

FCC 62-866

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20554

<p style="text-align: center;">In the Matter of REVISION OF FM BROADCAST RULES, PARTICULARLY AS TO ALLOCATION AND TECHNICAL STANDARDS Petition of FM UNLIMITED, INC. For changes in FM Station Assignment Rules</p>	}	<p style="text-align: center;">Docket No. 14185 RM-94</p>
---	---	--

FIRST REPORT AND ORDER

BY THE COMMISSION: COMMISSIONER FORD CONCURRING AND ISSUING
A STATEMENT IN WHICH CHAIRMAN MINOW CONCURS.

TABLE OF CONTENTS

	<i>Para- graph</i>
I Introduction.....	1
II Over-all objectives.....	5
III Fundamental considerations and basic assignment tools.....	6
"Go-no go" approach; measurements.....	9
Propagation curves to be adopted.....	12
Signal ratios for determining interference.....	15
Channels.....	19
Channels for use by Class A stations.....	22
IV Type of assignment plan for commercial channels.....	26
Protection to a particular contour or mileage separations.....	27
The Table of Assignments.....	36
V Zones, Classes of stations, Maximum and minimum facilities zones.....	39
Classes of commercial stations.....	46
Minimum facilities for new commercial stations.....	49
Maximum facilities for commercial stations:	
Class A.....	52
Class B.....	53
Class C.....	54
VI Signals, protected areas, and separations.....	57
Signals for service.....	57
Protected areas.....	59
VII The educational channels.....	67
VIII The Table of Minimum Mileage Separations.....	75
IX Equivalence; terrain factors.....	76
Terrain factors.....	82

TABLE OF CONTENTS—continued

	Para- graph
X Directional antennas and polarization:	
Directional antennas.....	84
Polarization.....	89
XI Questions concerning existing stations.....	91
Existing stations of great height and power...	93
Expansion of existing facilities.....	98
Wholesale channel shifts and deletions.....	100
Operation with sub-minimum facilities.....	102
XII Pending and subsequently filed applications.....	104
XIII Canadian considerations.....	105
XIV Other matters:	
Assignments and programming; duplication..	107
Operator rules and monitors.....	111
Miscellaneous suggestions and arguments....	112
XV Conclusions and Order.....	120
Appendix A Amendment of Part 1	
Appendix B Amendment of Part 3	

I. Introduction

1. The Commission has under consideration its Notice of Inquiry, Notice of Proposed Rule Making, and Memorandum Opinion and Order in the above-entitled matters (FCC 61-833, issued July 5, 1961), and the comments and reply comments submitted in the proceeding by interested persons. This proceeding was instituted for the purpose of determining what changes in the FM rules and technical standards are necessary for the optimum development of this broadcast service, and how the expansion of the service can be achieved with the least amount of delay and burden on the Commission, applicants, and other parties. Some tentative conclusions were drawn from our preliminary studies and experience and set forth in the Notice, especially with regard to the need for a fixed "go-no go" type of processing procedure, new FM propagation curves, and for an over-all plan designed to make the best possible use of the respective channels in the FM band (a table of fixed minimum mileage separations between co-channel and adjacent channel stations was proposed). Specific proposals, in some instances in the alternative, were advanced and outlined in the Appendix to the Notice. In addition, questions were asked about specific matters such as antenna and receiver performance, and the matter of the extent of AM-FM program duplication to be allowed was raised.

