

# National Association of Broadcasters

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## *Report on the* **MEETING OF ENGINEERS**

In Havana, Cuba, November 1—December 6, 1947

PRELIMINARY TO THE

### **Third North American Regional Broadcasting Conference**

Scheduled to be convened in Canada, August, 1948



*This report, written by Royal V. Howard, Director of the NAB Department of Engineering, and Neal McNaughten, newly appointed Assistant Director, endeavors to consolidate the salient points, issues and results of the recent meeting of North American engineers in Havana. Both Mr. Howard, as NAB representative, and Mr. McNaughten, then Chief of FCC's Standard Allocations Section, were delegates to the conference.*

**W**ITH the growth of broadcasting, and in order to permit maximum use of the radio spectrum, it became evident in the early 1930's that an understanding as to allocation of channels between the various North American countries was necessary. The earliest of these understandings toward such cooperative use was a bilateral agreement between the United States and Canada which became effective in 1932.

To further these objectives the First North American Regional Broadcasting Agreement (NARBA) Conference was held in Havana in 1937. After ratification by Canada, Cuba, the Dominican Republic, Haiti, Mexico, Newfoundland and the United States, the Agreement went into effect in 1941. Under the basic international provisions (Cairo 1938), the broadcast band was widened at the Havana Conference from 550-1500 kc. to include the frequencies 1500-1600 kc.

At the time the Agreement became effective in 1941, 777 U. S. radio stations out of 862 shifted frequencies from 10 to 40 kc.

Since that time various bilateral agreements have been reached and, with the expiration of the 1937 Agreement, an Interim Agreement was reached by the Second NARBA in Washington, D. C., in February 1946 which extended "in the jurisdiction of each country the application of the provisions of the NARBA (with certain exceptions) for a period of three years."

The Interim Agreement established a North American Regional Broadcast Engineering Committee (NARBEC) for the purpose of determining facts and making recommendations thereon which would enable governments to comply with the technical provisions of the Agreement to their mutual satisfaction. All signatory nations, with the exception of Mexico, agreed to participate in the Engineering Committee.

The Interim Agreement also called for the convocation of the participating nations (to be held August 2, 1948) in Canada for the purpose of drawing up a new Treaty.

The Interim Agreement provided for the filing, through the Office of Inter-American Radio (OIR) in Havana, of the various countries' proposals for modification of the Treaty, and, additionally, Article XIII of the Interim Agreement (*modus vivendi*) stated that there shall be a Conference of Engineers prior to the Treaty Conference who "shall examine the technical aspects of the documents communicated by the interested Governments. A joint report of their findings, views and recommendations shall be circulated to the Governments . . ."

### Proposals

The release of the various countries' proposals on October 3, 1947, less than one month before the scheduled meeting of the Engineers on November 1 in Havana (1947 *NAB Reports*, page 815) brought forth strong industry reaction as to the effect such proposals might have upon the United States allocations structure.

Mexico's proposal, which suggested a complete revision and reallocation of the entire broadcast spectrum, and pro-

posed the establishment of a minimum power on clear channels of 100 kilowatts, was considered most extreme. Mexico's proposed allocation would have shifted stations from 17 to 60 channels, whereas the previous NARBA reallocation maximum shift was 4 channels at a time when very few directional antennas were in use. Seventeen regional channels would be shifted under the Mexican proposal from low to high frequencies, and 3 regional channels from high frequencies to low. Two hundred forty-three full-time stations, 48 daytime stations, and approximately 900 locals would likewise have had their channels shifted. Approximately 300 directionals would have to be changed.

Mexico proposed to exchange 1220 and 1570 kc. assigned to them as class I-A, for 630 and 980 kc. (presently regionals) and, additionally, requested that existing regional channels 590 and 950 kc. be cleared of stations and assigned to Mexico for I-A use. Mexico also requested that 540 kc. be made a clear channel.

Mexico additionally proposed many other classification changes, protection for their stations inside the United States, and other modifications.

Newfoundland's proposal contained a request for 3 additional Class III-A stations on 790, 830 and 980 kc.

Haiti requested two additional high power Class II stations on 1080 and 1130 kc. with 25 kilowatts.

The Dominican Republic requested Class II stations on 650 kc., 945 kc. and 1170 kc.

The Bahamas wished 1540 kc. kept clear for 50 kilowatts.

