network under the same circumstances. Is that correct?

*Answer:* That is correct.

*Question:* You also admit I think that as a practical matter

a licensee of a station if it is affiliated with a network can't exercise any judgment with respect to individual network programs. He has to take the network pretty much on faith because he can't pre-audition the programs that are coming over the wires.

*Answer:* Oh, yes, he can.

*Question:* How can he do it?

*Answer:* We submit to our broadcasting affiliates all commercial programs 28 days in advance of the time when they get the programs. They know the character of the program, the script—

*Question:* Mr. Sarnoff, I don't mean to try to check you in any small detail or anything of that sort, but the testimony has been up until now that the stations are notified 28 days ahead of time that a certain advertiser has the hour and the program will be a variety program or music or drama and if it is available the names of the principal actors, but not copies of the script because very frequently that script is revised within an hour of the broadcast so that they can't either read the script or actually hear the program until it comes over their station.

*Answer:* Undoubtedly true, if that is the information you have been given by the program department. But my general impression is that substantially a month in advance of the program the broad character, or the broad outline of the program is made available to the station, and even a sustaining program is described as far in advance as possible. I recognize of course that there is spot news and last minute changes and all that kind of thing, so that as a practical matter the individual station may not in each instance have the direct opportunity, but he has had the opportunity to select his network affiliation, to begin with.

*Question:* That is what I say. It is largely a question of taking the network on faith rather than the individual programs. The information about a particular program, as I understood the testimony, is probably considerably less information than you get on a moving picture or a show before you actually go in and see it.

*Answer:* That is possible.

*Question:* So that until you actually hear the program you would not know just whether it was a good or a bad program; he has to take that on faith with his network affiliation. Now, do you think that is a consistent system that the licensee makes a network commitment of 50 per cent of his program time know-

ing in general when he makes it very little more than that he hopes that network will come through with good programs?

*Answer:* Well, all I can say as to that is again, that the proof of the pudding is in the eating. Again I cite that over a period of 13 years from the total operation of all the networks in this country there have only been two or three instances where this Commission felt it necessary to take cognizance of the complaints about programs. Now that means the system is working pretty well.

*Question:* Mr. Sarnoff, as you say the proof of the pudding may be in the eating, but the question of whether the licensee is going to get acute indigestion is something that he never can be quite sure about until these programs come over. Now, supposing that as you suggested this morning it is possible to have a new network start up and he won't have any past history of operation. You have to take that on faith. Now do you think that the Commission should renew a license or grant a license knowing that 50 per cent of that time is going to be practically controlled by an organization which is not subject at all to the Commission's scrutiny, about which it knows little or nothing, and can know little or nothing?

*Answer:* Well, I think that the Commission's duty and the station's duty are the same in this respect, that the station that puts on the program must be liable for any violations of the license, and must be responsible for what it does. As a matter of fact even in a press association, while in theory the city editor has an opportunity to look at the news bulletin before he prints it, nevertheless when he gets a news flash from the Associated Press or the United Press or any other reputable press organization he prints it and if he should print misinformation or libelous information, the individual newspaper is held responsible for what it does and the press association itself is not the one that is looked to as the sole source of responsibility. When the individual newspaper selects the press association it places its confidence on the basis of its record.

*Question:* I don't think there is any question that it is a perfectly satisfactory system of placing ultimate responsibility with the object of imposing penalties to say that the station licensee, having a license, shall be liable for whatever comes over the air, but the licensing problem, I think you will admit is quite different. The Commission must try and determine whether the programs that come over are going to be good or not. It isn't enough to

... liable if they are had. It is a question of

finding somebody with good judgment to select them in the first place.

*Answer:* Well, when you come to the renewal of a license of an individual station you can then take into account the sum total of its public service, and I think that the record will show that those local stations which have been affiliated with networks have as a practical matter given a larger measure of public service and a better measure of public service than those which have not been affiliated. So why worry about the network?

*Question:* I am not sure whether everybody would agree 100 per cent with that opinion, but assuming that they would. The question is, should the licensing authority select the person who is going to be responsible in the sense of having actually selected or rejected the program material? Should it license him or should it license somebody else?

