

# The National Association of Broadcasters

NATIONAL PRESS BUILDING \* \* \* \* \* WASHINGTON, D. C.

PHILIP G. LOUCKS, Managing Director

## NAB REPORTS

Copyright, 1933, The National Association of Broadcasters

Vol. I No. 32  
Sept. 19, 1933.

### PROCEEDINGS SECOND ANNUAL MEETING

#### Engineering Section

NATIONAL ASSOCIATION OF BROADCASTERS

June 26, 1933, Chicago, Illinois

The Second Annual Meeting of the National Association of Broadcasters was held in the West Room of the Hotel Sherman on Monday, June 26th, at 10:15 A. M.

CHAIRMAN J. A. CHAMBERS: "The Second Annual Meeting of the National Association of Broadcasters is now in session. Mr. Loucks, Managing Director of the N. A. B. has a few comments to make."

MR. LOUCKS: "I will not make a speech, but I think I should point out and make clear to you exactly the powers of the Engineering Section of the N. A. B. This is the second annual meeting of the Engineering Section; the first meeting was held last year. Sections are not provided for in our constitution and we consider them officially as open committee meetings. Therefore, such action as you may take and such resolutions as you may adopt will be properly referred to either the Board of Directors or the general membership. The section has no power to bind the Association. Binding resolutions can be adopted only by the Board and the membership. I simply want to point out that any resolutions adopted will be directed either to the Board or the membership as a whole. That is all I have to say."

CHAIRMAN: "We will go right into the published program. We are fortunate in having with us Mr. Nelson of the Bell Laboratories. Mr. Nelson has been at several meetings at which we have discussed the need for Standards in Broadcast Practice."

#### STANDARDS IN BROADCAST PRACTICE

By E. L. NELSON

MR. NELSON: "Gentlemen, I have discussed this subject on numerous occasions and I have no doubt that many of you know just what I am going to say. This matter is one that can hardly be over emphasized at the present stage of broadcasting. It is a highly complex undertaking which involves one function which is performed by one agency and another by an entirely different agency. Technical requirements are essential to the successful progress of that undertaking. The problem of broadcasting is such a complex undertaking that the need for these systems requirements should follow logically. The method by which they should be brought about is by building up an organization through commercial agencies and arriving at that sort of a technical organization that we need. I think that one of the difficulties arises from the fact that transmitting people, for example, are interested primarily in putting programs on the air and receiving people in picking up programs on the air. In other words, we have looked at our own particular function without regard to the overall job we have

today. The program sponsors do not pay you to put anything on the air except what they are really interested in doing as advertisers. Your job from a technical standpoint is to build equipment and system which will enable you to operate machines scattered all over the country. We are going to have to do a good job.

"Since this is a cooperative undertaking I feel it is very fortunate that we have already started along the right lines in organizing ourselves in this important work. Most of you, I presume, know that the committee, the Engineering Section of the N. A. B. and the Broadcast Committee of the I. R. E. have already met and agreed upon a program in this field and have held several meetings. I think the fact that we are making progress is a very happy circumstance and promises early progress in this important field. Probably the most important thing that has been holding this matter up and causing slow progress to be made, in my opinion, is the fact that a good many people who have been closely in touch with the situation, who have seen the commercial aspects of it, haven't been sold on the approval of the thing. They have taken the position that systems requirements will do no good. I do not quite subscribe to that viewpoint. I think that its purposes hold a little more by the receiver people than the transmitter people. In saying that I may be making a rather loose statement but have in mind the further discussion of this and we can clear the viewpoints on the subject.

"Another aspect in the matter which may be brought up by the transmitter people is their opinion that that is why we have a Federal Radio Commission. I do not believe it is entirely the job of the F. R. C. I believe if we are to make progress this is a job for us to do. Whatever is done along these lines, the expenditure of sums of money and selling the public on changes, is evident. If money is going to be spent you ought to have definite ideas on how it is going to be spent.

"Referring to practical suggestions with the idea of simply indicating to you some of the possibilities in this direction. I want to inform you first of all of the tremendous success of the regulation recently imposed by the Commission requiring fifty cycles and the degree to which that has improved beat note interference. The history of that perhaps you do not know. I think it is quite fair to say that the idea was brought to the attention of the industry by a report prepared by the I. R. E. Broadcast Committee in response to some inquiries which were made by Dr. Dellinger when he was acting as Chief Engineer of the Commission. It was the recommendation of the committee, after a rather detailed study of the matter that there would be no improvement by increasing the regulation of the requirement below fifty cycles. At that time we advanced the suggestion with considerable temerity because there was considerable doubt commercially of the equipment that was to make it practical to impose fifty cycles. The report was published and I was considerably concerned because a number of people who had a right to an opinion in the matter came to me and told me it was ridiculous to impose a fifty cycle requirement. I do not want to claim all the credit for the I. R. E. but at the time I did not think the Commission would ever have the ability to impose the fifty cycle requirement, but it was done after many hearings and from then on you all know the history. That is an example of what can be done after a study in the proper direction. We will have to approach several other things in the same manner.

"I am very much concerned about the matter of band widths. It is a fact that at the present time you cannot sell broadcasting equipment to most broadcasters unless you



guarantee a ten kilocycle band width. The ten kilocycle interval between stations was set up originally when we were talking about 5 k. c. side bands. Nevertheless, there are many stations where the studio is located in close proximity to the broadcasting stations, which are actually putting out large range—to 10 k. c. That applies largely to the local stations but at the same time it will apply in the near future to some of these clear channels. I do not believe that we are ever on sound ground on the subject of band widths as long as the average radio receiver is not capable of reproducing bands much above 3.0 or 3.5 k. c. There have been some receiving people who say that they have tried wide band receivers and that the public does not want them because it is not commercial. I believe that purely from competitive standards we are going to be forced to meet this situation. We are going to have to do it.

"You can see a similar variation going ahead of you in the sound picture field. At the outset there was more wonderment at sound pictures than anything else but they have rapidly expanded to the front. The wide range systems are being brought about in the sound picture field just as rapidly. People are going to ask why they can't get the same quality in their homes. This is another example for you and I still feel that there may be competitive limits which will force us in this direction. You are familiar with some of the experiments which have been made in connection with the wired radio systems and particularly through the power lines. These people have one big advantage in that they do not have to resort to advertising lines during the program. It will be perfectly logical for them to get wide band transmission with the best of quality. If they do that, you will immediately find yourselves faced with the necessity of following their course, but the reaction on radio would be extremely far reaching. It seems to me that the 10 k. c. intervals between stations is one of the most stable influences in broadcasting today. This has brought out in our review of the broadcast field. I do not believe at the present time that research objectives constitute a foundation on which to build. One idea which might deserve consideration is to split the bauds from 7500 or from 7000 to 3000 cycles. When you are in the immediate vicinity of a high power station you can tune the receiver noise level down. The local side bands overlap any of this interference and you can now approach 7000 cycle reproduction. When you are at some distance from the transmitter, however, there is a point where you have to consider adjacent channel stations of somewhat equal intensity and the job would be to close down this band pass to 3000 cycles which is all you are getting now and is a reasonably accepted standard. You get then freedom from noise and it is working in practice.