Cuba requested and advocated the "necessity of a complete revision of the Treaty."

Canada requested that the channel 540 kc., authorized by the International Telecommunications Conferences in Atlantic City, on which she has operated a 50 KW station for many years, be made a Canadian Class I-A channel. Canada additionally proposed to add a new class of station to be known as Class V which would operate with 50 watts of power on clear channels assigned to the country in which the clear channel was allocated. These Class V stations would be intended to supplement the service of a dominant station or network in areas not otherwise served.

The United States proposals mainly advocated the adoption of new technical standards in keeping with the increased technical advancements of the art, and additionally proposed the inclusion of the frequency 540 kc. into the spectrum without specifying power or class.

Previous to the Engineers meeting in Havana, a meeting between Government and Industry was held in Washington on October 17 to establish the *modus operandi* and official delegation policy.

A Government-Industry Committee of Engineers was appointed to segregate the United States proposals into three parts: (1) purely engineering; (2) policy; and (3) mixed policy-engineering. This Committee, on completing its work, presented its results to the full joint Government-Industry meeting at the State Department in Washington on October 25th.

After minor modifications of the Committee's work, the U. S. delegation was instructed "to write recommendations only upon those items of a purely technical nature and to

explore and discuss the views of the other countries' submitted proposals." Matters of pure policy, the Committee agreed, were not within the scope of the Havana meeting.

### Conference

The Conference of Engineers was held in Havana from November 1 to December 6, 1947. Countries present were: Canada, Cuba, Dominican Republic, Haiti, Mexico, Newfoundland and the United States. The Bahamas, while an adherent to the Treaty, was not represented. The Haitian and Dominican Republic legation attaches to Cuba served as observers for their respective countries, while other countries were represented by legal and engineering personnel.

In its opening Plenary Session in Havana, the Meeting created Committee I, composed of representatives of the several countries, to prepare a report outlining in detail the scope of the meeting. This Committee likewise divided the agenda into its three component parts although they realized "that, strictly speaking, it was most difficult in many cases to draw clear lines between matters that were purely technical and matters which involved both engineering and policy."

The Conference then designated Committee A to consider the purely technical parts of the agenda, with the understanding that a specific recommendation upon these items would be appropriate.

The second part of the agenda, made up of mixed engineering and policy, was referred to a working group designated as Committee B. The general policy, approved in Plenary meeting, was that Committee B "would study and discuss the subject matter but that no specific recommendations would be made" to the Plenipotentiary meeting in Canada.

The Conference, recognizing that many of the recommendations in its report would be subject to further appraisal by the several countries prior to the Canadian Conference, stated that "it would be clearly understood that the views, findings and recommendations of this meeting were submitted only as a working basis for the preparation of the further proposals of the countries to be submitted to the forthcoming conference in Canada."

The mixed policy-engineering Committee B devoted a substantial portion of its time to the consideration of a number of engineering proposals not a part of the present NARBA or the Interim Agreement. It was evident from such discussion, Committee B stated, that despite the extensive new knowledge of radio acquired in recent years, available data concerning a number of engineering matters are in some respects incomplete.

Committee B's view was that new proposals had been submitted with respect to the basis for classification of stations and channels and for changes in the present provisions of the North American Regional Agreement concerning methods to be followed in the determination of the intensity of skywave signals. There have also been proposals for changes in the extent to which stations of several classes are to be accorded protection from interfering signals; of the adoption of new ratios of desired to undesired signals on adjacent channels; for the preparation of maps showing ground conductivity in the several countries; and for the

specification of somewhat detailed engineering data on notifications and changes in assignments. Therefore as a result of these new proposals, the Conference recommended that these be studied and that, "through such study, in addition to careful overall review by each country of the views and opinions expressed, much can be accomplished toward assuring a new Agreement in which full advantage will be taken of the most current and complete engineering data available."

Canada, Cuba and the United States felt that many proposals were beyond the scope of the agenda as they involved policy and mixed policy-engineering, and the Engineering Meeting could do nothing except recommend that each country form its own judgment. However, the Mexican Delegation felt that it had been unduly restricted as no detailed study was made by the Conference of the technical aspects of the different nations' proposals and that a technical study should have been made which would serve as a basis in order that the Conference might present its conclusion and recommendation to the various governments. Mexico felt that, as a result of this restriction, "there has been transferred to the Conference in Canada the work which should have been entirely attended to in Havana with the dilatory consequences which can be foreseen."

