IRE STAGES LARGEST

Lengthy program of engineering papers draws over 3000 registrations — FM allocation uppermost in interest

● Beyond question, the most interesting single feature of the Winter Technical Meeting staged by the Institute of Radio Engineers, January 24-27, in New York, was the highly controversial subject revolving about the frequency allocations proposed by the Federal Communications Commission and particularly those for FM. Two sessions devoted to the general subject, one, based on the paper by K. A. Norton, formerly FCC and now of the War Department, and D. W. Allen, Jr., FCC—"Very High Frequency and Ultra High Frequency Signal Ranges as Limited by Noise and Co-channel Interference"—and the other a session especially added to permit extended discussion of that paper, may well prove to be a pretty accurate preview of the public hearings which FCC has scheduled to let in more light on the whole subject, and that will open in Washington on February 28th, the original date of February 14th having been postponed two weeks.

In the broad, both sessions were essentially attempts on the part of FCC to justify its position in moving FM upstairs to an as yet untried spot in the spectrum and both drew fire from the FM contingent. Since, FM Broadcasters, Inc., has let it be known that the organization is planning a vigorous protest against the move "upstairs." It will participate in the oral arguments scheduled by FCC and file briefs setting up its contention that FM broadcasting has been operating satisfactorily for over five years in its present position in the spectrum and protesting any move to an unexplored region for which neither receiving sets nor transmitters have been designed. RTPB, which originally recommended that FM be left substantially "as is" has authorized its Panel Chairmen to consult with their memberships to determine whether they will file briefs and participate in the oral arguments.

At the time the proposed allocations were made public, FCC let it be known that the shift had been made entirely for engineering reasons and because studies which had been made by that body, and predictions which had been projected as a result of studies made by the Bureau of Standards, indicated continuing and probably increasing interference with FM signals in their present position in the spectrum. Both Norton and Allen reiterated those statements and amplified them. The FM people, on the other hand, are generally against going to higher frequencies and made no bones about saying so. The Norton and Allen paper included a series of charts based on measurements made at 46 and 73 mc and projected to 105 mc which indicated that continuing interference might be expected at the lower frequency but that at 105 mc little or no interference from sporadic E or other effects might be expected.

For better FM service

Allen pointed out that for broadcast service with a high antenna and a high power the service area increases with an increase in frequency. Norton added that there is no question but that there will be some interference at the higher frequencies but it will be for extremely short periods. In the meantime, FCC's studies indicate that it is logical to expect sky wave interference to FM reception amounting to 1 per cent of the time at 40 mc; 0.1 per cent at 60 mc and 0.01 per cent at 88 mc. This, then, is the basis upon which the proposed new allocation was made and according to Allen the shift is proposed purely in order that better FM service may be made possible for the listening public.

Against these theories the most important point made by the current FM contingent is that the proposed allocation is made entirely on predictions rather than on measurements and experience. Norton claimed that the facts on interference have never been refuted. Major Armstrong, on the other hand, pointed out that the service range presently predicted is something "which I do not know how to get," and added that in his judgment it is possible to furnish an interference-free service starting where we are now as well as we can by going up 30 mc as FCC proposes. He stated further that the present controversy appears to be "the age-old battle between theory and practice."

Time and again the statement was made that the time is not ripe for any change in frequencies for the reason that no one has had enough experience and that "know how" is conspicuously lacking. C. M. Jansky, Jr., chairman of FM Broadcasting Panel No. 5 of RTPB, echoed the feelings of many in the crowded room when he said, "whatever is done should be done on a basis of facts and not on some interpretation of those facts." "The question is," he said, "can we get more good out of going 'upstairs' with FM than there is harm in staying where we are?"

BRIEFING THE WINTER TECHNICAL MEETING PAPERS

SIGNAL RANGES

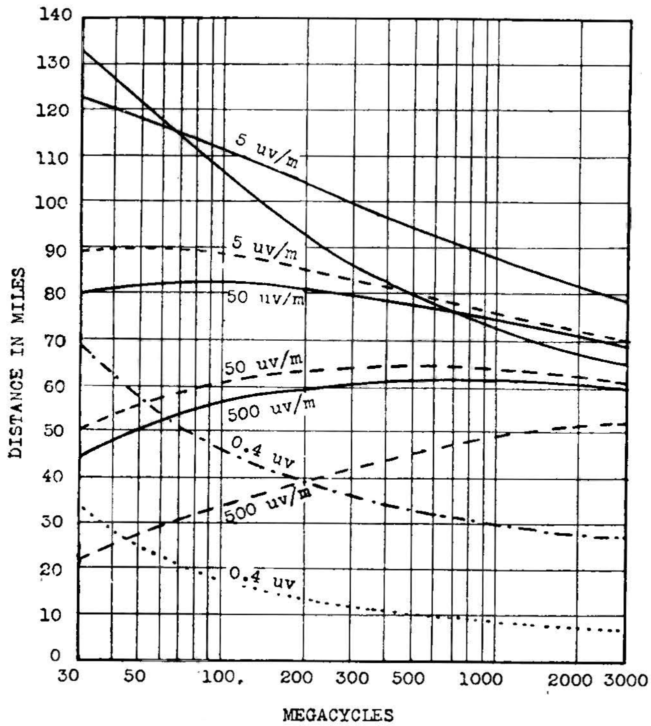
K. A. Norton, U. S. War Department, and E. W. Allen, Jr., Federal Communications Commission