"These are just some of the ideas of practical steps that can be taken. One of the problems of this job is to outline the program and nobody can outline the program at the present time. It is difficult to sell some of these people, to give them the picture, because it is not possible to outline the whole program from the beginning. This matter calls for a research undertaking but I think the immediate thing is that we appreciate the necessity of some academic attack on the common objectives of the industry. We pledge ourselves to it and while I do not believe that there will be a revolution, nevertheless, I believe that as time goes by and we look back on what we have accomplished and where we have proceeded from, we will regard this movement as one of the most constructive steps that has been taken by the industry. I hope I have said enough to prompt some of you to get on your feet and comment on this thing."

CHAIRMAN: "I think the Engineering Committee fully understands the purposes even if some of the rest of the people here did not grasp that from the way you spoke. I doubt I would ask any questions here."

MR. NELSON: "I have been hoping that somebody would discuss the matter on a half dozen or so angles. Since there has not been a disagreement, there may be something in it after all."

MR. HORN: "A fair standard for transmitter and receiver would help out an improvement in the industry."

CHAIRMAN: "Is there any further discussion?"

CHAIRMAN: "I would like to suggest, realizing that it

has a great many problems, both technical and political, the idea of transmitting the carrier and one side band."

MR. NELSON: "That is a suggestion which has been advanced again and again. There are complications which all of you should realize. A lengthy mathematical derivation of this subject would be in order but I want to give you an angle on some of the complications here. In the first place the carrier, two side band, system is the natural way to do this job. The ordinary carrier is modulated so that the distortionless detection is possible. Just as soon as you subtract one of these components you have taken away something from that wave and you no longer have a distortionless system. Unless you do something you will find you are introducing a lot of distortion. In telephone plants where many of this kind are in use, the way it is overcome is to employ a very large carrier in the demodulating tubes because this single side band and the second order terms produce much distortion. Distortion components are in that way rendered negligible. There is a problem you are going to face; for to employ carriers of large power, we are going to have to have a special kind of receiving equipment not now available. While it is technically possible, I hesitate to adopt it at the present time for some of the reasons mentioned above. One of the merits of this is the fact that we can use existing receivers if you have 3,000 cycle reception."

CHAIRMAN: "If we are going to get out, we will have to limit these discussions. Your Engineering Committee, as Mr. Nelson told you has already had several meetings with R.M.A. concerning transmitter manufacturing and are rapidly working toward a set of acceptable standards. We have canvassed all of the members of the N.A.B. and expect to get answers from them to determine exactly what the broadcast studios want and how they feel about various standards. At our next meeting we hope to discuss a complete analysis on the existing set-up and the possibility of establishing definite standards in regards to certain specific phases of it. To get on with the program, there has been a great deal of discussion recently on antennas. Mr. Harmon of Westinghouse Electric and Manufacturing Company has a discussion on that subject."

## BROADCASTING ANTENNA DEVELOPMENTS

By R. N. HARMON

MR. HARMON: "I am going to present a very brief discussion of the various types of antennas which might be used for various types of problems as they may come up before the stations. I will then answer a number of definite questions which may propose a more desirable way of meeting antenna problems in general."

(Mr. Harmon illustrated various antennas and discussed them.)

CHAIRMAN: "Mr. C. B. Aiken of the Bell Telephone Laboratories is with us. He will discuss synchronization."

## SYNCHRONIZATION DEVELOPMENTS

By C. B. AIKEN

MR. AIKEN: "Synchronization is about eight years old now. About that long ago we made our first efforts to synchronize on the same wave. This was done almost concurrently in England and Germany and other countries shortly afterward. The English experiments were particularly interesting because of the experiments of P. P. Eckersley. Captain Eckersley's first experiments were made on two stations, thirty miles apart in England. We know what synchronization is and have a pretty clear conception of synchronized transmission. We know that it is very closely related to transmission and it becomes recognized that distortion in the mid-air between the two synchronized stations, fifty miles apart, is unavoidable and that there is nothing that can be done to eliminate such distorted reception. The matter is one of field strength. We predict whether or not there should be distortion in mid-air. If there is any slip in synchronization, of course conditions are much worse than they are when everything is as carefully controlled. You have probably heard the type of distortion



tion you get in between synchronized stations. At times the reproduction is very distorted so that it is quite impossible to listen to a program without real discomfort. At other times it will improve and be good. A good deal of work has been done in studying what constitutes permissible value, and the ratio is four to one. Four times the strength on the other side gives quite good reception. Careful tests made by skilled observers can get no distortion on such conditions but it is very probable that three to one is satisfactory in most cases. If the carrier frequencies of two stations differ slightly you get added effects, requiring a ratio of something like ten to one.

"To synchronize stations in one region there cannot be any appreciable frequency difference in transmitting the same program. There is another great advantage to be obtained by the use of a linear detector, since that type of a receiver gives an independent carrier ratio on a detector—that is, unless you have automatic gain control. Automatic gain control affects this factor, sometimes.

"In the early days of synchronization, it was very difficult to keep within a small fraction of a cycle and maintain control of carrier frequencies over entirely indefinite periods. Two such systems are available and make it possible to hold in synchronism two stations which are a few miles apart. You may not, of course, have too much time delay between programs for the requirements are very rigid. A plan for synchronization is available and the problem is more one that is up to the industry to vote for commercial application than it is to the engineering division to further improve the technical aspects of the equipment, for they are well ahead of the game.

"There has recently been discovered a synchronizing system whereby it is possible to limit the distortion between stations ten miles apart. That, I think is the present picture of the possibility of synchronization."

MR. HARMON: "As some of you know, the Westinghouse station has been operated since 1926 under certain circumstances. The wire line systems used have a carrier frequency band of 27 k.c. We have very little difficulty in synchronization of these two stations and they are still being operated today."

MR. NELSON: "With regards to Mr. Aiken's statements, I feel they may be lost in the large amount of very interesting discussions of the very interesting difficulties being encountered in synchronization. There have been a large number of organizations devoted to this particular problem and I hope it can be safely said that from a technical standpoint that what you need today is a synchronized job which can be made available and perfected to an extent for practical operation. The matter now becomes a problem of the industry to appreciate new instruments which would make it possible for them to improve the amount of service they are giving the country at large. There are two factors necessary for progress in this line. One problem that has to be worked out nontechnically is that of assuring cooperation between the various stations involved, on a given channel, for example, because that is the soundest way to proceed. Certainly we cannot say that the time has arrived to give up the clear channels for such purposes and the value of application where such stations must exist lies on the regional channels. Under the new deal, there ought to be no difficulty in securing synchronization along this line. The outlook for synchronization is very bright; the treatment is up to you."

MR. LOYET: "I would like to say a little bit on the synchronization plan. I would like to point out that we offered to do that when first synchronization was introduced and suggested with both diagrams and paper talk that you could discriminate against one station and another by means of ground loop or antenna and I don't believe we ever received a letter from a single listener that they had improved a station. If he can get results, he isn't going to put up a complicated lay-out to receive one station. He will be satisfied with the rest of the stations he can get regardless of signals. So anybody offering use of the idea of changing receiver design in order to pick up stations is going to be laboring under difficulties."

CHAIRMAN: "Any further discussion?"

MR. FOSS: "May I ask Dr. Jolliffe regarding this synchronization plan—if he has any comments to make as far as the Commission is concerned?"