*Answer:* It should license the station that uses the frequency which the Commission authorizes the station to use. The minute it goes back of that, as I tried to say before, it can't merely license a network as such because it is then licensing a program institution, and then it must license the entertainment, and then—

*Question:* Well, isn't it licensing a program institution when it licenses a station?

*Answer:* Well, it licenses a station to utilize that frequency for public service. That station is free to get its service from anybody it chooses, not merely from a licensed network. It can get its program from an advertising agency or it can get it from an entertainment service or anybody it wishes, but once you impose the licensing system you limit that local station so that it will have to deal with licensed networks.

*Question:* That is true.

*Answer:* Well, that is putting an imposition on them.

*Question:* Well, as I understand it now, taking a station that is not affiliated with a network, that licensee is selected and has the obligation of choosing good programs. That is the purpose for which he is licensed. Now he may or may not listen to each singer or go over the script of each talk that is put on, but if he is living up to the responsibility of his license he does make an intelligent effort to select good program material. Do you think that that is the proper thing, but that as far as networks are concerned his only selection should be which network he will pick?

*Answer:* That's right.

*Question:* And he should have no selection as to the actual program material that comes from that network.

*Answer:* Except as I have indicated before, he has the right of rejection in so far as the physical—

*Question:* But his rejection would have to be based on a hunch in 99 per cent of the cases?

*Answer:* And on the record of the service that he is subscribing to.

*Question:* Well, I suppose he would have to cancel his contract if he felt that the network wasn't good?

*Answer:* Yes, and go to another network.

*Question:* Don't you think that the network in effect does get control of the station? I am not talking now of control in the sense that it dictates its policies, but it does get 50 per cent of the time on which it can put programs of its selection as distinguished from the licensee's selection?

*Answer:* Well, I don't regard that as getting control, no, any more than—

*Question:* Well, don't let us quarrel about the terms. It does, that situation does obtain, though?

*Answer:* I think if you are going to continue the present system of American network broadcasting I know of no other way by which it can be continued except by the network system to have a right-of-way for a specified period of time over a given number of stations. Otherwise networks can't make contracts with advertisers. That is inherent in the situation.

*Commissioner Walker:* Well, then as a matter of fact who has control of the station, the licensee or this Commission or the chain which has the exclusive contract to broadcast over the station?

*The Witness:* Well, in our case as I have said, as to half of the time, the local station itself is free. As to the other half it is at least free to reject within the physical limits that it can reject. As to the remainder of the time, obviously the network itself having sold that time to an advertising client has as a practical matter transferred the use of those facilities to the program agency. It is just as proper to say that the advertising client controls that station as it is to say that the network controls that station.

*By Mr. Dempsey:*

*Question:* Mr. Sarnoff, the testimony has all been to the effect that while the advertising agency may bill the program that Mr. Royal or someone in his department scrutinizes that program

very carefully before it goes on the air and eliminates any part of it that he doesn't feel would be proper from the standpoint of NBC, so that he actually or someone working with him scrutinizes and selects and rejects not only the general program but the particular program very carefully before it goes out over your network. Now, the licensee just can't do that when he takes network programs. He can do it when he takes local programs whether they are built by an advertising agency or not.

*Answer:* Well, to that extent the licensee or individual owner depends upon service rendered by the network.

*Question:* Well, don't you think to that extent it might be said that the station is licensed half to the network and half to the licensee?

*Answer:* Well, you could say it; but that wouldn't alter my opinion as I object to the government controlling a program whether it is a program by the network or whether it is a program by the licensee.

*Question:* Well, no one has suggested that the government control the program. You have said that the government should take the station off, if the programs are bad.

*Answer:* Well, what is the purpose of licensing a network?

*Question:* What is the purpose of licensing a station for broadcast purposes?

*Answer:* You are licensing the individual station because you are licensing it to use a certain wave length, a certain facility and a certain electric power, and to observe certain laws. Now, when the station fails to do any of those things, you can terminate the license.

*Question:* And one of those things is render program service?

*Answer:* Yes, but not the character of the program service in detail. I am speaking of the broad public service.

*Question:* Yes, program service.