2. A number of parties submitted comments. These ranged from views on one or two specific topics, such as duplication of AM programs on FM stations, to opinions on many of the subjects covered in the Notice. The parties included such varied segments of the industry as networks, broadcasters, educational organizations, and equipment manufacturers.¹ Unfortunately, very little supporting data was

¹ Parties filing comments in Docket 14185: Gainsville Broadcasting Co., Inc., Gainsville, Texas; Radio Station WFAH, Alliance, Ohio; KXTR-FM, Kansas City, Mo.; WOHI and WOHI-FM, East Liverpool, Ohio; WPBC, Minneapolis, Minn.; University of Connecticut, Storrs, Conn.; KAMA-FM, Dallas, Tex.; WKFM, Chicago, Ill.; High Fidelity Broadcasters, Inc., Bethesda, Md.; Rutgers University, New Brunswick, N. J.; Jampro Antenna Co., Sacramento, Calif.; Western Slope Broadcasting Co., Inc.

submitted by most of the parties. In the important area of station assignment principles, for example, while some parties made specific suggestions as to re-shuffling of channels among certain large cities, no one submitted any specific data, even on a sample basis, showing possible allocations over an area as a whole. However, the comments and replies were helpful to the Commission, and have been given careful consideration in connection with all of the decisions reached.

3. The present document represents the Commission's conclusions as to many of the matters raised in the earlier Notice, including adoption of minimum mileage separations between co-channel and adjacent channel stations, which will be strictly adhered to as in the television service, classification of stations and maximum and minimum facilities for each class, division of the country into Zones different from the present Area 1 and Area 2, and similar matters. However, further consideration of this matter has led us to the belief that the long-term optimum use of this band of frequencies may well be best insured by a Table of Assignments, assigning particular channels to individual communities, similar to that in television (see §3.606 of our Rules).

4. We are issuing simultaneously herewith a Further Notice of Proposed Rule Making with respect to the concept of such a Table and the principles and priorities to be used in working it out. Work on a tentative table has been begun, and it is expected that a tentative Table will be released shortly. The Further Notice also relates to other subjects set forth therein.

II. Over-all Objectives

5. While differing in their recommendations, the commenting parties in general agreed that there is need to examine the FM situation, with a view to providing for the orderly and efficient development of that service. No one quarreled with the over-all objectives set forth in the Notice as those to be pursued in this development, as in the standard broadcast service—(1) provision of some service to all of the nation, or as much as possible; (2) provision of as many program choices to as many listeners as possible; and (3) service of local origin to as many communities as possible (see the earlier Notice, para-

KREX-FM, Grand Junction, Colo.; Bruce F. Elving, Duluth, Minn.; KFML-AM and FM, Denver, Colo.; Burden Associates, Mount Kisco, N. Y.; Intercollegiate Broadcasting System, Washington, D.C.; Association of Federal Communications Consulting Engineers, Washington, D.C.; Donald J. Lewis, New York, N. Y.; Meredith Broadcasting Co., KCMO-FM, Kansas City, Mo.; National Association of Broadcasters, Washington, D.C.; WIBF, Jenkintown, Pa.; KMLA Broadcasting Corp., Los Angeles, Calif.; WTAX, Inc., Springfield, Ill.; American Broadcasting Company; WKRQ-TV, Inc., Mobile, Ala.; Washington Post Company; Southern Broadcasting Corp.; (KTOD-FM), Sinton, Tex.; Havens and Martin, Inc. (WCOD), Richmond, Va.; KCBH (FM), Los Angeles, Calif.; Columbia Broadcasting System, Inc.; A. Earl Cullum, Jr., Dallas, Tex.; National Broadcasting Company, Inc.; Radio Corporation of America, New York, N. Y.; Zenith Radio Corp., Chicago, Ill.; FM Unlimited, Inc., Chicago, Ill.; Storer Broadcasting Co., Bulletin Co. (WPBS), Philadelphia, Pa.; Lohnes and Culver, Washington, D.C.; Time-Life Broadcast, Inc. (WFBS-TV), Indianapolis, Ind.; WOOD-FM, Grand Rapids, Mich.; KLZ-FM, Denver, Colo.; Department of Education, Puerto Rico; Group of Licensees of FM stations (FM broadcasters); WBEN, Inc., Buffalo, N. Y.; Capitol Broadcasting Co., Inc. (WRAL-FM), Raleigh, N. C.; Concert Network, Inc. (WBCN), Boston, Mass.; National Association of Broadcasters; King Broadcasting Co., (KING-FM), Seattle, Wash.; WYZZ, Wilkes-Barre, Pa.; WUOM, Ann Arbor, Mich. (noncom); R. A. Isberg, San Francisco, Calif.