DR. JOLLIFFE: "I was hoping I was going to get out of this discussion. I wish to point out expressly what Mr. Nelson says. We are interested in bringing about a study of the systems of broadcasting. There are many individual cases which from an economy standpoint or listener's standpoint might give better attention to the question without hurting too many people. These few people involve considerable public interest.

"Consequently in applying this in allocation, we must watch New York and immediate service areas of stations of clear channel class. However, in the local channel class, there is the possibility of considerable improvement in the locations that were originally made and there are some bad spots. Many bad spots could be improved by improving the frequency control. A large amount of improvement was noted with respect to reducing the frequency control from 500 to 50 cycles. We now have further increases in the service area of some of these stations which must come about from their own efforts in further frequency control. If they can get frequency control they have improved their service area or added listeners to their improved service. In other words, in the regional or local class, synchronized experiments expand a station. On the clear channel synchronization, there is apt to be more than one station on, which will decrease the quality of that channel whether it be to a small number of people or to a large number of people. Synchronization comes about in the class of channel you are working on."

CHAIRMAN: "I think we will have to call a halt in the discussion of that. The next business is that of the North American Conference and Mr. J. W. Baldwin of the N.A.B. is going to tell us something about that."

## NORTH AMERICAN CONFERENCE

By JAMES W. BALDWIN

MR. BALDWIN: "Gentlemen, there could not be a more opportune time than this to talk to a group of engineers who are seriously interested in the art of broadcasting. The duties of the station executives, embracing as they do, matters concerning commercial accounts, program construction and public policy should never be minimized but the fact remains that radio engineers must provide the vehicle without which all other labor goes for naught.

"Never in the history of American broadcasting have you gentlemen of the Engineering fraternity had so great a responsibility for the future of American broadcasting as now. This fact has been forcefully emphasized at the meetings, which have been held in Washington, since late in February, preparatory to the Central and North American Radio Conference, which will convene in Mexico City on July 10th.

"By reason of a strict injunction of secrecy imposed upon the participants by the Department of State, we have been unable to inform the membership concerning matters of greatest importance to every broadcaster in the United States. Our protests against the injunction of secrecy were unavailing.

"At the outset we filed a statement of our position, declaring in substance, for a widening of the broadcast band so as to include 10 carrier frequencies below 550 k.c. and opposing the use of any frequencies above 1500 kc as compensation for frequencies in the band 550 k.c.—1500 k.c. that may be given to other countries. Our statement was supported by all the technical data that could be made ready in the time allowed.

"One of our most serious handicaps has been the lack of sufficient technical data to mould public policies. We know that the whole weight of scientific research favors the use of low frequencies for broadcasting. But it is nevertheless incumbent upon us to build a record of quantitative data that will be overwhelming in the minds of those whose responsibility it is to shape government policies.

"Let me say to you at this point that the N.A.B. has at its headquarters a radio engineer of whom the membership can justly be proud. I know that I reflect the opinion of many when I say that J. C. McNary will travel far in the



field of radio engineering. He has been of inestimable value in the preparation of technical data for the prosecution of our aims and purposes before the United States delegates. And of even greater importance—he has before him a program for the collection of further data upon which must depend in large measure the future of our broadcasting structure. You will find Mr. McNary an able and willing leader, but the burden is too great for any one man. He needs the complete cooperation of every one of you.

“Upon the success or failure of this line of attack depends whether broadcasting shall use frequencies, the propagation characteristics of which can justify the necessary investment of capital or whether broadcast stations shall become mere community phonograph stations. This must be so for broadcasters today are working in a band that is crowded. And within a few days duly appointed representatives of the United States will listen to the demands of Mexico, Cuba, Honduras, Nicaragua, Guatemala, Costa Rica, and Salvador for a place in that band. Neither of these countries have a single exclusive frequency under any treaty or other agreement. We are not informed as to what their demands will be. We do know their demands will be backed by the pride of their nation—a factor which certainly does not introduce a minus sign in the equation.

“The all important question is—How may their demands be complied with? Will the number of American broadcast stations be reduced so as to allow other countries a part of the frequencies in the existing band? Or will the broadcast band be enlarged to provide for the demands of other countries? If the broadcast band is enlarged, will it be extended above 1500 k.c. or below 550 k.c.?

“If the band is extended below 550 k.c. it will be done over the protest of the government and private mobile interests. These interests, including the Navy and Army, Aeronautical Radio, Inc., U. S. Shipping Board, U. S. Ship Owners' Association, Inc., Coast Guard and Marine radio operating companies, have been able to climax their activities against American broadcasters, with a joint appeal to the Secretary of State, which, I am informed, bears the signatures of the Secretary of the Navy, the Secretary of War, the Secretary of the Treasury, the Secretary of Commerce, the Secretary of Agriculture, the Postmaster General, and the Chairman of the U. S. Shipping Board. All of which may mean that broadcasters are just waifs in the storm.

“These same interests have not opposed an extension of the broadcast band above 1500 k.c. to include 1640 k.c.

“We have doggedly fought for the use of low frequencies for broadcasting. We have urged the responsible government officials to recognize the trends in Europe toward the use of low frequencies for broadcasting, and to make provision for the establishment of prior rights, in the United States, in the same low bands. We have endeavored to point out the lack of coordination of related government radio activities whose demands for channels are so great. We have challenged the use by shipping interests and government departments of equipment which, by reason of its antiquity and poor quality, requires a space in which to work that cannot be justified by the present state of the art.

“We confidently believe we have built a record that cannot forever be ignored and upon which the industry can continue to build with an eye to the world convention in Cairo in 1937. The lack of adequate preparation spelled failure at Madrid in 1932. The decisions made at Madrid have been millstones in the preparation for the Conference at Mexico City. There is no reason to make the same mistake twice. I have every confidence that you can and will give your best toward building a record based on research that cannot fail to shape future policies of the government which affect broadcasting.”

CHAIRMAN: “Gentlemen, this subject of the North American Conference is now open for discussion. Everyone should realize its importance; as Mr. Baldwin has pointed out its purposes have been more or less of a secret nature. His collection of data has been without some of your knowledge. If you have any comments to make at this time or any questions to ask, Mr. Baldwin will be glad to take care of them.”

MR. FOSS: “I recognize the fact that we all have had the problem of being able to widen the band and I also recognize the fact, and I guess you all do, that we would like to

widen the band from 550 down, due to the fine propagation characteristic. I am wondering if the National Association wants the comments of this meeting to go on record. Personally, I feel as though we should make some kind of a statement recommending that the Association do all in its power to widen the band and expand the number of channels even from 1500 up if necessary. I may be wrong and suppose the Association does not want an expression at this meeting at all. I would like to hear from someone else on the subject. I feel that if we widen the band, or if we have a part in it, we are going at least to accomplish something which in 1937 at Cairo can perhaps be readjusted with the proper investigation Mr. Baldwin called for. I am not in favor of 1500 k.c. up, but I think it would be better than nothing.”

MR. BALDWIN: “The Association is on record as opposing frequencies above 1500 k.c. in lieu of frequencies in the band 550-1500 k.c. We have agreed that from an interference point of view there is no objection to extending the band to 1640 k.c. I think it would be an error for the National Association of Broadcasters to agree to an expansion of the broadcast band over 1640 k.c. because I think by doing that it would establish a precedent. You know it is impossible to use frequencies above 1500 k.c. in lieu of what we have and do it successfully. I think it would be a very dangerous precedent.”