*Answer:* Now, the network as a matter of fact isn't using radio at all, so long as it is confining itself to programming, it is in the audio end of the business and not in the radio end of the business.

*Question:* That is quite true. But the licensee to the extent that he carries network programs is not in the audio business at all. He is only in the transmitting business.

*Answer:* That is right.

*Question:* And one of the important elements which he should be in is removed from him by his network contract?

*Answer:* Well, suppose you were to conceive on that theory

that 10 local stations, say independent stations, decide to make contracts with Amusement Agency X to get all of their artists for those 10 stations, and then they hook some wires into that agency. That agency becomes a network programming service, and I maintain that that does not give the government the right to go and license that amusement agency.

*Question:* Well, do you think that a licensee would have the right to turn over his facilities so far as programming is concerned to a third person and that the Commission would have no concern with that at all, to renew his license, or a man could come in and ask for a license and say, "The whole question of programming is going to be handled by X. I am not going to have anything to do with it. I am only going to run the physical facilities." Do you think he should be granted a license if we don't know anything about X?

*Answer:* Well, I am not suggesting that particular operation. I do maintain that those stations that I have referred to theoretically would have the right to appoint that agency to sell half of its time or whatever percentage it determined on, for amusement purposes and that that agency would have the right to furnish those services to those stations without a license from the government and that when each of those 10 stations came up for renewal of their licenses the question of the kind of service that they rendered to the public, and not from whom they received the programs, should be the determining question whether the license should be renewed or not.

*Question:* How about granting it in the first place?

*Answer:* Granting it in the first place? Well, I told a long story this morning encouraging you to grant licenses particularly to those people who would like to create networks that do not now exist. I don't know why there is so much talk about existing networks when all this space in the ether is still available to develop new networks.

*Question:* Mr. Sarnoff, supposing a man came in to apply for a license and said, "I want this power or this frequency, this location." You said, "What about programs?" He said, "My programs are going to be handled by an entirely different organization. I have made a contract. They will handle all the programs." Do you think the Commission should inquire into who and what that organization is?

*Answer:* Yes, I think it is perfectly proper to inquire, but if the Commission said, "All right, I will give you the license provided the fellow you are going to get your programs from also

submits himself to a license from us," I would say I had some question about that.

*Question:* Well now, maybe we are arguing about the word license. Do you think it is a matter of concern, proper concern to the Commission to determine whether or not and if so to what extent a licensee is turning over the programming of his station to other persons?

*Answer:* If you eliminate the word license there, why then you and I haven't any quarrel at all about it, because I think it is perfectly proper for the Commission to make any inquiry it sees fit from the beginning to the end of the service. It is perfectly proper for the Commission to do what it does in asking the National Broadcasting Company as a network to furnish all its information, its data, its method of operation, its figures, all these things that we are doing. I don't object to that.

*Question:* All right. Now supposing that you had an organization that was in the business of furnishing programs and the programs that it furnished for a period of time had been very bad and the licensee came in for renewal and said, "Fifty, seventy-five or a hundred per cent of the time of my station is going to be given over to that organization." Do you think that would be a basis for denying his renewal?

*Answer:* I think that if it was as clear-cut as that, I should take it into account in granting or refusing the license, yes. But certainly that case is not actual with regard to any existing network that I know anything about.

*Question:* Mr. Sarnoff, just one other question. In your direct testimony you testified that some 95 per cent of the stock of R.C.A. was held by some 143,000 people, or I think in one of the exhibits it was shown that it was held by a hundred and forty some thousand people distributed throughout the United States. I am not asking for an exact number.

*Answer:* What is your question?

*Question:* The question is whether 95 per cent of the stock of R.C.A. is distributed among some hundred and forty-five or fifty thousand shareholders?

*Answer:* Well, all of the stock of R.C.A. is held by approximately 250,000 shareholders and no single shareholder owns as much as one-half of one per cent of the stock.

*Question:* At the 1938 meeting the stock of 143 of those shareholders was voted by proxy committee, was it not?

*Answer:* Proxy committee held in 1938 and also in 1939 approximately 65 per cent of the total votes.

*Mr. Dempsey:* I have no further questions.

*Commissioner Brown:* Are there any further questions?

