CLEAR CHANNEL SUPER-POWER

By The Broadcast Committee of the I.R.E.*

In line with RADIO NEWS' *policy of reviewing broadcasting, the two views are printed on these broadcasting are always matters of controversy, think of these conceptions. If after reading the their letters will be sent to the*

THE combination of clear channels and shared channels which forms the basis for the plan of broadcast allocation now in effect in the United States was adopted by the Federal Radio Commission in 1928. The clear channel assignment was evolved at that time as the result of overwhelming expert testimony, based not only on the lessons of some seven years of broadcasting in its present form, but also on the more mature experience of the other older branches of the radio industry. During the past four years, ample opportunity has been afforded for both the expert and the layman to obtain first-hand information on the relative advantages of the clear channel under a great variety of operating conditions. Yet current discussion of broadcast problems frequently discloses much inaccurate information and loose thinking on this important question. Under the circumstances, it is felt that a careful recapitulation of the engineering viewpoint on the place of the clear channel in the existing scheme would prove interesting and, perhaps, valuable.

It is characteristic of radio signals, in common with other types of wave motion, that once they are launched "on the air" they continue to travel away from their source while their intensity diminishes at a rate determined only by the conditions which they encounter in transit until they are too feeble to be detected or until they are lost in the prevailing noise level due to random electrical disturbances. There is no means known to the art whereby the projected waves can be abruptly brought to a stop at some remote point or whereby their intensity can be suddenly reduced to a negligible value at a predetermined distance. It is obvious, therefore, that from the radio transmission standpoint, purely artificial boundaries such as those of the zone or the state or the nation are of no significance.

Suitable Signal Ratios

This same fundamental consideration governs the operation of two or more broadcast stations on a single, assigned carrier frequency. The signals from any one station cannot be prevented from invading the areas local to the others. Successful shared channel broadcasting, therefore, hinges on the possibility of receiving a signal from the wanted station which is predominately stronger than those from all other stations holding the same frequency assignment. Experience indicates that if the reproduced program is to have entertainment (as distinguished from novelty) value, the intensity of the wanted signal at any particular receiving point must be from 20 to 100 times the combined intensity of the interfering signals established at the point by all other stations operating on the same channel. Even these large ratios do not always represent a high standard of performance. The background of interference must be extremely feeble if it is not to detract from the artistic excellence of the reproduction, and for high-grade urban coverage an effort is usually made to obtain considerably greater ratios.

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The result of the restrictive effects of interference described above is to limit the acceptable service from a shared channel station to areas where the received signal intensities are high, hence to areas within a few miles of the transmitter. The limitations of shared channel operation are, therefore, apparent. It is clear that while such an arrangement will accommodate a considerable number of stations and will afford service to a relatively large number of detached areas closely surrounding such stations, there will in general be much larger intervening areas in which no station produces a predominately strong signal and in which, therefore, no service worthy of the name can be given. This analysis, then, indicates that the field of the shared channel is to serve important detached centers of population, such as our cities and larger towns.

In the United States, however, on account of its size and its important agricultural interests, a considerable part of the population is sparsely distributed in small towns and villages and on farms. It is essential that these people be given broadcast service as an ordinary matter of equity. In addition, they constitute a noteworthy fraction of the buying public, which is supporting American broadcasting as it is constituted today. The establishment of the present system of clear channels followed early appreciation of the fact that service to this group could not be provided on a shared channel basis but that national channels on which only one station operated at a time would have to be employed for the purpose. The experience of subsequent years has served only to emphasize the fundamental soundness of this conclusion.

On account of the absence of interference from other stations assigned to the same carrier frequency, the signals from a clear channel station (except where subject to excessive fading) will afford service until they have reached the point where they are too feeble to be heard above the prevailing electrical noise level with any degree of satisfaction. Fortunately, the electrical noise level in most rural districts is quite low, with the result that reasonably long distances can be covered with transmitting stations of moderate power. If higher power is employed, however, the range of the station and the area which it serves will be considerably extended. In addition, at the more remote receiving points the grade of service will be improved because the stronger signal is further above the prevailing electrical noise level and the reproduced program, therefore, suffers relatively less from an objectionable noise background. Since higher power on clear channels will thus extend and improve the broadcast service in outlying rural communities, since the avowed purpose of the clear channel is to serve such communities, and since clear channels by their very nature are reserved for the use of a single station so that interference with other stations assigned to the same carrier frequency is not a possibility, it is thought to be logical and consistent not only to permit but to require the use of adequate power by all stations holding clear channel assignments. This, briefly, is the basis for the practically unanimous engineering position regarding the use of high power on clear channels. Under existing conditions, there is no technical reason for not requiring all clear channel stations to employ transmitters of at least 50 k.w. Conversely, the denial to the rural listeners on many of the clear channels of the improved and extended service which could be made available to them by requiring the use of 50 k.w. transmitters on those channels is not based on technical reasons.

Failure, in the past, to use sufficiently high power to enable distant listeners to obtain the full advantage of the inherent characteristics of clear-channel operation has led to suggestions for the virtual abandonment of these channels. Where the distances and time differences involved are no greater than those in the United States the assignment of additional stations to the existing clear channels must inevitably result in a real limitation of the areas served and the assignments will thus lose their clear-channel nature. The engineering conception of the clear channel has always embodied high power as one of its essential accompaniments.