MR. FOSS: “I do not question that, but thought we would rather have 1500 k.c. than nothing. The one thing I am thinking of is the very strong drive that is going to be made for 1650 k.c. by the other interests and we must recognize this fact. It is important to answer the question for the reason that no one to my knowledge has any idea what the North American countries want in the way of frequencies. If these facts were known, it would be possible to answer the question. If, for example, it were not for the noise level, we would be willing to use 1500 k.c. up, but, so far as American broadcasters using them for what they now use and which is to be given to the Republic of Mexico, then that is a much more serious question.”

MR. BALDWIN: “I think perhaps you misunderstood me. I did not mean that we could not give up 1500 to 1650 and take from 1500 to 1000. I meant that the general band be widened at this conference, if possible. I think perhaps interests in our own country might protect us from giving these frequencies. I am taking exceptions, making statements—perhaps offering too much discussion on the subject.”

MR. JANSKY: “I think some one who has had the opportunity like I have to see the magnitude of the problem which is confronting the Association in connection with the North American Conference, ought to get up here and say something about the splendid work that Mr. Baldwin and Mr. McNary have been doing on this subject. I am frank to state that there is not a single broadcaster who realizes the problem he is up against but that the headquarters at Washington are doing their very best to save the American broadcasting industry from what may be a striking blow. I appreciate what this industry is up against from the standpoint of coming out at this North American Conference with a whole scalp. I am not going to comment upon the relative value of frequencies above or below; if the broadcast industry does not know by this time, that is too bad, but there are secret forces at work to prevent any widening of the broadcast band at this time. I do think that it is important that the industry appreciate that Mr. McNary and Mr. Baldwin are doing the very best they can without the support they ought to have from the broadcast industry in what is to be an extremely difficult situation.”

CHAIRMAN: “We had better go to the next subject. We have been discussing some value of frequencies and Dr. Dellinger has some facts to give us.”

## PROPAGATION CHARACTERISTICS

By DR. J. H. DELLINGER

DR. DELLINGER: “Chairman and gentlemen, I will say a few words about the status of this subject. The subject is one of basic physical data. I think that the development of standards in your field is unavoidable because of the tremen-



dous complicated problem that you have. In order to determine what constitutes acceptable signal intensity, or what constitutes tolerable interference, and what are the frequencies that should be allowed in broadcasting, and what frequencies should be used in a practical combination of distance and other rules of these problems, involve in one passing day a great variety of other problems, psychological problems and practical problems. These factors are all very complicated in the particular one which I wish to discuss.

"It appeared, from the preparatory work for this North American Conference that it would be desirable to get as clear a statement as might be possible of that one side of the problem—the physical facts,—and that was done by a small committee that was appointed in connection with the preparation for the North American Conference. That committee has turned out a report which sets forth an issue which I think will be of use to you. It turns out to be more clear and distinct than we hoped at the start.

"There has not been any place to which you could turn to find out definitely the specific relative values of the various frequencies of the broadcast band and the frequencies adjacent thereto. It has become possible to take known facts and give you a definite answer to those questions. A little work of this kind was done at the Madrid Conference and it was thought that it would be helpful if some definite statement be compiled to give the actual field intensities at the frequencies concerned in broadcasting. The results of that work are contained in a paper published in the July issue of the Proceedings of the I. R. E. This report of the American Committee which I am talking about will also be published later in the Proceedings.

"This American Committee has developed the subject considerably further. What we did was first to check available data and plot curves giving the field intensities at distances from zero to 6,000 kilometers and frequencies from 150 k.c. to 1700 k.c., those being the limits of the range in which you are presumably interested. This work also includes figures giving the variation with frequency for interference with reception of signals caused by static and other noise such as electrical interference, receiving set noise, etc. The data included in this report are based on all the facts we could get our hands on. Data has been obtained both in this country and in other countries and covers all of the theoretical work that has been done. A number of things stand out and I will just mention a few of the high spots. In the first place you have to untangle the difference as between day propagation and night propagation. Up to a certain distance in the daytime, the transmission is only ground wave transmission and for night, ground wave transmission conditions are pretty uniform and we put down definite curves giving the intensities at the various frequencies. It is those ground wave curves which give you values which vary with the different frequencies. Ground conductivity varies from sea water to the worst ground conditions we have. It turns out from the data we have collected that the distance of transmission at night is independent of ground conductivity and independent of frequency and that is distinctly brought out in the data that we compiled, and seems to be quite well substantiated.

"The day and night distances vary from about 40 kilometers for the lower conductivity and the higher frequencies to about 400 kilometers for the higher conductances and the lower frequencies. At greater distances than those, the sky wave predominates and the ground wave is negligible at the receiver so that it fades both day and night. We have some data showing that and it seems to be a reliable conclusion. To this fading distance both day and night, the received intensity approaches ground values. The report giving this compilation, we also have plotted the field intensity curves on a larger scale for the short distances. For distances up to about one hundred and fifty miles the curves show the received intensities for the various frequencies. These curves will be of use to you in collecting service areas data and that sort of thing. As I said they are pretty reliable and you can apply them to any particular example and you will find that they check. I might summarize that in this part of the data we assimilated some rather complicated sets of phenomena and the few points I have mentioned, together with the curves enable you to check phenomena and write down something which will apply and give you some actual facts for propaga-

tion in different cases. When you come to consider the limitations imposed by noise and the very seriousness of noise, the problem is even more complicated. By checking such facts as we have, as I said, we have worked out curves giving the distance at which you get a useable signal for various values of noise level, which corresponds to various localities for various assumed regions signal intensity to noise, for different powers.

"Mr. Chairman, to go into any further detail of the matter of data available on this acceptable signal for different regions of signal intensity to noise, etc., would take ten or fifteen minutes. I am not sure whether it would be desirable to do that. Perhaps it might be well to terminate my presentation here and I would be glad to carry on further if it is interesting to you."

CHAIRMAN: "You said the curves are available?"

DR. DELLINGER: "The report of this committee was sent out by the Federal Radio Commission and I presume that they have some copies for anyone who is especially interested. The document has been sent in to the Proceedings. Just what particular issue it will appear in, I do not know."

DR. JOLLIFFE: "As far as copies are concerned, we have a very limited number."

CHAIRMAN: "I think that answers a lot of questions on frequency valuation and points out a lot of things quite clearly. We are all interested in being able to secure the information. Before we go into this next discussion, which I am sure will break up the meeting, I want to get a picture of the entire group."

CHAIRMAN: "Gentlemen, this next subject is of great interest to a number of people. It has been put on the program because it has been discussed quite a bit and promptly everyone began writing about it. The subject is power increases for local and regional stations and may go on for several hours. It is now eight minutes of one. A motion to adjourn now for luncheon is made; possibly you would like to go right into the discussion of it."

Upon motion, it was decided to continue the meeting.

CHAIRMAN: "Mr. Bridges WEBC will open the discussion."

## POWER INCREASES FOR LOCAL AND REGIONAL STATIONS

By W. C. BRIDGES

MR. BRIDGES: "I am here as an advocate of higher power on regional channel frequencies, because of a conviction that only through a substantial increase in power will we be able to continue meeting the demands put upon us by our present audiences.

