

## MINUTES OF REGULAR MEETING OF

### WASHINGTON RADIO CLUB

January 13, 1940

The first regular meeting of the Washington Radio Club of 1940, held on Saturday evening, January 13, at 8:00 p.m. in the National Museum Auditorium, witnessed the largest attendance at a regular meeting of the Club in its history. Over six hundred persons--many from out of town, including a large number of notables in the radio field--were in attendance.

The meeting included a demonstration, the first in history outside of New York and the New England states, of the new system of frequency modulation invented by Major Edwin H. Armstrong, of Columbia University. Also the feasibility of multiplexing with this system was demonstrated. This was the first public demonstration of multiplexing with this system.

The principal speaker was Major Edwin H. Armstrong, known throughout the world for his work in connection with the regenerative circuit, super-regeneration, and the super-heterodyne circuit, and now the inventor of the revolutionary system of frequency modulation. The actual demonstration of the system was handled by Stuart L. Bailey, of Jansky & Bailey, prominent consulting radio engineers, Washington, D. C., and licensees of High Frequency Broadcast Station W3XO, located in Georgetown, D. C. This station was the first in this part of the country to be licensed to use this system. Mr. Bailey will be remembered as having previously spoken before the Club. Certain ultra high fidelity electrical transcriptions (flat to about 9500 cycles), furnished especially for the occasion by the Associated Music Publishers, Inc., formed part of the demonstration. In order to show the extremely high fidelity characteristics of the system, an experienced radio announcer and three outstanding musicians performed in a studio specially prepared for the demonstration at 1219 Wisconsin Avenue, N. W., Washington, D. C. Concerning this portion of the program, the official organ of the Broadcasting Fraternity, the National Association of Broadcasters Reports, dated January 19, 1940, at page 3973, stated "The reproduction of the live talent was so life-like that it evoked spontaneous applause from the audience, even though they were only hearing the artists through a loud speaker."

The multiplexing portion of the program was accomplished by transmitting a high fidelity musical program and two ultra audio (21000 and 20000 cycles) simultaneously. The ultra audio tones actuated an electronic typewriter supplied by the International Business Machines Corporation at the rate of 100 words a minute. The original of the letter transmitted is attached. A dozen or more carbon copies were made of this letter at the same time as the original.

The meeting was opened at 8:15 p.m. by President Fred W Albertson of the Club. After a few words of welcome of the Washington Radio Club, "the oldest radio organization in existence," to the special guests of the Club, including the Washington sections of the Institute of Radio Engineers and the American Institute of Electrical Engineers, the Baltimore section of the Institute of Radio Engineers, the Baltimore Radio Club, and the Greenbelt Radio Club, he presented Major Armstrong as an outstanding amateur, and contributor of more outstanding inventions to the radio art than any other single individual. President Albertson pointed out that in checking over some of Major Armstrong's applications to the Federal Communications Commission for the Major, he was "pleased to note that he listed as one of his qualifications to carry out radio research that he had been a 'ham' since 1906."

Major Armstrong, as an introduction, stated that he was proud to be a "ham" and that it was entirely fitting that the first public demonstration of this new contribution to the Radio Art should be a meeting of the oldest radio club in existence.

For about an hour, Major Armstrong outlined the history and nature of his invention, its advantages over the conventional amplitude modulation, and how, in his opinion, it would revolutionize the radio telephone service, particularly standard broadcasting. Portions of his talk were illustrated by slides.

A few of the advantages of frequency modulation over amplitude modulation which were pointed out are:

1. Freedom from QRM and all forms of QRM.  
This means extremely ~~low noise~~ levels.
2. Feasibility of ~~very high fidelity~~ (30 to 16000 cycles used in the particular demonstration).
3. Practicability of wide dynamic range.
4. Usability of a ~~small fraction~~ of the signal strength necessary for amplitude modulation.

(extremely low power requirements)

5. Wide consistent range of transmission at higher frequencies (43.2 megacycles used in this demonstration); many times the distance to the horizon.
6. Efficiency in the operation of transmitting equipment.
7. All transmission in effect, at 100 per cent modulation.
8. High powered stages of transmitters operating Class C.
9. No modulator necessary with its reserve power of four times the carrier power.
10. Riding of the gain control unnecessary, and no chance of transmitter being put off the air because of over-modulation on peaks.
11. Total elimination of cross-talk, heterodyning and ordinary QRM between stations operating on the same channel.