*Mr. Hennessey:* I have no further questions of Mr. Sarnoff except to say that in his testimony he has referred several times to certain NBC policies recently adopted. In the earlier part of the testimony the testimony was that NBC had no written policy, though certain procedures had grown up. Since the early part of the hearing those policies have been reduced to writing and at this time I would like to offer as Exhibit, whatever the appropriate number is, copies of a booklet entitled, "Broadcasting in the Public Interest by the National Broadcasting Company."

*Commissioner Brown:* Do you have the required number of copies?

*Mr. Hennessey:* Yes, I do.

*Commissioner Brown:* Exhibit 663 is admitted.

(National Broadcasting Company Exhibit No. 663 received in evidence.)

*Mr. Hennessey:* I have no further questions. I would like to ask, Mr. Sarnoff, whether there are any points in your examination today which you yourself would like to develop further?

*The Witness:* I have nothing further, thank you.

*Mr. Hennessey:* I think that is all.

*Commissioner Brown:* That is all. The witness is excused. (Witness excused.)

(Whereupon, at 4:30 o'clock p. m. the hearing was adjourned until Thursday, May 18, 1939, at 10 o'clock a. m.)

## APPENDIX

**M**R. SARNOFF'S testimony at the hearing before the Federal Communications Commission on Nov. 14, 1938 was supplemented by counsel for the National Broadcasting Company, who introduced into the record three documents relating to the development of broadcasting. Mr. Sarnoff was asked to identify the letters which he wrote on the respective dates shown thereon. He so identified them.

**I. Radio Music Box.**—Excerpts from a letter written by Mr. Sarnoff in 1916 to Mr. Edward J. Nally, then Vice President and General Manager of the American Marconi Company. This was four years before the first broadcasting station—KDKA at Pittsburgh—went on the air.

**II. Broadcasting Problem and Recommendation for Forming the National Broadcasting Company.**—This letter was written by Mr. Sarnoff to Mr. E. W. Rice, Jr., then honorary Chairman of the Board of Directors of the General Electric Company, and a copy thereof sent to Mr. E. M. Herr, then President of the Westinghouse Electric and Manufacturing Company. This letter is dated June 17, 1922—four and one-half years before the NBC was formed.

**III. Future Developments.**—Excerpts from a general office memorandum on radio developments and future possibilities written by Mr. Sarnoff on April 5, 1923—sixteen years ago.

Copies of these documents appear on the following pages.



## I

## RADIO MUSIC BOX

## Excerpts from "History of Radio"

by Gleason L. Archer

In 1916 Mr. Sarnoff embodied in a written recommendation to Edward J. Nally, the General Manager of the Marconi Company, the details of his proposed "Radio Music Box" scheme. Elmer E. Bucher, at that time an engineer of the Marconi Company, has informed the author that he was with Mr. Sarnoff in 1916 when the latter dictated the following statement:

"I have in mind a plan of development which would make radio a 'household utility' in the same sense as the piano or phonograph. The idea is to bring music into the house by wireless.

"While this has been tried in the past by wires, it has been a failure because wires do not lend themselves to this scheme. With radio, however, it would seem to be entirely feasible. For example—a radio telephone transmitter having a range of say 25 to 50 miles can be installed at a fixed point where instrumental or vocal music or both are produced. The problem of transmitting music has already been solved in principle and therefore all the receivers attuned to the transmitting wave length should be capable of receiving such music. The receiver can be designed in the form of a simple 'Radio Music Box' and arranged for several different wave lengths, which should be changeable with the throwing of a single switch or pressing of a single button.

"The 'Radio Music Box' can be supplied with amplifying tubes and a loudspeaking telephone, all of which can be neatly mounted in one box. The box can be placed on a table in the parlor or living room, the switch set accordingly and the transmitted music received. There should be no difficulty in receiving music perfectly when transmitted with a radius of 25 to 50 miles. Within such a radius there reside hundreds of thousands of families; and as all can simultaneously receive from a single transmitter, there would be no question of obtaining sufficiently loud signals to make the performance enjoyable. The power of the transmitter can be made 5 kw, if necessary, to cover even a short radius of 25 to 50 miles; thereby giving extra loud signals in the home if desired. The use of head telephones would be obviated by this method. The development of a small loop antenna to go with each 'Radio Music Box' would likewise solve the antennae problem.