"Unquestionably, regional stations have suffered a loss of many listeners since the general advance by cleared channel stations to 50 kilowatts. If nothing is done, I am convinced that we shall soon find ourselves in more difficult circumstances. Under the American plan of broadcasting, we are largely dependent on advertising revenue to meet the cost of operation. This being true, when a station finds itself with income reduced, due to lack of advertising, eventually it will have to cut costs. This will be rapidly reflected in the quality of service. As the quality of service falls, listeners tend to look elsewhere for what they have come to expect, and the advertisers remaining will soon be found spending less money with the stations thus affected.

"I am not suggesting that cleared channel stations be limited as to power, or otherwise regulated beyond what is true of the present. However, with standards of performance changed, since the Federal Radio Commission set 1 kilowatt as the upper night-time limit on regional frequencies, our position as a group has been placed at a disadvantage due to the fact that cleared channel stations have been able to multiply their original figure of 5 kilowatts.

"Broadcasting is now an established medium for advertising. It is no longer an experiment, and, therefore, has its place in modern business. But old claims for coverage will have difficulty in standing up under field strength surveys, not to mention listener-preference investigations. These surveys



are being made and more will follow and be employed by advertising agencies in behalf of their clients.

"The large national advertiser already has his suspicions as to claims for coverage, and is after the truth. He knows that the listener will, with few exceptions, tune to the stations affording programs most free of interference. A few years ago, atmospheric and man-made electrical disturbance was tolerated to a degree hard to comprehend today. All of which indicates that with new standards of performance, something will have to be done, and done soon, if we would maintain our present rate cards.

"WLW is called the nation's station by its announcers. We have also heard cleared channels spoken of as national channels, giving the impression that such stations not only carry programs of a more broad or national interest than others, but also actually serve the entire nation, or a large part of it.

"The designation 'regional station' I understand as indicating one covering the interests of a given trade area or community possessing common problems and capable of reaching listeners in an adequate manner. A local station may be presumed to cover a limited area as, for instance, a small city,—the intent being to take care of matters of peculiar interest to listeners residing therein.

"When the Federal Radio Commission gave consideration to regional coverage, it doubtless concluded that 1 kilowatt was sufficient and that one-tenth of a kilowatt would be satisfactory where local coverage only was desired, while cleared channel stations were given 5 kilowatts. However, it appears that 5 kilowatts was found to be insufficient, and although a quota charge of 5 units was made against each full-time station of that power, this charge was not changed when such stations increased power to 10, 25, or 50 kilowatts. It would seem, therefore, that no quota difficulty should arise for stations of other classifications, if there is economic, social, and engineering justification for a general increase in power. I believe economic and engineering evidence is available to substantiate the contention of many that the Commission should modify its orders, so as to increase power on regional and local frequencies.

"Given a sufficient increase, these stations will be able to regain much lost ground, for the reason that their programs have or should have many items of local and sectional interest not carried by cleared channel stations. By thus bringing back original scope and cementing their audiences, the revenue will return to pay for improved output, for advertisers will find that after all five or six, 50 or 500 kilowatt stations won't do the job any more than will a Chicago paper take the place of one published in Duluth.

"The North American Conference on Radio to be held in Mexico City may result in some change in the present allocation or frequencies in the United States. But it would seem that power increases or other improvements in public interest should not be delayed on that account.

"I firmly believe that the American plan as opposed to the British, Canadian or any other is superior and best suited to our temperament. However, the relative standing of local and regional stations must be maintained with that of the cleared channel station if we would continue broadcasting in private and not governmental hands—otherwise a strong bar will be let down to those advocating public ownership and operation.

"That we may continue the American plan with greater profit to the public and to the industry, I ask for regional and local stations with the privilege of improving service through a more just and scientific allocation of power.

"With your permission, I now present C. B. Persons, WEBC's engineer who will continue along more strictly engineering lines."

## POWER INCREASES FOR LOCAL AND REGIONAL STATIONS

By C. B. PERSONS

MR. PERSONS: "I am employed by Station WEBC, which operates on a frequency of 1290 kilocycles, a channel shared by six other stations. WEBC's power output is 1 kilowatt at night and 2½ kilowatts daytime. WEBC is located

at what is known as the Head-of-the-Great Lakes—the western most port of Lake Superior. WEBC has studios in both Duluth, Minnesota and Superior, Wisconsin—these cities being separated by the St. Louis River. The transmitter is located two miles from the business district of Superior and six miles from the business district of Duluth. The total population of Duluth and Superior is approximately 150,000.

"While many of the statements I will make apply specifically to Station WEBC, I believe that these statements will apply in a degree to all regional stations. I am not acquainted with the problems of local or cleared channel stations, or stations on frequencies lower than 1000 k.c. It is my intention to discuss two general facts. First, the fact that the present power allocations to regional stations are inadequate. Second, that higher power levels for regional stations will not create an undesirable situation.

"The present power levels allowed regional stations are either wholly inadequate or else the term 'regional station' has been misapplied. My interpretation of the expression 'regional station' is a station giving serviceable signal to all listeners in the city in which it is located, and in the trade area of that city. A local station then would be a station giving a serviceable signal to all listeners within the city in which it is located. The Federal Radio Commission has designated some forty channels, as 'cleared channels.' Because cleared channel operation provides possibilities not found in other services for long distance transmission, I would say that the particular field of usefulness of a cleared channel station would be to give national coverage, or to give a serviceable signal to all listeners within the country in which it is located.

"With the possible exception of a few local stations in small cities, I can think of no instances where these definitions are borne out in practice. Yet, I cannot believe that the Federal Radio Commission has intended other meanings for the words 'cleared channel,' 'regional' and 'local.' To expect a regional station to only give local coverage and a national station to give regional coverage, with occasional national coverage, is not in keeping with the apparent intended meaning of those words.

"Suppose we proceed on the basis that the term regional station means a station that gives a serviceable signal to all listeners within the trade area of the city in which the station is located. I would define the term 'trade area' as the area surrounding a city, from which the merchants of that city draw their trade. It is the area from which people travel to a particular city to buy and sell, and these people are bound to that city by social and political ties. When a merchant in a city places advertising, he does so with the view of reaching all people who are likely to come to his establishment. This means that he must reach, in addition to inhabitants of the city in which he is located, the inhabitants of the surrounding trade area. When the average city merchant, wholesaler or manufacturer chooses radio advertising, he attempts to choose a radio station that effectively covers the territory from which he draws his trade. This type station is logically the regional station. He assumes that the regional station reaches all inhabitants of his trade area. He is told by station solicitors that the station covers that territory, and he is charged for his advertising on the basis of trade area coverage.

"But do regional stations lay down a serviceable signal over their trade area? In our case, I have grave doubts. This is a point over which there is constant conflict between the Commercial Department and my department. The solicitors, in good faith, represent the station as giving a trade area coverage, and when they get a kick back from the advertiser, it is passed along to me with resulting arguments. If we were giving good trade area service, there would be no kick backs from advertisers, or complaints from listeners.

"Now the question immediately arises in one's mind: Is WEBC's transmitter operating so inefficiently as to lay down a field strength below that recognized as average for stations of our power? I can quickly dispose of that possibility. Because of what appears to be a very favorable location, our transmitter lays down a field strength of 200 millivolts per meter, at a distance of one mile, with an antenna input power of 1 kilowatt. The generally accepted standard for antenna input powers of 1 kilowatt at a distance of one mile is 125 millivolts per meter. We find ourselves doing a somewhat



better job than the average. Still, appearances are that we are not giving trade area coverage.