High Power Coverage

In addition to its value as a means of affording service to distant towns and extensive rural areas, the clear-channel station is also well adapted to cover a single relatively large center of population, such as one of our major cities. This is due to the fact that high power can be employed and that the station will, therefore, be surrounded by a relatively large area in which strong signals prevail, permitting excellent reproduction to be obtained. There are easily recognized economic and operating advantages to be gained by a broadcast station in associating itself with a large city which will enable it to extend a service of the highest order to the mutual advantage of everyone concerned. Under the circumstances, it is not surprising that practically everyone of the existing clear-channel stations is identified with one of our larger cities. This fact, however, should not be allowed to direct attention from the principal purpose of the clear channel, that is, service to scattered outlying units of population, for which it would not be economically possible to obtain broadcasting on any other basis.

To recapitulate:

1. The field of the shared channel is to afford broadcasting service to important detached centers of population, such as our cities and larger towns.
2. The field of the clear channel is to afford service to those vast intervening areas in which the density of population is so low that a broadcast service could not otherwise be supported and in addition to a single large center.

These principles, if kept firmly in mind, will afford insight into one phase of the

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broadcast allocation problem that has been the subject of spirited debate from the time that the establishment of clear channels was first suggested; namely, the relative advantage of increasing the total number of broadcast stations capable of being in operation at any one time by making multiple assignments to some of the existing clear channels; or looking toward the opposite course, the relative merit of increasing the number of clear channels by deleting or transferring shared-channel stations. The consequences of proceeding in either direction are evident:

1. Decreasing the number of clear channels by assignfing additional stations (for night time operation) to channels now used by only one station at a time would have the effect of affording additional services to certain localized urban groups but at the expense of decreasing the service to rural listeners and to those at remote points.
2. Increasing the number of clear channels at the expense of the shared channels would have the opposite effect, assuming that assignments for the stations thus displaced could not be provided for on the remaining shared channels.

The foregoing statements are based on radio considerations of a very fundamental nature. However, in view of the industry's growing appreciation of the complexity of radio transmission phenomena and the store of experience that is the result of the past eleven years in broadcasting, the question naturally arises as to whether our increased knowledge and vastly improved technique do not now warrant modifications in these earlier generalizations. After a careful review of the situation the Broadcast Committee is forced to the conclusion that the clear channel is still essential to the extension of broadcast service to the populations of our rural areas and is likely to remain so for some time to come. Further, it is felt that many of the limitations that have been ascribed to the clear channel are the direct result of existing power limitations rather than of any inherent characteristic of clear-channel coverage. The engineering case of the clear channel has always been based on the assumption that adequate power would be employed. There appears to be no technical reason why greatly increased power (in excess of 50 k.w.) should not now be permitted to suitably equipped and appropriately located or relocated stations holding clear-channel assignments.

Assuming that service to distant listeners is to be maintained, it is evident that continued provision must be made for an adequate number of clear channels. Whether the number should be forty, or more, or less, however, is a matter that can be determined only by careful study. The balance of service between the rural listener and the urban listener is determined in considerable measure by the relative number of allocated clear and shared channels. Decision as to the correct balance point is a matter of general policy.

Traffic Control

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by a transcription studio. On valuable big-city channels, the providing of the radio transmission service becomes more and more an incidental matter: a licensee, even if he has no plant of his own, can usually buy transmission service from some other concern which has a suitable station. In cases where as many as four licensees in one locality divide with each other the time on a channel (as on several channels in New York City), it obviously makes no direct difference either to listeners or to advertisers whether three of the licensees buy transmission from the fourth one, who owns the station, or whether all four buy their station service from an electrical-operating concern which owns a suitable transmitter—and which might just as well own a dozen other transmitters, and sell their service by the hour to various channel holders or "licensees". The notion that a broadcast licensee must be a station operator is as unfounded from the engineering as from the business standpoint, and apparently, from the legal standpoint as well. Essentially, at least in big-city practice, the "licensee" is a person or organization appointed, by a legal instrument called a "license," to the privilege of controlling program traffic on certain channels during certain hours in a certain territory.

That suggests the tremendous importance of the growing tendency to separate the *broadcast-traffic* (channel-hour control) business from the *transmitter-operating* business. The successful operation of either of these lines of business requires indeed a very different set of qualifications from the other. Clearly, there is no good reason why the government should require *any* license applicant to operate his own radio-transmission service (though most licensees now do it) any more than his own wire-transmission service (practically none of them do that). Nor is there any particular reason why a broadcast licensee need be confined to one station or one channel, any more than to one studio or to one day of the week. Broadcasting runs along in these grooves simply because nobody has yet lifted it out!

Who Should Be Licensed?

If then the licensing of broadcasters is not to be confined to station operators, and if there is thus no particular limit either way on their number, who is to be licensed? When the channels used in any city have been rendered far more valuable by being reduced in number, who shall receive them? Shall the government encourage the formation of a single responsible civic body in each large city, and grant it a license to control all the channels used. Or shall the Commission grant a valuable channel or two to some responsible body of music lovers as an endowment to the broadcasting of good music? And another block of channel-hours to some farmers organization to encourage the broadcasting of useful agricultural information? And one to the local radio dealers' association to finance the continuous broadcasting of programs most effective for demonstrating sets? And one block to the educational institutions, and one (perhaps five or six channels for Sundays only) to the churches? How much preference shall be given to officially-created bodies—city or state—as compared to unofficial ones? Shall entertainment channel accommodations be granted by license to competent commercial sound-studio operators ("networks", transcription agencies, etc.) on some sort of stipulation that will furnish to such concerns a strong financial motive for broadcasting as much good entertainment as they can afford to, with the least amount of advertising required to finance the job, instead of vice versa? Or shall commercial promoters simply be left free to buy whatever channel hours they want from strictly public-interest licensees?

Questions like these are of course for the licensing authority to answer as they present themselves. It would be foolish for anybody to attempt to prophecy what form or forms of organization are most likely to pre-

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