"The same principle can be extended to numerous other fields as, for example, receiving lectures at home which can be made perfectly audible; also events of national importance can be simultaneously announced and received. Baseball scores can be transmitted in the city by the use of one set installed at the Polo Grounds. The same would

be true of other cities. This proposition would be especially interesting to farmers and others living in outlying districts removed from cities.

"By the purchase of a 'Radio Music Box' they could enjoy concerts, lectures, music, recitals, etc., which may be going on in the nearest city within their radius. While I have indicated a few of the most probable fields of usefulness for such a device, yet there are numerous other fields to which the principle can be extended. . . .

\* \* \* \*

"The manufacture of the 'Radio Music Box' including antennae, in large quantities, would make possible their sale at a moderate figure of perhaps \$75.00 per outfit. The main revenue to be derived will be from the sale of 'Radio Music Boxes' which if manufactured in quantities of one hundred thousand or so could yield a handsome profit when sold at the price mentioned above. Secondary sources of revenue would be from the sale of transmitters and from increased advertising and circulation of the *Wireless Age*\*. The Company would have to undertake the arrangements, I am sure, for music recitals, lectures, etc., which arrangements can be satisfactorily worked out. It is not possible to estimate the total amount of business obtainable with this plan until it has been developed and actually tried out but there are about 15,000,000 families in the United States alone and if only one million or 7% of the total families thought well of the idea it would, at the figure mentioned, mean a gross business of about \$75,000,000 which should yield considerable revenue.

"Aside from the profit to be derived from this proposition the possibilities for advertising for the Company are tremendous; for its name would ultimately be brought into the household and wireless would receive national and universal attention."

\* \* \* \*

When the Radio Corporation of America took over the business of the American Marconi Company in the autumn of 1919, David Sarnoff was commercial manager of that corporation. Upon the merger Mr. Sarnoff became commercial manager of RCA. It is apparent that he had abundant faith in his "Radio Music Box" idea and that in the winter of 1920, months before broadcasting began at East Pittsburgh, he revived the idea by laying the same before Owen D. Young, chairman of the board of General Electric Company and RCA. On March 3, 1920, Mr. E. W. Rice, Jr., the President of the General Electric Company, requested Mr. Sarnoff to submit an estimate of prospective radio business based upon his "Music Box" idea. A significant portion of that reply is as follows:

"The 'Radio Music Box' proposition (regarding which I reported to Mr. Nally in 1916 and to Mr. Owen D. Young on January 31, 1920)

\* *Wireless Age* was a monthly radio magazine, published at that time by the Marconi Wireless Telegraph Company of America.

requires considerable experimentation and development; but, having given the matter much thought, I feel confident in expressing the opinion that the problems involved can be met. With reasonable speed in design and development, a commercial product can be placed on the market within a year or so.

"Should this plan materialize it would seem reasonable to expect sales of one million (1,000,000) 'Radio Music Boxes' within a period of three years. Roughly estimating the selling price at \$75 per set, \$75,000,000 can be expected. This may be divided approximately as follows:

1st year—100,000 Radio Music Boxes.....	\$ 7,500,000
2nd year—300,000 Radio Music Boxes.....	22,500,000
3rd year—600,000 Radio Music Boxes.....	45,000,000
	\$75,000,000"*

\* *Editor's Note:* RCA's actual sales of home instruments during the first three years were as follows:

1st year, 1922.....	\$11,000,000
2nd year, 1923.....	22,500,000
3rd year, 1924.....	50,000,000
	\$83,500,000

## II BROADCASTING PROBLEMS

Mr. Sarnoff's Letter of June 17, 1922

MR. E. W. RICE, JR.,  
Honorary Chairman  
Board of Directors  
General Electric Company  
120 Broadway, N. Y. C.