The work of Committee B on mixed engineering-policy matters resulted largely in obtaining for purposes of the record the views of the various countries. Because of the divergent views of the several countries concerning the nature and scope not only of Committee B's work but that of the meetings' terms of reference set forth in the Interim Agreement, no detailed study was made of any specific proposal. However, substantial agreement in principle was reached on some items.

### 540 Kilocycles

It was acknowledged that the standard broadcast band would include 540 kc., raising the total channels to 107. However, "it was recognized the determinations with respect to the particular classifications to be given 540 kc., i.e. whether it should be a clear channel, regional or a local channel and the use of that frequency to be made by the several North American countries, were beyond the scope of the present meeting and should remain for the conference in Canada." The United States strongly supported this position and emphasized the numerous different possibilities for class and use of this new channel. No objection was raised on this point by any of the countries.

### Mexico's Views

In connection with Mexico's point of view upon her proposals for a complete reallocation of all stations, Mexico explained that her proposal was based essentially upon: (1) the desirability from an engineering viewpoint of having clear channels together at the lower portion (540-1140 kc.) of the standard broadcast band, with regional channels in a block (1150-1540) next to the clear channels, and the local channels a block at the upper end (1550-1600 kc.) of the standard broadcast band; (2) Mexico's need for two additional clear channels; and (3) Mexico's desire that two



clear channels now assigned to her be exchanged for two channels in the lower portion of standard broadcast band. The frequencies 1220 and 1570 kc. now assigned to Mexico for Class I use would be exchanged for 630 and 980 kc., which would be used by Mexico for Class I stations.

Mexico explained that 590 and 950 kc., now allocated as regional channels, were requested by her for Class I use because it appeared that these two channels could be cleared of their regional assignments more readily than any other regional channels which would serve her purpose. Mexico said also that if other channels near these could be cleared more easily they would have no objection. Her desire for lower frequencies was based primarily upon these channels better propagation characteristics over the Mexican terrain.

Canada, Cuba and the United States in a brief reply pointed out the highly complex engineering problems and possible economic consequences which would result from these proposals. Cuba added that she was using the frequencies under discussion and would not under any circumstances consider any change. Canada, in discussing the matter, stated that she had 40 stations which would be affected by the proposal, 30 of which operated with directional antennas.

The United States went into some statistical detail showing that the Mexican proposal of complete reallocation would involve a shift of approximately 1800 U. S. stations.

In response Mexico stated that she recognized her proposal presented highly complicated problems requiring the most careful study before the Canadian Conference, that modifications of her proposal would probably be required in the light of such study, and that Mexico was willing to consider the possibility of meeting her needs through some other method in order to avoid as much as possible the difficulties described by the other nations. However, upon presentation of the Mexican proposal, Canada, Cuba and the United States indicated that the formulation of specific recommendations with respect to any one frequency or groups of frequencies was beyond the scope of Committee B and the Engineering Meeting.

Mexico recognized that the acceptance of her proposals with respect to a complete reallocation of channels as well as the principles of protecting the services of clear channel stations in other countries and limiting the signals of regional channel stations at the border involved a great number of changes in assignments and stated that it should be kept in mind that if the countries within the region are not disposed to accept a certain amount of self-sacrifice so as to satisfy their mutual needs it will not be possible to accept any of numerous proposals involving changes, particularly those referring to new technical standards.

Following refusal by the Chairman of Committee B to permit the procedure proposed by Mexico, that country withdrew from the agenda all other items of a similar nature submitted for detailed discussion.

Mexico suggested that investigation should be made of increasing power on certain regional channels similar to that permitted Cuba on certain channels under the Interim Agreement. Mexico expressed the belief that the purpose

for which she was requesting additional clear channels would not be served by the use of specific stations on regional channels.

### **Cuba's Views**

On the subject of clear channels, Cuba's point of view made no provision for stations such as those now designated I-A, which Cuba proposed to change to "national channel." The Class I category proposed by Cuba corresponds essentially to the I-B classification under her proposal which would operate with a minimum power of 10 kilowatts. These stations would be prohibited from radiating in excess of 50 kilowatts toward any other country making use of the same channels.