graphs 6 and 7). As we pointed out in the earlier Notice, these objectives are in part in conflict with each other, as is true with any broadcast service where the number of channels is insufficient to meet the possible demands of all communities. This problem is most sharply focused by the situation prevailing in the northeast section of the country. Most of this area, and probably all of it which is heavily populated, receives at least one usable FM service, and to this extent our first objective has been achieved. But FM assignments have been concentrated to a great extent in the larger cities and surrounding metropolitan areas, precluding in many instances the making of Class B assignments, or even lower-power Class A assignments, in other communities in the same area. While this assignment process up to now has provided the residents of many of the larger cities and metropolitan areas with a plenitude of service to choose from, and thus worked toward achievement of the second objective mentioned, at the same time it has worked to prevent achievement of the third objective, provision of local outlets for as many communities as possible. At present it is not possible to provide a first FM station to some sizable communities in this region, to serve as an outlet for local expression, although service is available to these communities from stations in other places. Some larger cities are limited to fewer channels than their population warrants. Likewise, it appears that achievement of the second objective—plentiful choice of services—has been hindered as far as area and populations outside of the immediate vicinity of the larger population centers is concerned.

III. Fundamental Considerations and Basic Assignment Tools

6. In the earlier Notice herein (paragraph 20) we set forth tentative conclusions as to two basic concepts which, we believed, might well be those which should govern future FM station assignments. The first of these was that any future assignments should be based on an *over-all plan*, designed to achieve maximum and optimum use of each channel and take into account total effect on over-all service, rather than the present system under which an applicant selects a particular frequency and (absent conflicting applications or basic qualification questions) generally the only consideration is a case-to-case weighing of service gains against whatever interference the proposed station would cause, individually, to existing stations. The second was that applications should be considered strictly on a "go-no go" basis, by which an application will either be granted or rejected depending on its compliance with fixed rules, without elaborate case-to-case weighing of various factors as at present.

7. Our earlier Notice (paragraphs 26 to 29) also set forth specific proposals with respect to two fundamental tools to be used in future FM station assignments—the propagation curves to be used, and signal ratios to be employed for determination of objectionable interference, co-channel and up to three channels (600 kc) removed.

8. The concept of an *over-all plan* is discussed later in connection with the more specific question of the type of plan to be adopted. As

to the three other basic matters just mentioned, after consideration of the views expressed we are of the opinion that our earlier proposals are correct. The reasons for these conclusions are set forth in the following paragraphs.

Need for a "go-no go" approach; undesirability of using measurements

9. In our earlier Notice (paragraphs 9, 18, 19) we set forth at length the reasons leading to our tentative conclusion that future FM assignments, like television assignments, should be on a "go-no go" basis, with both potential applicants and the Commission being in a position to predict, through use of criteria and procedures set forth in our Rules, whether a particular proposed operation will be granted or must be denied. The absence of such a concept in the AM service necessitates, in many cases, the elaborate consideration of various factors on a case-to-case basis in connection with each application. Service gains must be weighed against losses in each case; populations must be counted; field strength measurements and often counter-measurements are submitted to attempt to determine the exact location of contours; extent of other service available must be considered. The controversies over all of these matters often result in long, involved, and costly hearings. The whole process has led to the great delays and burdens, on the Commission, on private parties, and on the public, all too familiar in the standard broadcast service. Moreover, the absence of the fixed standards leads to the generation and filing of marginal applications.