Dear Mr. Rice:

With the idea of presenting to Mr. E. M. Herr and yourself, members of the Broadcasting Committee appointed by the Board of Directors of the Radio Corporation of America at its last meeting, a suggestion which might form the basis of a discussion at the first meeting of the Broadcasting Committee which I hope can be held some day next week convenient to Mr. Herr and yourself, I submit the following:

First, it seems to me that in seeking a solution to the broadcasting problem, we must recognize that the answer most be along national rather than local lines for the problem is distinctly a national one.

Secondly, I think that the principal elements of broadcasting service are entertainment, information and education, with emphasis on the first feature—entertainment; although not underestimating the importance of the other two elements. Expressed in other words, and considered from its broadest aspect, this means that broadcasting represents a job of entertaining, informing and educating the nation and should, therefore, be distinctly regarded as a public service.

That this kind of a job calls for specialists in the respective fields and that it requires expert knowledge of the public's taste and the manner in which to cater to the public's taste is apparent on the surface. That manufacturing companies or communication companies are not at present organized and equipped to do this kind of a job in a consistent and successful way is to my mind also clear.

If the foregoing premises be correct, it would seem that the two fundamental problems calling for a solution are—

1. Who is to pay for broadcasting?
2. Who is to do the broadcasting job?

Many suggestions have been made by well-intentioned persons on the inside and outside, in an endeavor to answer both the above problems, but to my mind none of the suggestions yet made, with which I am acquainted, are sufficiently comprehensive or capable of withstanding the test of real analysis and this largely because the major portion of the suggestions thus far offered build a structure on a foundation which calls for voluntary payment by the public for the service rendered through the air.

With respect to problem # 1. Attractive as the above suggestions are, I am of the opinion that the greatest advantages of radio—its universality and, generally speaking, its ability to reach everybody everywhere—in themselves limit, if not completely destroy, that element of control essential to any program calling for continued payment by the public. Stated differently, it seems to me where failure to make a payment does not enable a discontinuance of service—as for example, in wire telephony, gas, electric light or water supply—the temptation to discontinue payments on the ground of poor service, etc., is too great to make any system of voluntary public subscription sufficiently secure to justify large financial commitments or the creation of an administrative and collection organization necessary to deal with the general public. Therefore if I am correct in assuming that such a foundation is insecure over a period of time, the superstructure built on such a foundation is perforce equally weak.

For these reasons I am led to the conclusion that the cost of broadcasting must be borne by those who derive profits directly or indirectly from the business resulting from radio broadcasting. This means the manufacturer, the national distributor (The Radio Corporation of America), the wholesale distributor, the retail dealer, the licensee and others associated in one way or another with the business.

As to # 2. When the novelty of radio will have worn off and the public is no longer interested in the means by which it is able to receive but rather, in the substance and quality of the material received, I think that the task of reasonably meeting the public's expectations and desires will be greater than any so far tackled by any newspaper, theatre, opera or other public information or entertainment agency. The newspaper, after all, caters to a limited list of subscribers. The theatre presents its production to a literal handful of people, but the broadcasting station will ultimately be required to entertain a nation. No such audience has ever before graced the effort of even the most celebrated artist or the greatest orator produced by the Ages.

Because of these reasons, I am of the opinion that neither the General Electric Company, the Westinghouse Company nor the Radio Corporation would in the long run do justice to themselves or render satisfaction to the public if they undertook this tremendous job.

The service to be rendered distinctly calls for a specialized organization with a competent staff capable of meeting the necessities of the situation.

With the foregoing in mind, I have attempted to arrive at a solution of both problems #1 and #2, which, while not completely answering all of the questions which may fairly be raised, at the same time provides, I think, a structure capable of expansion in accordance with the development of the art and business and if subject to objections, at least not to those recited in the preliminary paragraphs of this letter.

The plan I have in mind and one which I respectfully suggest for your consideration and discussion at the first meeting of the Broadcasting Committee is as follows:

Let us organize a separate and distinct company, to be known as the Public Service Broadcasting Company, or National Radio Broadcasting Company, or American Radio Broadcasting Company, or some similar name.

This company to be controlled by the Radio Corporation of America, but its Board of Directors and officers to include members of the General Electric Company, Westinghouse Electric Company and possibly also a few from the outside prominent in national and civic affairs. The administrative and operating staff of this company to be composed of those considered best qualified to do the broadcasting job.