"The remaining possibility is that the signal reaching the listener is not adequate for the kind of service we are supposed to give. When an advertiser engages the services of our station, he expects the station to bring his message to his customers or potential customers clearly and understandably at the time he contracts for. The advertiser cannot be expected to anticipate times when portions of his customers or listeners will be unable to receive his message, because of local interference, and contract for time accordingly. The advertiser selects the time when he believes he will have the attention of the type of audience most interested in his product. It is the job of the station to bring the advertiser's message to all listeners in the trade area of that station well enough to override local interference, so that these listeners may listen to the advertiser's message if they so desire. And this must be possible at any hour of the day or night.

"Extensive observations convince us that when using an antenna input power of 1 kilowatt, the true service range or where our signals can be received absolutely, is about 1½ miles, or a field intensity of greater than 100 millivolts per meter. We find that we give fairly good service up to a point where the field strength drops to 25 millivolts per meter, which is about 5 miles. At points where the field strength is less than 25 millivolts, the listener may listen to us and he may not, depending on the extent of static and induction noises. The advertiser may reach customers outside of the 5 mile circle, and he may not. Remember, I am speaking of good noise free service. That is the kind listeners expect, and that is the kind of service radio advertisers are beginning to expect and the only kind they are going to continue to pay for.

"We give good service up to 5 miles, with an antenna input power of 1 kilowatt. Some of the heavily populated suburbs of the cities in which we are located are 10 miles from our plant. The trade area of these cities has a radius of about 75 miles. For us to expect to increase our power output so that listeners on the outer edge of our trade area circle receive a 25 millivolt per meter signal, is a little beyond our present hopes. However, such service appears to be the ultimate, and any step toward that end is a step in the right direction.

"It is our feeling that if, as the next step, we could move the 25 millivolt line out so that it at least includes the cities in which we are located, we could be temporarily relieved of the pressure being brought to bear on us by listeners and advertising clients. This would mean a five-fold increase in power. Our present power is 1 kilowatt night, 2½ kilowatts day. A five-fold increase would make 5 kilowatts night, and 12½ kilowatts during the day.

"Now I want to point out why increased power to regionals will not create an undesirable situation. I am told that when a station increases its power, the blanket area of that station expands and the station becomes a nuisance to a greater number of listeners. As many regional stations are now located near the centers of population, this may seem, at first thought, to be an obstacle in the path of high power. I have been told that the blanket area of a station is the area around the station where the field intensity is greater than 100 millivolts per meter. I am also told that blanketing means that a station's signal arrives at the receiver with such intensity that the set cannot tune that station out within plus or minus 50 kilocycles of that station's frequency. Personal experience shows me that when using a modern receiver, a 100 millivolt signal does not cause blanketing. Neither would a five-fold power increase in any transmitter or 2¼ times 100 millivolts cause blanketing.

"Laboratory curves show that the average 1931-32 superheterodyne receiver has selectivity such that the ratio of response of wanted to unwanted signals is in the order of 50,000 to 100,000, where the difference in frequency is 50 kilocycles. This is not the ultimate. Better selectivity will be available when it is needed.

"I realize that there are a number of obsolete tuned radio frequency single circuit and crystal receivers in use, and of course they are not as selective as a superheterodyne receiver. If there were a general movement toward higher power, the owners of these sets might protest. In answer to that argument, I want to read a quotation from an article in March,

1933 issue of "Electronics" written by Mr. C. W. Horn, Chief Engineer of the National Broadcasting Company: "To refuse or make impossible improved service to a large number of listeners, because there are still a number of obsolete receivers in use, controverts all ideas of progress. For there to be no progress until these obsolete receivers fall to pieces or die of old age is utterly unreasonable. Just as manufacturers will not build improved receivers unless there is demand for them, just so will there be no improvement in general reception conditions until a situation is created whereby these few obsolete receiving sets must be replaced. A broadcasting station is intended to serve the public, which I interpret to mean the great majority and not a selected few. For this reason, I feel that the Federal Radio Commission could very well change its requirements, and classify areas having 1000 or more millivolts per meter as blanket areas, instead of a figure 100 millivolts as at present. Radio manufacturers will give added attention to more complete shielding and selectivity of receiving sets, so that in time even 1000 millivolts can be exceeded."

"The quality of receivers has improved to a point where the old 100 millivolt blanket area no longer holds. Therefore, regional stations should be able to increase their power, and remain in the same location without fear of blanketing. Another cry against higher power for regionals is the assertion that heterodyned interference between regionals on the same channel would be worse. This fact was a real menace a few years ago. However, today we find transmitters maintaining their frequency closer than 50 cycles, thus eliminating the penetrating beat note audible on some parts of the dial. And we also find that the percentage of modulation is increased from 30 or 40% to 80 to 100%.

"The total effect of these two improvements is to eliminate the nuisance type of interference and replace it with simple cross-talk. Cross-talk from channel sharing stations has never concerned us overly much. Such cross-talk that does interfere with our programs, only shows up a few hours during some evenings, and comes almost entirely from one station. Where cross talk causes difficulty, I suggest the use of reflecting system to concentrate the energy where it is most needed. It happens in our case that approximately 80% of our audience lies northwest of our plant. With increased power available and if it were so stipulated, we would install a reflector in such a way that the field intensity east, south and west of our transmitter remains substantially the same as it is at present, while a gain in signal intensity would be realized northwest of our plant, a place where it is most needed. Other stations on our channel are east, south, and west of our plant. In other words, the signal would be reflected away from the other stations on our channel.

"It has been argued that because of the presence of the fading ring, where sky wave and ground wave meet with such intensity as to cause severe fading, increases in power, being unable to correct this, would be useless. Stations on frequencies higher than 1000 k.c. are likely to find this fading ring well within their trade area. Recent investigations have revealed that this effect can be reduced through proper antenna design at the transmitter. In addition, automatic volume control on receiving sets has helped to still further reduce the unpleasantness of fading.

"Another angle to the interference problem is this: cleared channel stations have increased their power. If regionals and locals increased their power, we would find all signals arrive at the listeners receiving set at a higher level than say three years ago. What would be the effect? Just this. The listener would decrease the sensitivity of his set. The signal in the speaker would be the same, but static and induction noises would be decreased. If that process could be carried far enough, the listener could decrease the sensitivity of his set so far that static and other noises would completely disappear.

"Now to sum up: regional stations are supposed to lay down a serviceable signal over the trade area of the city in which they are located. As things are at present, most or all regional stations give only fair local coverage and fail altogether to give trade area coverage. A five-fold increase in the power of all regional stations would go part way toward improving this situation. The expense of this change should be well within the means of all regional stations. A general increase in station power outputs will not create an undesir-



able condition. The coming of good superheterodyne sets has eliminated the fear of blanketing. Improvement in frequency stability and in the percentage of modulation of transmitters has eliminated the heterodyning from shared channels. Directional radiating systems could be used to reduce cross-talk by shared channel stations. And finally, as cleared channel stations have increased their power from 10 to 100 times, all other classes of stations should increase more or less proportionately to put them back on an equal footing.