10. Most of the parties commenting on this question agreed with this basic "go-no go" concept (although some parties also favored use of assignment tools, such as field-strength measurements, which would be difficult to fit into such a system). However, some parties believed that the Commission should retain "flexibility" even in consideration of individual cases, e.g., making grants where warranted even though the proposed operation would cause interference to existing stations within their "normally protected" contours (on the theory that the gains in service would exceed the losses from such interference). This argument must be rejected. Nearly a generation of experience with such "flexibility" in the AM field (a concept embodied in §3.24(b) of the Rules) demonstrates that, whatever advantages may accrue therefrom in some individual cases, these are outweighed by drawbacks, burdens, and delays involved, discussed in the earlier Notice and summarized in the previous paragraph. Moreover, as a practical matter such "flexibility," permitting case-to-case weighing of gains and losses in connection with each proposed operation, is incompatible with consideration of other, broader factors which should be taken into account if the FM service is to experience optimum development—the cumulative effect of a series of new operations on the service of an existing station or stations, possible later expansion of the facilities of existing stations, possible other uses of the channel sought more consistent with our general objectives, the efficiency of the proposed assignment, and, in sum, the general relation-

ship of the proposed grant to the present and future over-all situation of the medium. These matters, it appears, must be resolved on the basis of fixed rules, generally applicable, which can be used by the Commission, its staff, and by private parties, to determine the disposition to be made of an application or potential proposal.

11. As to use of field strength measurements, the rules presently provide for their use in FM assignments (though they are seldom if ever used), but in the earlier Notice (footnote 9) we proposed to delete all reference to measurements in the Rules so that assignments would be made entirely on the basis of propagation curves or data derived therefrom. The Association of Federal Communications Consulting Engineers (AFCCE) and some other parties urged that measurements should be used as an FM assignment tool, to make allowance for terrain variations. The subject of terrain considerations is discussed later; however, as far as use of measurements is concerned we must reject the AFCCE's suggestion and adhere to our earlier proposal. This is because field strength measurements are not an exact tool. It must be borne in mind that the results obtained by measurements, in a particular situation, will vary with locations chosen, time of day, season, and method of taking. Even in a particular situation, involving the same small area and period of time, measurements taken by one party often indicate that interference would exist, while measurements taken by another party indicate absence of interference—a phenomenon all too familiar in AM hearings. Consideration of conflicting measurements would obviously be completely incompatible with a “go-no go” approach. Where a complete set of measurements is properly made, it may give a fairly good idea of a station's coverage area in the absence of interference. But, since the extent of a station's actual service area is usually limited by interference, service measurements are of relatively little value in the absence of interference measurements, and the latter are extremely difficult and complicated to make to an extent sufficient to be useful. Therefore—as in television—it is preferable to use the propagation curves adopted here, based on analysis of a large number of measurements.

12. *Propagation curves to be adopted.* In the earlier Notice (paragraphs 26 and 27) we proposed to replace the present FM propagation curves used for determining interference (Figure 1 of § 3.333, based on groundwave propagation only), with more up-to-date curves, which among other things take into account tropospheric propagation—using for service and interference respectively the F(50,50) and F(50,10) curves proposed for low band VHF television (Channels 2 to 6) in Docket 13340. No party disagreed with the decision to adopt new curves, and most comments on this matter favored those proposed. However, the AFCCE suggested that (1) service should be determined on the basis of an F(50,90) curve, in order to guarantee a higher quality of service; and (2) for adjacent channel assignments, that interference should be determined on the basis of the F(50,50) curve, on the ground that at the shorter distances involved nearly “steady state” propagation conditions prevail.

13. In our view, our original proposal in this respect (which was earlier supported by the Radio Propagation Advisory Committee (RPAC), a government-industry group) is correct. As to AFCCE's suggestion concerning use of the F(50,90) curve for service, the distinction between this and our proposal amounts to a difference in the area to be protected, AFCCE's proposal amounting to protection of a smaller area, thus permitting somewhat closer assignments. Imposition of this unduly high standard as to what constitutes adequate reception would mean loss, through non-protection, of generally useful service outside of the protected contour, and would unduly limit stations' service areas.² TV service is evaluated on the F(50,50) basis, and the same should apply here. In the absence of any good basis therefor, there is no reason to complicate our rules by addition of a third curve.