Cuba felt that her frequency assignments under the present agreements are inadequate and that Cuba needs approximately 12 assignments of channels for the use of Class I-B stations with full I-B protection. She no longer desires to continue the special categories of stations for which exceptions were made to her and desires the allocation of channels to her in the same manner as such allocations are provided for other countries and under the same rights and limitations.

Commenting upon the proposal of Cuba, the United States pointed to the basic problems arising out of the omission of any provision for stations of the present I-A type and, in connection with the general statement of Cuba with respect to her need for Class I-B stations, the United States pointed out that they, too, are faced with needs for additional service to millions of people in the United States and outlined the effort being made in clear channel proceedings to determine how these needs may best be met. The suggested plans for meeting these needs include possible increases in power, to 750 or perhaps 1000 KW, on clear channels, and possible relocation of clear channel stations.

### **Class V Stations**

In connection with the Canadian proposal for Class V stations of low power (50 watts) on Class I channels, Cuba stated that although she believed such a class of station might well prove desirable for some countries, it probably would be of little use to Cuba because of the high noise level in her country.

Mexico felt that this type "V" station in all probability could be made use of by Mexico but believed that likewise, in view of the high static levels in Mexico, perhaps a 100 watt maximum power would be preferable.

The United States in reply recognized the objectives sought to be obtained by the Canadian proposal and stated that in their view Class V stations would be essentially similar to Class II stations except that the protection to which Class V stations would be entitled will be less than the protection to which a Class II station is entitled and the power of such stations would be less.

In clarifying this point of her proposal for Class V stations, Canada stated that it was her view that Class V stations could be allocated only to a clear channel on which that country has an assignment and therefore is dissimilar to the Class II classification.



The United States presented for discussion item by item the new 10% and 50% skywave curves, the angle of departure curves, the Class I-B 50% reference contour versus latitude curve, adjacent channel ratios, and proposed that elimination of the 1800 and 2800 mile rules covering Class I-B stations be considered. Aside from the fact that agreement in principle was reached on the RSS rule, no extended discussion took place.

Canada and Cuba approved of the inclusion in a new treaty of the U. S. proposed "50% RSS exclusion rule" for making additional assignments. Mexico agreed in principle to the RSS rule but reserved stating views on the percentage figure.

Items on which substantial or complete agreement was reached are as follows:

### **Skywave Signal**

A general definition was approved for "skywave signal" in lieu of the present definition for "secondary service area." The new skywave signal definition is as follows:

#### *Skywave Signal*

A radiated signal which is reflected back from the ionosphere.

### **Class III Stations**

The distinction between Class III-A and Class III-B stations is of no further use and should be deleted.

### **Calculations of Groundwave Signals**

For the purpose of calculating ground wave signal strength, the adoption was recommended of 20 new curves (families of curves) in lieu of the one curve now contained in Appendix IV of the present NARBA (FCC AM Standards of Good Engineering Practice, Appendix I, Graphs 1 to 20, inclusive). With a reservation on the part of Mexico, a method of carrying out ground wave field intensity measurements was adopted. In connection with determining groundwave interference to groundwave service, the following was adopted:

"In cases involving interference from two or more groundwave signals, the largest undesired signal will be considered to determine the existence or absence of interference at any point."

(NOTE: This was adopted in lieu of a complex RSS system.)

### **North American Regional Broadcasting Engineering Committee (NARBEC)**

Continuance of the NARBEC as proposed by Canada and the United States was recommended for favorable consideration. Mexico abstained from consideration in the matter of NARBEC since it is not now a member of that committee.

### **Adjacent Channels**

Canada proposed continuance of the present NARBA adjacent channel ratios of 2:1 (desired to undesired) but would agree to the 1:1 ratio proposed by the United States. Agreement could not be reached on the ratio of signals 20 kc. removed. Canada and the United States agreed that the present 30 kc. ratio be deleted, but no agreement was

reached on the U. S. proposal that stations not be assigned with less than 40 kc. separation if the area enclosed by the 25 mv/m groundwave contours of the two stations overlap, nor was agreement reached on the proposal that no station will be assigned with less than 30 kc. frequency separation if the areas enclosed by the 25 mv/m groundwave contours of either overlaps the area enclosed by the 2 mv/m groundwave contour of the other.

### **Determination of Objectionable Interference**

Although specific ways and means of determining the existence or absence of objectionable interference were not decided upon, it was agreed that provision for such determination should be included in the recommendation as follows:

The present and extent or absence of objectionable interference from stations on the same channel or adjacent channel shall be:

1. Determined by actual measurements of the interfering signal obtained by the methods presented in this agreement (new NARBA).  
(NOTE: No method fully agreed upon.)