"It is our opinion that all regional stations should be allowed to increase their power output to 5 kilowatts night, and 12½ kilowatts daytime. I also have another suggestion, which will be food for thought. Because of high levels of static during portions of the year, why should not regional stations be allowed to use a power of 12½ kilowatts both night and day during the spring and summer. Let the listeners have interference-free reception from as many stations as possible, so they may select programs on their merit alone. Such practice could only work good for American broadcasting.

"The movement for higher power for local and regional stations is yet young. Correspondence with numerous station owners and station managers has shown us that there is a general feeling that regional stations should be granted power increases. It is apparent that individual action will accomplish but little. The Federal Radio Commission is not going to consider raising regional power levels unless they are first convinced that the regional stations want power increases. Action through the N.A.B. is one way of accomplishing this. Our intention this afternoon has been to present briefly a few facts on the general situation, cite a few of our experiences as a regional station, and to attempt to arouse interest in the problems of regional stations."

MR. FOSS: "This particular discussion rather puts me in a bad position and I have got to be careful. A couple of years ago I applied for and got a 5 k.w. transmitter for a station which I built in Portland, Maine, to operate on 1 k.w. At present we have 7 millivolts for the city. I would like to have 25 millivolts across the city. To get 25 to 75 millivolts it looks like 25 to 75 k.w., which is more than Joe Chambers is getting experimentally.

I don't believe that we, as a group, realize how damn near we are to losing what we have. I was hoping someone would give an expression that if we keep what we have in this country we are going to be lucky. I recommend that we do everything in order to keep what we have. I think 2 millivolts is a pretty good signal to have floating around and I am quite happy to use 500 microvolts when I can get it in.

MR. BALDWIN: "In connection with the Davis Amendment, I think all of you, as engineers, know that the apparent meaning of Section 9 as amended is one which speaks of equality of transmission and reception facilities.

"I believe that there isn't one single thing that is more important for the N.A.B. to do than to undertake a real honest effort to have the Davis Amendment repealed at the next session of Congress. If there is any agreement with other countries that results in the listing of a single frequency as an exclusive channel for other countries you can put it down that there is going to be a general reaction of a number of stations in the United States. There is going to be a reaction in the face of the Davis Amendment. You gentlemen might not agree with the method of computing equality as set up by the Federal Radio Commission and you might object.

"As some one has pointed out, a 500 watt station cannot be increased to a 1,000 watt station without interfering with quota charges, as compared with no increase in the charge to quota for a clear channel station of 5,000 watts increasing to 25,000 or 50,000 watts.

"Do not forget that unless we consider these problems seriously, and offer something to the Federal Radio Commission, they never will be changed."

MR. BRIDGES: "I would like to offer a resolution: Whereas, It is the sense of the Engineering Section of the National Association of Broadcasters that power increases for local and regional stations merits study and investigation,

"Be It Resolved, That the Engineering Committee is hereby instructed to investigate and report its findings to the annual convention.

"I would like to ask Mr. Baldwin if he thinks the resolution will accomplish something for us."

MR. BALDWIN: "I think it depends on how much you put into it. You are not going to get out of anything any more than you put into it."

CHAIRMAN: "I will ask that the resolution be read again."

A motion was made and seconded that the resolution be adopted. It was put to a vote, all in favor remaining seated and all opposed rising. The motion was carried.

CHAIRMAN: "A committee will be appointed to study and investigate the power increases for local and regional stations."

MR. HOFFMAN: "Mr. Baldwin has brought out some good points and I would like to offer this resolution.

"Whereas, It is the sense of the Engineering Section of the N.A.B. that the Davis Amendment to the Radio Act of 1927 is unsound from an engineering point of view and is contrary to the laws and nature, be it resolved that we impress upon Congress the necessity for the repeal of this amendment and that, pending the repeal of the Davis Amendment, the Federal Radio Commission be impressed with the necessity for changing its present method of charging so as to allow increases in daytime power without increasing the charge."

CHAIRMAN: "That is rather a broad resolution and I think that should be open to some discussion.

"The resolution would impose an obligation upon us and I think it should be carefully studied before we attempt to correct the commission in its ways with a far-reaching resolution. I think that we should study the matter very carefully before attempting to set us any new standards."

MR. GROVE: "I should like to ask if any one of the members present could express himself on the horizontal increase of power, either daytime or nighttime, and whether it is technically possible from the standpoint of interference. I have been told that horizontal increase of power would cause no additional interference. I do not know and would like someone else to express himself."

CHAIRMAN: "The resolution just passed imposes on the committee the obligation of determining those facts very definitely."

MR. FOSS: "We cannot make recommendations to the Commission unless they are backed up with definite facts. I do not think that any group of the N.A.B. today has enough facts to go on record for the whole association as recommending that the system be changed. Probably we all object to it. I do, and everyone else does. We cannot put ourselves in a position to say something is wrong unless we can offer something that is better and make suggestions."

DR. JOLLIFFE: "I do not care what kind of resolutions the Engineering Section of the N.A.B. passes. I do think that the resolutions which the Engineering Section or any engineering section pass should be based on sound principles. There is one way of getting sound principles and that is studying facts which underlie these principles. There has never been presented to the Commission any organized study of transmission data in connection with any case presented to it. Up to the last few months the only organization that has made or attempted to make a study of the engineering principles is the engineering division of the Federal Radio Commission under my direction. If an organization such as this believes those facts are wrong, we are willing to take it under discussion. However, I want to point out that the quota system under which we work was given a lot of consideration. It is not perfect. We know where it is weak probably better than the rest of you, but until we have something better, I insist it is as good as anybody has proposed and we will continue to enforce it. However, if the Engineering Section of the N.A.B. will make an engineering study and present it to the F.R.C. I want to assure you that as long as I am in charge at the F.R.C. it will be given very careful consideration. However, any resolution which may be adopted on the spur of the moment without engineering facts and based on individual cases, I can assure you will be given very little consideration. These, gentlemen, are the facts as they stand to you. The Engineering Division of the Com-



mission wants all the data we can get. We must change our engineering principles or rather our empirical data from time to time as we get more facts. But I want to impress again that we must be shown on the basis of adequate data, adequately analyzed and adequately presented. I just want to use an illustration. During the past few months there has been considerable talk against the selectivity curves used by the Commission in connection with the empirical standards. The selectivity which we took from good data has been obtained for a period of a year. It was subjected to an attack at a meeting of this group and some others at a meeting in New York a few weeks ago and it was presented originally at that meeting to show that this selectivity curve is related to receivers which are several years old. We had the data prepared in a form which we can analyze and I am sorry I do not have it with me here. We drew on what selectivity curves were submitted and those which we use in our empirical standards. Our curves lie between the tuned and the super-heterodyne receivers from 1931 to 1933 and I submit that there is where it should lie. That is simply given as illustration of attacks of statements which are made without adequate data. If the men, and they were good engineers, had analyzed the curves and compared them they would have found that out, but it isn't until you get down to an analysis that you get definite facts. Referring to the statement I made that we want all the data any of you have and if our empirical standards are wrong, we will change them,—we will be the first to change them, but we ask that in presenting to the Commission any data or any request for change that it be based on a sound study such as was proposed in the first resolution and that the study consist of adequate data, adequately analyzed and properly presented."