The President, following Major Armstrong's talk, introduced Stuart L. Bailey. There followed a technical description of Station W3XO, which is located in Georgetown, D. C. and licensed to operate on 43.2 megacycles with 1000 watts, using the Armstrong system of wide-swing frequency modulation with a maximum bandwidth of 200 kilocycles. This description was illustrated by slides. The actual demonstration of frequency modulation in operation then presented. Reception was from time to time on several different receiving sets located on the stage of the auditorium, including a receiving set manufactured by the Radio Engineering Laboratories, built especially for frequency modulation, and a new Model 480-M Stromberg-Carlson Telephone Manufacturing Company all-wave broadcast receiver. A large, wide-response Weight high-fidelity loud speaker, supplied through the courtesy of the Yankee Network, Inc., was used with the R. E. L. receiver. Although an outside antenna was available, reception was on a ~~small dipole~~ antenna located on the stage of the auditorium.

Absolutely no interference of any nature whatsoever was experienced during the demonstration. It is interesting to note that a year or so ago another demonstration was attempted in this same auditorium, using an ordinary amplitude modulated broadcast

receiver with a rather elaborate outside antenna. Because all of ~~the equipment for this building is operated on direct current~~ it was found impossible even to receive the local broadcast stations without considerable interference, and the demonstration was abandoned.

The first portion of the program broadcast consisted of the following:

"Hail, Hail, The Gang's All Here," an Associated electrical transcription by the All States Band.

Station identification announcement by Dwight Rorer, formerly of Station WPEN, Philadelphia, and WSJU, Bridgeton, New Jersey, who announced all of the following selections.

"Macushla," an Associated electrical transcription.

"Washington Post March," a World Broadcasting System Band recording.

"Alice Blue Gown," an Associated organ electrical transcription.

After the mechanical reproduction portion of the program, Mr. Bailey described the studios of the station constructed especially for the occasion. He pointed out that the telephone company wanted the prohibitive sum of over Two Hundred and Thirty Dollars for a high fidelity line from one of the local broadcasting station's studios for this one occasion, making it necessary to construct studios near the transmitter. The live talent portion of the program demonstration was also announced by Mr. Rorer and was presented as follows:

Piano Solo, "The Polish Dance" (Scharwenka) by Maestro Arturo Papalardo, former director of the Manhattan Opera Company and nationally known artist.

Vocal Solo, "My Hero" by Olive Harris, lyric soprano of Alexandria, Virginia, artist of Maestro Papalardo. (Offenbach)

Piano Solo, "The Apache Dance," by Maestro Papalardo.

Vocal Duet, Romberg's "Auf Wiedersehn" by Olive Harris, soprano, and Dwight Rorer, baritone, accompanied by Maestro Papalardo.

Mr. Bailey then gave an outline of the particular advantages of frequency modulation in multiplex operation, with a description of how it was to be done in this demonstration. He pointed out that along with a high fidelity broadcast program there might be transmitted at the same time, without mutual interference, a second such program or perhaps a facsimile program or both. It was shown how binorel transmission was very feasible with frequency modulation.

Then followed an Associated electrical transcription, selections from Verdi's "La Traviata," by the Associated Symphony Orchestra. At the same time that this was being received a radio typewriter, similar to a teletypewriter, located on the stage of the auditorium, received a letter dated January 13, 1940, addressed to the Washington Radio Club and signed by Walter S. Lemmon, Director of the Radiotype Division, International Business Machines Corporation. The original of this letter is attached. (It contains the autographs of Major Armstrong and Mr. Lemmon). Following the receipt, it was read to the meeting by President Albertson.

The President introduced Professor C. M. Jansky, Jr., senior member of Jansky & Bailey, an outstanding radio engineer, and a former "ham." Professor Jansky figured prominently, the President said, in the early days of broadcasting in formulating our present rules and standards of allocation, and is imminently qualified to present the advantages and disadvantages of the new system in allocation.

Among other things, Professor Jansky pointed out that two powerful stations operating on the same frequency, both using frequency modulation, would not interfere with each other, as we now understand interference, at any point within their service area. Halfway between the two stations, one or the other station would be heard, but never both, and a slight change in the location would eliminate one and bring in the other. He stated that instead of a ratio of desired to undesired signal strength of 20 to 1 necessary to good reception with amplitude modulation, a 2 to 1 signal strength ratio was adequate with frequency modulation. Professor Jansky predicted that frequency modulation would soon replace much of our present amplitude modulation, and that the advantages of frequency modulation were so great and so numerous that its adoption could not possibly be suppressed.