2. Estimated by reference to the propagation curve in Appendices .... and ..... (Present Appendices IV and V.)  
(NOTE: No specific skywave curves were agreed upon.)

### **Mileage Separation Tables (Appendix VI, Present NARBA)**

All countries were in agreement that the mileage separation tables have been of little or no use since the effective date of the NARBA and therefore should not be included in the new Treaty.

### **Notification**

Notification of new, or change in existing, assignments of one country to the others has in the past required certain minimum technical data. The desirability of the submission of more detailed engineering data with notification of station assignments was generally recognized and the following data was recommended for submission:

". . . showing, with respect to each station, its call signal, geographical location of the center of the antenna in latitude and longitude, frequency, power and antenna characteristics, including electrical and physical dimension of directional as well as omnidirectional antenna systems (for directional systems horizontal and vertical radiation patterns for both day and night operation shall be furnished; vertical pattern need only be shown for the directions in which protection is required)."

### **20:1 Co-channel Ratio of Desired to Undesired Signal**

It was agreed, without extended discussion, that perhaps from some viewpoints a higher ratio might be desirable, but that for practical purposes continuance of the 20:1 ratio should be recommended.

## Antenna Performance

Certain minimum values of radiation in millivolts per meter per kilowatt at one mile for each class of station are set forth in the present Treaty. Due to disagreement between the various countries as to new values and the manner in which such values may be used with respect to predicting interference from new stations, no recommendations were made and the views of each country were made part of the record.

### 650 Mile Rule

The United States desired that the minimum value of antenna efficiency in millivolts per meter per kilowatt at one mile should be increased for each class of station to be consistent with those values encountered in actual measured installation. Cuba and Mexico desired a method of computing antenna efficiency whereby the theoretical value of millivolts per meter at one mile for an antenna system may be notified for purposes of estimating interference without adherence to minimum or maximum values.

Both Mexico and Cuba proposed the elimination of the present 650-mile border rule for the location of Class II stations.

### Definitions

It was recommended that the following definitions be accepted:

#### *Standard Broadcast Channel*

The term "standard broadcast channel" means the band of frequencies occupied by the carrier and two side bands of a broadcast signal with the carrier frequency at the center. Channels shall be designated by their assigned carrier frequencies.

#### *Assignment of Carrier Frequencies\**

The carrier frequencies assigned to standard broadcast stations shall begin at 540 kilocycles per second and be in successive steps of 10 kilocycles per second to and including 1600 kilocycles per second. No intermediate frequency shall be assigned as the carrier frequency of any broadcast station.

#### *Band Width of Emissions\**

The band width of emissions is not fixed provided that objectionable interference is not created.

#### *Ground Wave Signal*

The radiated signal which is propagated close to the surface of the earth and is not reflected back from the ionosphere.

#### *Power*

The power of a standard broadcast station is the unmodulated radio frequency power expressed in watts or kilowatts supplied to the antenna system.

#### *Spurious Radiations*

Spurious radiations from a standard broadcasting transmitter are the radio frequency harmonics, audio frequency

harmonics or any other emissions or modulation products not necessary in order to render the desired broadcasting service and may result in the generation of steady state or transient components capable of producing objectionable interference.

#### *Standard Modulation*

The standard form of modulation is amplitude modulation with an unsuppressed carrier of constant amplitude yielding two symmetrical sidebands.

#### *10% or 50% Signals General*

By a 10% (or 50%) skywave field intensity is meant that level of field intensity exceeded by the hourly median field intensities in some specified interval of calendar time for 10% (or 50%) of the nights of that calendar interval. The hour of the night to which the "hourly median" refers is the hour centered on the instant of time two hours after the latest sunset on the transmission path.

#### *Radiated Field Intensity*

The radiated field intensity in a specified direction is the inverse distance field in millivolts per meter at one statute mile (or the international equivalents in kilometers).

#### *Frequency Tolerance and Stability*

The operating frequency of each broadcast station shall be maintained to within 20 cycles per second of the assigned frequency, and shall not vary perceptibly over short periods of time under all conditions of operation.

#### *Elimination of Spurious Radiations*

In the event objectionable interference results from spurious radiations, the countries concerned shall cooperate by taking whatever steps are necessary to eliminate such interference.