14. As to the idea of evaluating first adjacent channel interference on an F(50,50) basis, at close-in distances there is relatively little difference between fields at a particular location as shown by this and by the F(50,10) curve, and therefore it makes relatively little difference which is used. At larger distances from the transmitter, there is a greater difference between the curves, as signal variations create more of a time factor.³ At these distances the conditions urged by AFCCE in support of this proposal cease to exist, and, in order to afford adequate protection from occasional interference it is necessary to employ an F(50,10) curve. Therefore, use of the F(50,50) curve would be inappropriate. It should be added as a general observation, that both of these AFCCE suggestions would result in minimizing the extent of protection to be afforded existing stations, so that more and closer assignments may be made. Adoption of these suggestions would be inconsistent with our basic decision herein, that (except for certain stations now operating with great height and power, discussed below) stations are entitled to a greater degree of protection than that afforded by present rules, in order to avoid destruction of useful service. AFCCE's suggestions must be rejected.

Signal ratios for determining interference

15. Under the present FM rules (§3.313(b)), objectionable interference exists where: (1) for co-channel stations, the undesired signal exceeds 1/10 of the desired signal; (2) for first adjacent channel stations (200 kc removed), the undesired signal exceeds 1/2 of the desired signal; (3) for stations two channels (400 kc) removed, the undesired signal is more than 10 times the desired signal; and (4) for stations three channels (600 kc) removed, the undesired signal is more than 100 times the desired signal. In the July Notice (para-

² AFCCE's proposal is for protection of existing stations to the 1 mv/m contour as determined by the F(50,90) curve. With respect to adjacent channel assignments this would mean substantially less protection than that provided either under our present basic assignment system, or the interim procedure based on the F(50,50) curve.

³ Under present protection principles (based on the 1 mv/m contour) and signal ratios, for first adjacent channel stations the interfering contour is the 0.5 mv/m (54 dbu) contour. For a station operating with 1 kw E.R.P. and effective antenna height of 500 feet, this contour lies 20 miles from the transmitter under the F(50,50) curve and 21.5 miles under the F(50,10) curve. For a station operating with 20 kw and 2,000 feet antenna height, contour lies 62.5 miles or 71.5 miles from the transmitter, respectively.

graphs 28 and 29) we invited comments upon the question of whether these or some other interference ratios should be adopted as the basis for FM assignments; we did not propose any specific changes.

16. Most of the commenting parties favored maintenance of the present ratios, in the absence of persuasive data to the contrary. Those changes suggested were generally in the direction of higher ratios—i.e., more protection—especially as to first adjacent channel interference. Zenith and RCA submitted data based on measurements of their receivers' performances. Otherwise, relatively little specific information was furnished. Some parties urged that the present adjacent channel ratio, while perhaps satisfactory for regular FM broadcast operations, is not enough to protect multiplexed operations—stereophonic broadcasting and subsidiary communications operation—which involve use of more of each FM channel. Zenith, pointing out that the signal-to-noise ratio for stereophonic broadcasting is about 23 db poorer than for monophonic broadcasting, on the basis of measurements on its receivers, urges that the desired to undesired co-channel ratio be raised to 100 to one (40 db), and first adjacent channel ratio to 20 to one (26 db). Zenith does not recommend any change in second or third adjacent channel ratios.

17. The limited information submitted, plus data gathered and prepared by the Commission's staff, persuades us that the present ratios should not be changed. They are sufficiently accurate for the system of minimum mileage separations which we adopt herein. As for stereo and SCA multiplex operations, as Zenith concedes, the higher protection ratios necessary for such operations are balanced by the fact that the service range thereof is less than that of regular FM service. Therefore, a series of ratios (or spacings based thereon) affording adequate protection to regular service will also afford appropriate protection to these other types of service.⁴ The spacings we adopt herein, substantially wider than required under present practice, will achieve this result.