Such company to acquire the existing broadcasting stations of the Westinghouse Company, General Electric Company, as well as the three stations to be erected by the Radio Corporation; to operate such stations and build such additional broadcasting stations as may be determined upon in the future.

Since the proposed company is to pay the cost of broadcasting as well as the cost of its own administrative operations, it is, of course, necessary to provide it with a source of income sufficient to defray all of its expenses.

As a means for providing such income, I tentatively suggest that the Radio Corporation pay over to the Broadcasting Company, two per cent of its gross radio sales, that the General Electric and Westinghouse Companies do likewise and that our proposed licensees be required to do the same.

Assuming, for example, that gross radio sales effected by the Radio Corporation for the year 1923, amount to \$20,000,000, which would represent, roughly, \$14,000,000.00 in billing prices for such devices made by the General Electric and Westinghouse Companies and, assuming further, that the gross volume of our proposed licensees' business for the year will be \$5,000,000 the contributions to the broadcasting company for the year would be as follows:

By the Radio Corporation of America—	
2% on \$20,000,000 would equal.....	\$400,000.00
By the General Electric Company—	
2% on 60% of \$14,000,000 would equal.....	168,000.00
By the Westinghouse Company—	
2% on 40% of \$14,000,000 would equal.....	112,000.00
By Licensees*—	
2% on \$5,000,000.....	100,000.00
<b>TOTAL .....</b>	<b>\$780,000.00</b>

\* *Editor's Note:* At the time this letter was written, in 1922, RCA had not yet established a general licensing policy.

While the total of \$780,000.00 may be regarded as inadequate to defray the whole of the expense of the broadcasting company, yet, I think it should be sufficient to provide for a modest beginning. Once the structure is created opportunities for providing additional sources of income to increase the "pot" will present themselves. For example, if the business expands, the income grows proportionately. Also, we may find it practicable to require our wholesale distributors to pay over to the broadcasting company a reasonable percentage of their gross radio sales for it will be to their interest to support broadcasting. It is conceivable that the same principle may even be extended in time to the dealers.

The broadcasting company may also find it desirable and remunerative to publish a radio magazine of national scope, which can be made to provide a source of income through its subscriptions and advertising columns. (In this, *Wireless Age* can be put into the "pot").

Since the broadcasting company is to be organized on the basis of rendering a public service commensurate with its financial ability to do so it is conceivable that plans may be devised by it whereby it will receive public support and, in fact, there may even appear on the horizon a public benefactor, who will be willing to contribute a large sum in the form of an endowment. It will be noted that these additional possibilities of income are merely regarded as "possibilities" and do not in themselves form the foundation upon which the broadcasting company is to operate.

Once the broadcasting company is established as a Public Service and the General Public educated to the idea that the sole function of the company is to provide the public with a service as good and extensive as its total income permits, I feel that with suitable publicity activities, such a company will ultimately be regarded as a public institution of great value in the same sense that a library, for example, is regarded today.

Mention of a library institution brings to mind the thought that great as is the public benefactor who endows a library for the purpose of educating the general public, the person who in the future may endow a broadcasting station or a broadcasting service will be a still greater public benefactor because of the many advantages which a broadcasting service offers to all classes of people, not only in the matter of education, but also in entertainment and health services, etc. Important as the library is, it can only provide the written word and at that, it is necessary for people to go to the library in order to avail themselves of its service, whereas in broadcasting the spoken word is projected into the home where all classes of people may remain and listen.

This letter is already longer than I had intended it to be and I shall, therefore, omit a number of other possibilities for increasing the revenue of the proposed broadcasting company and shall also refrain

at this time from entering into a discussion of its operating details, the manner by which it may acquire the existing broadcasting stations, etc., etc., but I hope that I have indicated sufficient of the fundamental principles involved in this proposal to have made clear the basic plan.

If the foregoing suggestions appeal to you as worthy of further consideration, I shall be very glad to discuss the matter in detail at our meeting.

I am sending a copy of this letter to Mr. E. M. Herr, President of the Westinghouse Electric & Manufacturing Company.