#### *Determination of Power*

The power of a station shall be determined by taking the product of the square of the current at the point of input to the antenna system and the total resistance at that point.

## U. S. Proposes Additional Standards

The United States in closing the Conference stated in part: "It is the opinion of the delegation of the United States that those of us in the NARBA should not be content to rest on our laurels but should continue to maintain our leadership for the rest of the world in terms of regional agreements as they pertain to broadcasting. . . .

"We recommend that those of us participating in this meeting of technicians also recommend to our respective countries that they consider carefully the desirability of including in the final recommendations they submit for the forthcoming Conference in Canada inclusion of certain Standards of Good Engineering Practice for the new NARBA, directed generally toward such items as:

"Uniform methods of making field intensity measurements and recordings.

"Correct and uniform method of evaluating and analyzing field intensity measurements and recordings.

\* These provisions were considered with the definition of "standard broadcast channel" because of their close substantive relationship with that definition. It was recognized that they may be regarded as operating requirements rather than definitions in a strict sense.



"Coordinated use of available data in the establishment of ground wave and skywave propagation characteristics.

"Installation, adjustment and maintenance of the directional antennas that are rapidly increasing in number and complexity.

"Procedures for the elimination of interference problems originating from spurious emissions, and cross modulation effects.

"Establishment of specifications for equipment that will insure operation, particularly with respect to frequency stability and modulation capabilities, within the permissible tolerances.

"Establishment of Monitoring Stations for the measurement of frequencies and technical analysis of emissions."

#### **OFFICERS OF THE MEETING**

Dr. Nicholas G. de Mendoza, Cuba, Chairman of the Conference

Mr. J. W. Bain, Canada, 1st Vice-Chairman

Mr. Eric Timmer, Haiti, 2nd Vice-Chairman

Mr. H. J. Clarke, Newfoundland, 3rd Vice-Chairman

Mr. George E. Sterling, United States of America, 4th Vice-Chairman

Mr. Hector Inchaustegui, Dominican Republic, 5th Vice-Chairman

Mr. Lazaro Barajas, Mexico, 6th Vice-Chairman

#### **Delegation Membership**

*Bahama Islands:* Not represented

##### *Canada*

Mr. Bain, Department of Transport, Ottawa

Mr. W. G. Richardson, CBC

Mr. Harry Dawson, CAB

##### *Cuba*

Dr. Mendoza, Director of Radio, Havana

Mr. Mario Torres Menier, Ministry of Communications

Mr. Jose J. Sentmanat, Ministry of Communications

Mr. Alfonso Hernandez Cata, Ministry of Communications

Mr. Guillermo Morales Lujan, Ministry of Communications

Mr. Armando E. Villalon, Ministry of Communications

Mr. Julio Benito de la Rosa, Ministry of Communications

Mr. Mariano Durland Nieto, Ministry of Communications

Mr. Raul Karman, Engineer

Mr. Ventura Montes, Engineer

Mr. Ramon L. Bonachea

Mr. Carlos Estrada, Engineer

Mr. Antonio de los Santos, Observer

##### *Dominican Republic*

Mr. Inchaustegui, Dominican Legation

##### *Haiti*

Mr. Timmer, Legation of Haiti, Observer

##### *Mexico*

Mr. Barajas, Ministry of Communications and Public Works

Mr. Juan C. Buchanan, XEB

##### *Newfoundland*

Mr. Clarke, Posts and Telegraphs

Mr. W. F. Galgay, Newfoundland Broadcasting Corporation

##### *United States of America*

Mr. Sterling, FCC

Mr. Don R. MacQuivey, Vice-Chairman, State Department

Mr. Neal McNaughten, FCC

Mr. James E. Barr, FCC

Mr. Joseph M. Kittner, FCC

Mr. E. F. Vandivere, FCC

Mr. George Gadea, FCC

Mr. Raymond L. Harrell, American Embassy

Mr. Raymond F. Guy, NBC

Mr. Royal V. Howard, NAB

Mr. John DeWitt, CCBS

Mr. James Parker, CBS

Mr. John Preston, ABC

Mr. George Adair, Consultant

Mr. Andrew Ring, Westinghouse

Mr. E. M. Johnson, MBS

Mr. G. Fritz Leydorf, CCBS

Mr. J. W. Wright, CBS