18. It should be noted that, since we are herein adopting a table of minimum spacings between stations, there is no longer any need for interference ratios in the rules. The rules set forth in the Appendix hereto do not contain such provisions.

Channels

19. In the July Notice, we did not propose any change in the basic FM channel structure—100 channels of 200 kc width each, with the lower 20 reserved for educational use. We did propose as possibilities: (1) using a group of 20 contiguous channels for use by low power Class A stations, instead of the 20 Class A channels now interspersed throughout the commercial portion of the band; and (2) reserving

⁴As to the first adjacent channel ratio (which was the one most commented on) one of the problems in making FM assignments, on the basis adopted herein or any other basis, is that the two-to-one ratio is a positive one, meaning that first adjacent channel spacing necessary between stations tends to approach the required co-channel spacing—a situation substantially limiting the number of FM assignments which can be made. Raising the ratio above what it is now would make provision of an adequate number of assignments even more difficult than it is at present, and therefore should not be done unless a really persuasive showing—much more than anything presented here—is made.

a group of 20 contiguous channels for use by high power "Class C" stations, designed for wide area coverage and protected out to a considerable distance.

20. One party (High Fidelity Broadcasters, Inc.) advanced a rather elaborate system by which Class A stations would be accommodated, not in the regular 100 FM channels at all, but in "interleaved" channels to be located 100 kc from the present frequencies (i.e., 92.2 mc, 92.4 mc, etc.). Interference ratios to be applied to these odd channels were specified, and it was proposed that these stations operate with vertical polarization. This proposal, as advanced here, has several deficiencies, and must be rejected. First, we have little information as to how such a plan would operate, what the correct ratios should be, and what benefits would be derived from it. No sample allocation plan was submitted, nor was any showing made as to the impact of a large number of these stations on Class B and other assignments. The requirement that vertical polarization be used would place a severe burden of incompatibility on these stations, and might well defeat the objective sought. The matter of 100 kc channeling will be further considered by the Commission.

21. The matter of use of the 20 channels now reserved for education is discussed below; for reasons stated we retain the present reservation.

Channels for use by low power Class A stations

22. Comments expressed both support for and opposition to the idea of making Class A assignments on 20 channels at one end of the commercial band, instead of on the 20 channels now assigned for Class A use, interspersed throughout the commercial band. No specific showings or analyses were presented on either side. The chief arguments advanced in favor were: (1) as pointed out in the Notice (paragraph 33), the making of a large number of Class A assignments would be facilitated if, in general, the only adjacent channel problems involved were other Class A assignments rather than higher power Class B stations; and (2) there would be less interference problems with Class B stations. One argument advanced against the idea was that, if all Class A stations were together at one end of the band, listeners would tend to ignore them and concentrate on the Class B stations in the remainder of the band, which, with their greater facilities and resources, tend to offer more attractive programming.

23. Since the Notice was issued, the Commission's staff has made studies on this question, with respect to the crowded Northeastern section of the country, the area constituting television Zone I. These studies indicate that, for that area, such a shift is not desirable. The chief problem is the number of Class B stations now assigned on the 20 channels at either end of the commercial band, which are so numerous that, for the shift to have any significance, these Class B's would have to be shifted to the remaining 60 Class B channels. The staff's study indicated that this cannot be done, consistent with any

sort of appropriate spacings between co-channel and adjacent channel stations such as those set forth in the Notice.⁵ Of 112 Class B stations in this area on the lower 20 channels, only 46 could be thus accommodated on the remaining 60 channels; 66 could not. For the most part, the ones which could not be reassigned are those in and around the large cities of this region. The problem is that these areas in and around the large cities have more than 15 Class B assignments each, which has been possible under the present system (which can yield 20 Class B assignments even in the city itself), but would not be possible with the shift of Class A channels to a contiguous band. Under that system, if proper spacings are to be maintained, no city and its surrounding area could have more than 15 Class B assignments. The proximity of this area to the Canadian border also presented some problems.

