

THE TECHNICAL ADVANCE OF RADIO DURING 1937

By

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In reviewing radio progress during 1937, we must pause to pay tribute to Guglielmo Marconi, the father of radio, whose passing came as a blow to the entire industry. His great talent started a chain of development which has not only given us radio as we now know it, but which also promises new and powerful services for the future. High fidelity broadcasting, facsimile, and television figure prominently in these future prospects.

Broadcasting with its many corollaries made great progress during 1937. Intensive research to provide better field equipment was productive of several important advances. Improved portable relay transmitters were put into service, utilizing all frequencies between 2 megacycles and 20 megacycles. Such flexibility permits satisfactory selection of a relay frequency between these limits which is the least affected by atmospheric conditions at a particular time. Resulting pick-ups have been notable for their freedom from phase distortion, fading and background noise.

This equipment is now supplemented by more stable ultra high frequency transmitters. Recent improvements here include the application of crystal frequency control to many of the portable and pack transmitters. New tubes have also contributed to more efficient relay broadcasting in the ultra high frequency region.

With improved stability of transmitters operating in this region of the radio spectrum has come wider fields for remote pick-ups, heretofore

unavailable due to lack of wire line facilities. Expansion in the use of the radio frequency "cue" channel, or where wire lines are impractical such as in mobile pick-ups, enables the remote crew to hear the progress of a program in which they are taking a part, and thus receive their "cues" to carry on. In this manner a most complicated diversity of program sources were placed completely under the control of the program directors at headquarters during the Presidential Inauguration Broadcast.

On this occasion, also, the ultra high frequency "beer mug" transmitter gave excellent results. Later in the year a transmitter of this type was used as a relay to a public address system, permitting members on the floor of large conventions to address the chair and the entire assembly through the PA system, from any spot in the auditorium.

These many advances in field pick-up and relay apparatus made heretofore impractical special event coverage entirely feasible. Programs never before attempted were successfully re-

laid to the radio audience with full dependability and with minimum distortion. The past year will be significant for the spectacular broadcasts so successfully achieved. The eclipse of the sun was broadcast from the South Seas. The Presidential Inaugural witnessed a technical radio coverage probably unequalled previously.

Improved technique for broadcasting studio programs paralleled development in field apparatus. Acoustical knowledge and practice advanced greatly. Additional materials have been added to the list of acoustical treatments. Improved uni-directional microphones were installed for use under special conditions. Improved filters were successfully utilized to produce a trick audio effect. A new studio installation was completed for NBC Operated Stations in Washington. Plants in Philadelphia, Cleveland and Hollywood are in process of construction.

New mixer circuits were developed and installed. Their operation provides lower inherent loss, making possible the operation of amplifiers at lower gain, resulting in lowered background noise.

Better performance of field and studio apparatus necessitates improved transmitters if full possibilities are realized. The past year was characterized by important advances in the design and operation of broadcast transmitters. Non-distortional peak modulation limiters, another technical advance, permits transmitters to operate with higher average modulation without danger of over-modulation on random peaks. In addition, the reverse feedback principle has been incorporated in the design of broadcasting transmitters and amplifiers. Appreciable reduction of harmonic distortion has resulted. Inherent background noise levels are also considerably reduced.

Yet, with these many improvements has come a simplification in transmitter design. Better tubes are available. Maintenance work has been facilitated, operating costs lowered.

Antenna design made substantial progress resulting in appreciable reduction of fading and resulting distortion plus general intensification of signal strength within service areas.

International broadcasting on the intermediate frequencies made rapid progress during 1937. Extensive plans were laid and carried through, to improve transmitting efficiency of American shortwave stations. Higher power with new antenna systems now make possible dependable service from American transmitters in many foreign countries. Directional antennas to Europe and South America are now in use at NBC's short wave relay station W3XAL in Bound Brook, New Jersey. Special program service is supplied for transmission to foreign countries.

1937 saw American broadcasting schedules carrying many more programs of foreign origination, transmitted from Europe via short wave to RCA Communications' Riverhead receiving plant, and thence to the networks. This service has been greatly improved and stabilized due to increased power in transmitters, directive antennas, and improved receiving facilities.

The technical advances in broadcast receivers have made important contributions to improved home reception. Automatic frequency control circuits are now incorporated in many receivers. Use of this circuit makes push button tuning practical and the past year saw the introduction by RCA of such automatic tuning. Set operation thereby was greatly simplified and the quality of reception improved thereby.

New high fidelity broadcasting stations appeared in the ultra high frequency band, providing excellent possibilities for dependable local service free from natural static. Many modern receivers are equipped to receive this U.H.F. band where full fidelity can be broadcast without sideband interference. NBC has two such transmitters atop the RCA Building, W2XHG on 41 megacycles and W2XDG on 38.65 megacycles, carrying respectively the Red and Blue Network programs.

Developments in microwave practice were also significant.

Television was the subject of vigorous experimentation during 1937. Early in the year definition standards of the RCA system were increased from 343 lines per picture to 441 lines, an improvement of 30 per cent. This change necessitated considerable alteration in auxiliary equipment in order to take advantage of the potentialities of the new standards. Amplifier circuits previously designed to pass 1.8 megacycles, were reconstructed to accommodate frequencies of 3 megacycles. The overall effect results in an improvement in resolution of approximately 60 per cent over the 343 line standard.

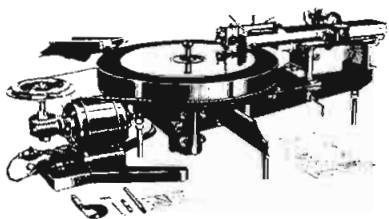
Television is definitely out of the laboratory stage and is progressing rapidly toward a practical system. Continued field testing will undoubtedly lead to the determination of the ultimate standards of transmission in the United States.

In the experimental studios, camera and lighting equipment were tested under actual operating conditions. An intermittent schedule of experimental broadcasting of both live talent and motion picture film was maintained during the entire year. Much has been learned of operating techniques, particularly those having to do with studio productions.

The National Broadcasting Company also devoted a great deal of time to the study of program material suitable for television productions. As these must be determined by actual test, program trials were televised and received by some 80 television receivers in the homes of engineers and executives of the RCA and NBC. Very gratifying results have been obtained.

It would be difficult to highlight all the technical advances of 1937. Progress has been attained in all lines. After all, technical advances have as their aim greater listening satisfaction for the radio audience. A fitting climax to the accomplishments of the year occurred on Christmas night when Arturo Toscanini conducted the first of a series of symphony concerts presented by NBC for the enjoyment of radio listeners in America and throughout the world. Every precaution had been taken to assure the technical perfection of these transmissions. Modern radio equipment has, indeed, made such fine musical programs feasible.

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