CHAIRMAN: "You have heard some of the facts concerning the Federal Radio Commission. Dr. Jolliffe pointed out that the Commission would be glad to accept a review of facts that we, as a body, can present. I can assure you that represented in this room are the engineers who can present more facts than any other group in the country."

"Is there any further discussion? The subject is still open for discussion."

MR. GILLIN: "Following Dr. Jolliffe's remarks, if the Davis Amendment is unsound, your remarks and the need for facts being brought to the attention of the F.R.C., I think it would be only fitting and proper that the resolution that has already been passed should be a portion of the general resolution to the end that the Engineering Section would get the data, and, if necessary, show that the Davis Amendment is wrong, and also to present an amendment to supplant the Davis Amendment. Because, after all, you are going to have to get something just as good or better as Dr. Jolliffe said or you cannot take the Davis Amendment out."

MR. COHAN: "I would like to take about two minutes to leave a thing or two with the membership of the N.A.B. I think that perhaps there are one or two facts generally overlooked in the functions of the Engineering Division of the N.A.B. This is not a group that gathers every day or every week; it is not a body group of the Association; it is not a group that has a lot of funds available for making intensive surveys or employing people to make them. Mr. McNary, who is now devoting his time to matters for the Association, cannot take under consideration every problem that is brought out and carry it through in a very complete engineering state. I think that if the Engineering Division of the N.A.B. is to get anywhere there should be proposed a better method of operation. The thing I have in mind is that all the stations which are members of the N.A.B. should elect or appoint, or automatically have appointed the chief engineers of every station to assist in whatever engineering work is of importance to the association, the Federal Radio Commission, and the listeners, and, as a method of functioning, allow the chief engineers of all the stations in each zone to select one of their number for direct contact with the Engineering Division of the N.A.B. and in that way there would be five men representing the entire gathering and each man would be the choice of the engineers in his zone. Anyone in any one of the zones having a matter for the engineering operations of the station could submit that to the man in charge of his zone and in turn would clear it through the

division and the headquarters in Washington could refer it to the other four members. Then these five members as a group could decide both the importance of the subject and the extent to which the engineering division of the Association should go in following it through.

"I think that would assist materially in doing just what Dr. Jolliffe has suggested and that is to give him all the engineering information or data we feel is of importance for his consideration and investigation, and not just on the spur of the moment. I would like some discussion as to how the Association feels with regard to such a group of engineers. We all come to the meetings and somebody resolves that we do this, and that the Engineering Division do that, and then the members of that group find that they cannot all get together in one city until four months hence and a year rolls around pretty rapidly. If the members of the Association would take some of this responsibility and cooperate, we would probably get something accomplished."

CHAIRMAN: "We seem to have started out for some discussion."

DR. JOLLIFFE: "I want to say that if this Engineering Section of the N.A.B. is going to make a study, I wish to offer all the data which we have accumulated as being available to the committee for such use as it may desire."

CHAIRMAN: "We certainly appreciate that, Dr. Jolliffe. I think most of us recognize that the Commission you have is certainly most complete as it stands. Mr. Cohan's remarks were quite correct in that for relatively small matters it is almost impossible to get everybody together."

MR. HOFFMAN: "I think that perhaps the best thing would be to withdraw the resolution."

CHAIRMAN: "Would you care to make a modified resolution?"

MR. HOFFMAN: "I assume someone else could make a suitable one."

MR. FOSS: "It does not seem to me that our Committee, as a committee of engineers, should try to suggest to anybody an amendment to take the place of the Davis Amendment. It is a case of not having anything better and I for one, as a member of the committee, would hesitate to voice my views thoroughly on the subject."

CHAIRMAN: "The Engineering Committee could do some work with regard to a revision in so far as we could collect technical and engineering data. I believe that perhaps we could collect enough to point out its many weak spots and we could get a change as a local matter. I think it is within the scope of this section."

MR. FOSS: "Is there a Legislative Committee? I do not know how it would apply. If this information could be referred to them we could revise the resolution that has been passed."

MR. COHAN: "I would like to offer a resolution that the stations in each zone carry out my suggestion and elect one of their number to act in a cooperative manner with the present Engineering Committee of the N.A.B. and that these five men in this group of individuals be a fact-finding committee and that the Engineering Committee take such matters which are referred to it and work them out in cooperation with the Broadcast Committee of the Institute of Radio Engineers."

MR. FOSS: "I second the motion."

CHAIRMAN: "The resolution has been made and seconded. We will put it to a vote. All in favor, raise hands. All opposed? Motion carried."

MR. CAMPBELL: "I have been very much interested in hearing ways and means of spending money. I am interested in saving some money in tube costs. We have at Dallas made some rather extensive studies in costs of tubes and other equipment and have found that tubes have been the only depression proof part of our transmitters. Some way or other should be devised to cut the cost of operation down and I think the Engineering Committee should look into that with a view to obtaining a reduction in transmitter tube costs. Receiving tubes are down to about twenty-five cents a dozen. While the transmitter tubes are about \$1650 each."

CHAIRMAN: "Although this is a little out of line with



the immediate thing before the committee, that is something that I propose be taken up and discussed by the engineers of the N.A.B. They will take some action to accomplish any such results. We did a lot of discussion about that a little while ago. Are we clear on that now?"

"Is that committee proposed by Mr. Cohan to supplant the present Engineering Committee?"

MR. COHAN: "The thought I had was that this would be a committee in the field. It would take the Engineering group of this Association and give each station better representation in the Association in order to carry out the last resolution. I would propose that the National Association of Broadcasters send a ballot to the chief engineers at all the stations who are members of the Association enclosing a list of the chief engineers in that zone and ask the men to vote on whom they want from that zone to represent them in that zone. These five men would bring the matters submitted to them by the chief engineers to the present Engineering Committee and the present Engineering Committee would then review and make whatever comments each might have and submit them to the other men in the four zones. In that way we can eliminate matters that are not terribly important but we can so revise them that we just get the root of the subject and eliminate any possibility off in other directions. The present Engineering Committee could augment the new committee and assist in field work which the present committee is not able to handle. It is possible that certain things would be desirable. If, for example, you were in the fourth zone and have a par-

ticular problem in that zone, the members of the Engineering Committee might be from the first zone and might be more familiar with the problem than the Engineering Committee and, therefore, would be the person you would rest heavily on, on the particular conditions in that zone. The field zone men would not replace the present committee but rather to augment it."

MR. COHAN: "This is not meant to pass the buck, but I move that Mr. McNary, Mr. Chambers and Mr. Loucks, all of whom happen to be in Chicago at the moment, tentatively decide on a number from each zone and submit that list to the other members and see if there are any objections?"

"A motion has been made and seconded and it is required that it be put to a vote. The subject has been discussed. All in favor—all opposed. Motion carried.

"Are there any further subjects to come before this meeting?"

MR. CAMPBELL: "I wish to emphasize what I said a while ago that we feel tube organizations to say the least, would bear investigation. It seems to me that the Engineering Committee should properly undertake such an investigation. This is offered as a suggestion as I think the matter of tube costs deserves serious consideration."

CHAIRMAN: "Gentlemen, this has been by far the biggest turnout I have seen at any meeting. I think that we have gotten more action started. It is moved that we adjourn."

Motion seconded and carried. 2:35 P. M.