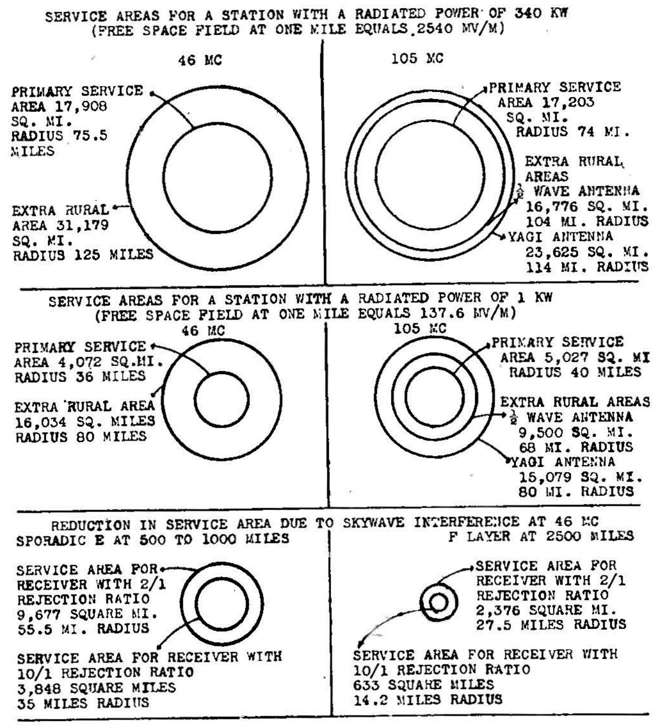
The paper first considered the theoretical ranges of ground wave signals for broadcast and land mobile services in the frequency band from 30 to 300 mc. It was shown that the distances to the theoretical broadcast contours which are to be protected from co-channel and adjacent channel interference increase with increasing frequency, whereas the broadcast interfering range and the extended rural broadcast range and mobile ranges, which are limited by receiver noise, decrease with increasing frequency. The possibilities of increasing the service ranges by the use of transmitting and receiving antennas with more antenna gain were discussed and the practical limits of their application indicated for both services.

Factors which may modify the theoretical ranges are: ambient noise levels, terrain, tropospheric propagation effects, long distance F layer and sporadic E layer interference.

A graphical illustration of the combined effects of such of the above factors as may be generalized is given by a comparison of the expected service areas of two FM

TECHNICAL MEETING





Left—Variation with frequency of ground wave service and interference range (Broadcast transmitter antenna horizontal ½-wave at 1000 ft., receiving at 30 ft. for 50 kw — — — and 1 kw — — —. For mobile service, land station antenna vertical ½-wave at 100 ft., vehicle antenna ¼-wave at 6 ft., for 250 watt —.—.— and 50 watt . . . . . Right—Comparison of FM service areas available on 46 mc and 105 mc, with transmitting and receiving antenna heights 500 ft. and 30 ft.; 6 db allowed for terrain irregularities

broadcast stations of equal power operating at 46 mc and 105 mc, when the service range is limited by (1) set noise, (2) the 50 uv/m protected contour, (3) F layer interference and (4) sporadic E layer interference.

It was shown that the noise-limited service range is greater at 46 mc than at 105 mc for stations of 1 kw and 340 kw effective radiated powers. For the large station the area within the 50 uv/m contour is greater at 46 mc than at 105 mc, while for the small station the 105 mc area is greater. Under conditions of interference via sporadic E from a station of equal power, the large station at 46 mc is expected to have a reduction in its protected area for 0.1 per cent of the time amounting to 46 per cent for a good receiver (2/1 rejection ratio) and to 78 per cent for an average receiver with a 10/1 rejection ratio. The 1 kw station at 46 mc will suffer a 5 per cent reduction in its protected area 0.1 per cent of the time for a poor receiver while for a good receiver reduction in area occurs for less than 0.1 per cent of the time.

For F layer interference, the area of the large station is estimated to be reduced for 5 per cent of the time by 86 per cent for a good receiver and by 96 per cent for the average receiver. The small station area for 5 per cent of the time will be reduced by 41 per cent for the good receiver and by 84 per cent for the average receiver. The time during which the reduction in area is effective is expected to increase materially with increase in the number of co-channel stations. In contrast to the serious interference situation at 46 mc, sporadic E and F layer interference is expected to be negligible at 105 mc.

MEETING HIGHLIGHTS

Setting an all-time record with over 3000 registrations, IRE wound up its largest gathering (Winter Technical Meeting) on Jan. 27 in New York after four days, with a program of some 42 engineering papers. The count at the annual banquet was 1260. Among newsworthy items: Presentation of the IRE Medal of Honor to RCA's Dr. H. H. Beverage, the Morris Liebmann Memorial Prize to Sperry's Dr. W. W. Hansen; award of Fellowships to H. H. Buttner, O. H. Caldwell, W. H. Doherty, A. W. Hull, A. L. Loomis, A. V. Loughren, F. X. Rettenmeyer, S. A. Schelkunoff, R. L. Smith-Rose, K. S. Van Dyke, Capt. E. M. Webster, P. D. Zottu.

HIGH FREQUENCY WATTMETER

Eugene Mittelmann,
Illinois Tool Works, Chicago

A new approach to the problem of measuring the useful power output of high frequency industrial and medical heating equipment resulted in an instrument that gives useful answers in all practical cases. A measurement of the power dissipation in the external load is possible by a method which uses the equivalent no-load loss conductance of the oscillator circuit as a standard of comparison. It was shown that the power absorption by the load is given by the expression

$$P = E^2 \cdot \frac{m}{R_o} \cdot \frac{(e_o - e_1)}{e_1}$$

in which E is the RMS value of the high frequency voltage across the tank circuit, R_o the equivalent parallel loss resistance of the oscillator circuit under no-load conditions, e_o and e_1 the resonant voltages across the tank circuit under no-load and load conditions, measured at any arbitrary level of the input power, and finally, m, a factor