Respectfully yours,

(Signed) DAVID SARNOFF,  
General Manager,  
Radio Corporation of America

## III

## RADIO BROADCASTING ACTIVITIES

Excerpt from a General Memorandum  
by David Sarnoff, dated April 5, 1923

\* \* \* \*

## FUTURE DEVELOPMENTS

*First*—As to broadcasting. I believe that every home in the United States and other civilized countries of the world, constitutes a potential market for a radio receiver of one kind or another. Instruments are being perfected and the costs consistently reduced. I can see the day when even the crowded homes of the slums or ghettos will have some kind of a radio receiver which will enable them to "listen-in" on broadcasting stations without expense, and for the first time in their lives, pick from the air, not only oxygen necessary to keep their bodies alive, but education, entertainment and culture which will keep their minds active, fresh and happy. Think of broadcasting grand opera from the metropolis, for example, so that these unfortunate and unhappy people might sit in their homes and enjoy its benefits.

This brings me to another possibility in broadcasting which I think reasonable to believe.

With the improvement in the character of the programs rendered, I feel radio broadcasting will make of us a nation of music lovers. I think soon when the President of the United States delivers a public address, millions of homes which will be equipped with radio devices, will be able to listen to the Executive's voice while he is speaking and if the Star Spangled Banner should be played where the President is speaking, tens of millions within the homes will rise to its strain.

Radio then, will do more than annihilate space, it will unite the Nation and ultimately, I believe, the world.

*Second*—Now as to radio's application to moving vehicles.

I believe that in time everything which moves or floats will be equipped with a radio instrument. This applies to the airplane, the railroad, steamship, motor-boat, automobile and other vehicles.

*Third*—I believe that television, which is the technical name for seeing instead of hearing by radio, will come to pass in due course. Already, pictures have been sent across the Atlantic by radio. Experimental, of course, but it points the way to future possibilities. It is not too much to expect that in the near future when news is telegraphed by radio—say to the United States, of important events in Europe, South America or the Orient, that a picture of the event will likewise be sent over by radio and both arrive here simultaneously, thus it may well be expected that radio development will provide a situation whereby we will be able to actually see as well as read in New York,

within an hour or so, the event taking place in London, Buenos Aires or Tokio.

I also believe that transmission and reception of motion pictures by radio will be worked out within the next decade. This would result in important events or interesting dramatic presentations being literally broadcast by radio through the use of appropriate transmitters and, thereafter, received in individual homes or auditoriums where the original scene will be re-enacted on a screen, with much the appearance of present day motion pictures. This re-enactment may, of course, be accompanied by music or speech of the original performance, thus conveying the impressions of sight and sound simultaneously to the broadcast listener and observer. The problem is technically similar to that of radio telephony though of more complicated nature; but, within the range of technical achievement. Therefore, it may be that every broadcast receiver for home use in the future, will also be equipped with a television adjunct by which the instrument will make it possible for those at home to see as well as hear what is going on at the broadcast station.

## NATIONAL AND INTERNATIONAL BROADCASTING

Broadcasting is moving further and further away from a multitude of small and comparatively cheap stations serving limited areas with material largely of local interest. The trend of the future will be, no doubt, the consolidation of such stations into larger and more powerful stations sending out programs of greater variety and significance and of finer artistic quality to ever larger audiences.

The day will come when two or three and possibly one station of national scope may serve an entire country and its voice will reach every city, town, village and hamlet within the country. It will also be heard in neighboring nations and in the extreme case in the very antipodes. Such international stations will send out simultaneously a variety of programs on different wavelengths to satisfy all individual tastes.

Here, for the first time, we will have in concrete form, "the voice of a nation" speaking audibly to the entire world as well as to its own citizens. If political developments keep pace with scientific advances, we may even hear the voice of the world expressed by a huge broadcasting station speaking for a future league of all nations; and the mandates of a world court or the message of a league council may be sent to the utmost confines of the earth in a trifling fraction of a second and reach everyone everywhere.

While it is, of course, impracticable to put an exact date on the time when the developments above referred to may be expected to translate themselves into actual everyday use, it is my opinion that in a radio sense they are almost around the corner and can be expected to materialize some time between the present and the next five or ten years.