

RTPB on FM

Panel 5 reaffirms existing standards of transmission, and proposes allocation of a continuous band of 80 to 100 channels, each 200 kc wide, from 40 Mc upward. "Bursts" and multipath distortion are found to be of minor importance

THE V-H-F Broadcasting Panel of the Radio Technical Planning Board has issued its report on post-war plans for frequency modulation. The Panel recommendations make no break with past practice, since all the basic standards of transmission are reaffirmed, and one additional standard proposed. In the matter of proposed frequency assignments, a conflict arises with the previous recommendations of the RTPB Television Panel, in the region of 50 to 60 Mc. Here the proposals of the two groups overlap somewhat, with the amateurs sandwiched in between.

Recommendations

The specific recommendations of the FM Panel are as follows: (1) Frequency modulation is the system best suited for v-h-f broadcasting. (2) The f-m broadcast band should extend upward from approximately 40 Mc. (3) The width of each f-m channel should be 200 kc (this implies 75 kc maximum frequency swing and 15,000 cps maximum audio frequency). (4) From 80 to 100 channels are necessary for a national allocation, allowing for educational stations as well as commercial broadcasters. (5) The direction of polarization should be horizontal.

Sudden increases of signal strength lasting from a fraction of a second to several seconds have been noticed recently on distant stations operating in the 40 to 50-Mc band, due possibly to reflections from ionized patches caused by the passage of meteors. It was argued that the existence of such bursts of interference, as well as the probable increase of long-distance propagation at times of sunspot maximum (every eleven years)

would cause difficulty to f-m service if the present region between 40 to 50 Mc were preserved for future use. The issue was finally referred to Dr. J. H. Dellinger of the Bureau of Standards, who reported that the existence of short bursts of long-distance interference is probably closely connected with sporadic E reflections in the ionosphere, and thus not connected with the sunspot cycle. In any event, he stated, the effects were not prevalent enough to impair the value of the frequencies seriously. He stated further that no frequency in the spectrum can be said to be free of transmission vagaries.

The Panel discussed at some length the multipath distortion effects reported by DuMont, which arise when a wave reflected from a building or other structure arrives at a receiver in strength comparable to that of the directly propagated wave, causing wave cancellation and a-f distortion. The panel came to the same conclusion reached earlier by the Television Panel, namely that such effects could be found, but that they were not sufficiently prevalent to warrant any change in the method of modulation or in the frequency swing.

Channel Width

A reduction of the channel width from 200 kc to 100 kc was discussed at length. The advantages claimed are reduction in the amount of ether space for the required 80 to 100 channels, consequent improvement in image rejection, reduction in multipath interference effects, and higher gain per stage in i-f amplifiers without loss in interchannel selectivity. The disadvantages are a loss of 6 db in signal-to-noise ratio throughout the service area,

a reduction of the service area within which 60-db maximum signal-to-noise ratio could be realized at the receiver, and a two-to-one decrease in the permissible frequency tolerance of the local oscillator in push-button operated receivers. The possibility of multiplex operation on the f-m channel would also be removed if the channel were reduced.

It was brought out that the optimum frequency swing for 60-db maximum signal-to-noise ratio (assuming a maximum modulating frequency of 15,000 kc) is about 125 kc, a figure considerably greater than the 75-kc swing now used and proposed for future standardization. The 125-kc swing permits the greatest area to be served with 60 db signal-to-noise ratio. Smaller swings, e.g., 75 kc, serve a smaller area with this signal-to-noise ratio, but a larger area with somewhat lower signal-to-noise ratio. The choice is thus a compromise between space used in the spectrum and area covered with the desired low level of noise interference.

The proposed number of channels for a national allocation, 80 to 100 channels, is based on a service comparable in scope to the present system of standard broadcasting, in which 105 channels are available. The greater interference radius of the standard broadcasting frequencies makes it impossible to provide noise-free service from all stations, particularly at night. Therefore a smaller number of f-m channels can be expected to give an equal or greater choice of program with virtually no interference at any time. Of the channels proposed, about 15 are expected to be reserved for educational stations.

The proposal to standardize on horizontal polarization is a distinct step forward, and should ultimately correct the present situation in New York, where eight f-m stations are about equally divided between vertical and horizontal polarization, making it difficult if not impossible to obtain optimum reception from all stations with a single receiving antenna.