Major Armstrong was again presented to the meeting by the President. He showed a number of slides demonstrating the magnitude of even the present adoption of this new system. He showed pictures of his own 40 kilowatt station operating on 42.8 megacycles at Alpine, New Jersey, W2XCN; of the 50 kilowatt 43 megacycle Yankee Network transmitter, W1XOJ, now under construction on Mt. Asnebumpskit, near Paxton, Massachusetts, 2 kilowatts

of which have been in operation for some time rendering a broadcast service to the entire New England district; of the 43 mile 250 watt 132 megacycle relay transmitter which carries the programs from Boston to the top of Mt. Asnebumpskit; of the amateur station of Carmen R. Runyon, Jr., W2AG - now licensed as W2XAG and W2XCR - in Yonkers, New York, at which amateur station much of the original research on frequency modulation was carried on. Many other slides were shown.

At the conclusion, the meeting was thrown into a question and answer forum, at which time the audience directed their questions to Major Armstrong, Professor Jansky or Mr. Bailey. The President finally was forced to cut off the discussion because of the lateness of the hour.

The meeting finally adjourned at 11:30 p.m.

On concluding the meeting, President Albertson thanked all those who had contributed to making the meeting a success. Special appreciation was expressed to Major Armstrong and his two engineers, Mr. James Day and Mr. John Bowes, who had been in Washington for days before working on the demonstration; to Professor Jansky and Mr. Bailey and their gang of engineers, including Mr. Oscar W. B. Reed, Vice President of the Washington Radio Club, Ronald H. Culver, another member of the Washington Radio Club, and Mr. George Lohnes; to Walter S. Lemmon, Director of the Radiotype Division of International Business Machines Corporation and his two engineers, Messrs. Lawrence and Holt, who had been in Washington for a week working on the details of the demonstration; to Paul DeMars, Chief Engineer of the Yankee Network, Inc., to Mr. Ray E. Manson, Chief Engineer of Stromberg-Carlson Telephone Manufacturing Company for equipment; to Professor Franklin M. Doolittle, of Station WLXPW and WDRC, Hartford, Connecticut, for slides; and to the announcer and musicians, Dwight Rorer, Maestro Arturo Papalardo and Olive Harris, for their work in connection with the live talent portion of the demonstration.

The Auditorium was packed to over-flowing with more than six hundred persons. A list of all of the out-of-town guests would be impossible. A few of those who came to Washington especially for the meeting from great distances are as follows: Dr. Eugene C. Woodruff, State College, Pennsylvania, President of the American Radio Relay League; Walter Bradley Martin, Roslyn, Pennsylvania, Director of the Atlantic Division of the American Radio Relay League; Dr. Greenleaf Whittier Pickard, Boston, Massachusetts, noted radio pioneer; Professor Franklin M. Doolittle, of Stations WLXPW and WDRC, Hartford, Connecticut; Mr. Italo Martino, Chief Engineer, WDRC, Hartford, Connecticut; Mr. Paul DeMars, Chief Engineer, the Yankee Network, Boston, Massachusetts;



Mr. Walter J. Dann, Manager, Station WTMJ, Milwaukee, Wisconsin; Mr. Kenneth Sliker, Chief Engineer, WEBC, Canton, Ohio, and the Ohio Broadcasting Company, and Mrs. Sliker; Mr. Mortimer L. Burbank, Manager, Station WJAR, Providence, Rhode Island; Mr. Thomas C. Pryor, Chief Engineer, Station WJAR, Providence, Rhode Island; Mr. Cecil D. Mastin, Manager, Station WBEF, Binghamton, New York; Mr. Clifford Harris, Chief Engineer, Station WIP, Philadelphia, Pennsylvania; Mr. Beverly T. Whitmire, Manager, Station WEBC, Greenville, South Carolina; Mr. Maurice Levy, Assistant Chief Engineer, Stromberg-Carlson Telephone Manufacturing Company; and Mr. Fred Allman, Manager, District Office, Graybar Electric Company, Richmond, Virginia. Mr. Allman had a dozen or more individuals with him from southern Virginia and North Carolina.

The Washington Sections of The Institute of Radio Engineers and The American Institute of Electrical Engineers, the Baltimore Section of the Institute of Radio Engineers, the Baltimore Radio Club and the Greenbelt Radio Club were specially invited to the meeting by the Washington Radio Club. Through the courtesy of these organizations, notices concerning the meeting were carried on their individual meeting announcements. President Albertson, in person, extended an invitation to the Baltimore section of The Institute of Radio Engineers and the Greenbelt Radio Club.

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William H. Smith, W3CKP,  
Recording Secretary,  
Washington, Radio Club