24. With this number of Class B stations which would have to be left in the contiguous band, it would be possible to reassign only 43 of the 71 Class A stations in television Zone I which operate on Class A channels above Channel 240, consistent with proper spacings. Thus, it appears that the idea of a contiguous band is neither feasible nor desirable in this portion of the country, which is herein designated FM Zone I, co-extensive with television Zone I. Likewise, for the same reasons, it appears inappropriate with respect to that portion of California (south of the 40th parallel) where present assignment conditions are generally similar, and which is herein designated Zone I-A.

25. With respect to the rest of the country, herein designated Zone II, by and large the FM band therein is presently less occupied, and there would not to the same extent be the question of either superimposing the new channel structure on existing stations or moving the latter. However, even so, it does not appear that there is anything to be gained from creating a contiguous Class A band. Conceivably, it could result in more Class A assignments over-all, and probably would if towns were distributed in a more or less geometric pattern across the country. But, even in Zone II, there is often need for numerous assignments in a particular relatively small area. In these situations, the potential Class A assignments under the contiguous band approach is substantially less than where the A channels are interspersed. Moreover, removing the Class A channels from their present interspersed positions throughout the commercial portion of the band would complicate the making of Class C assignments (which in the staff's work so far has proved more difficult than making Class A assignments), since all of the Class C first adjacent channel problems would involve other Class C's, with the greater adjacent channel spacing requirement involved.

25a. Two parties (Earl Cullum and High Fidelity Broadcasters, Inc.) urged that all commercial channels should be used without

⁵ The separations used in the studies were somewhat shorter than those proposed in the Notice. For co-channel, first adjacent channel, and second and third adjacent channel, they were, respectively: between Class B stations, 150, 90, and 40 miles; between Class A stations, 70, 35, and 15 miles; and between Class A and Class B stations, 115, 70, and 40 miles.

distinction as to classes of stations—i.e., low power Class A stations and higher power Class B or C stations would use the same channel. This concept we must reject, because it represents an inefficient use of channels. This is true because unduly wide spacings are necessary in order to protect the lower power stations from co-channel interference caused by the higher power operations.

IV. Type of Assignment Plan To Be Adopted for Commercial Channels

26. As mentioned, we have concluded that whatever plan is adopted herein as a basis for FM assignments, it must be of a "go-no go" character, as is the television assignment plan. This does not of itself determine what kind of plan should be adopted, since an assignment system might be very simple, or it might involve relatively complex computations and formulas, and still, as long as the end result is certain, it would meet this test. There are discussed later herein certain rather radical plans proposed by some of the parties, which we must reject for reasons stated. The principal alternatives, meriting serious consideration, are three: (1) protection of existing stations to a particular field strength contour, such as 1 mv/m; (2) the type of plan proposed in the Notice, a set of minimum co-channel and adjacent channel mileage separations between existing and proposed stations (which would almost necessarily have to be based on assumed maximum facilities for both); and (3) a Table of Assignments, similar to that formerly used in FM and now used in television, based on minimum separations but involving the assignment of particular channels to particular communities.

27. *Protection to a particular contour.* Several commenting parties argued against the Notice proposal and in favor of simply a "go-no go" principle by which an application would be considered on the basis of whether or not the operation proposed objectionable interference (according to the new curves and present ratios) to existing facilities. Perhaps the most vigorous proponent of this idea was the *AFCCE*, whose proposal is for assignments essentially on the same basis now obtaining under our interim processing procedure—protection of existing stations to their 1.0 mv/m contours on the basis of their existing facilities and those proposed in the application, using the curves and signal ratios adopted herein. *AFCCE* proposes to retain essentially the present rules relating to maximum facilities—20 kw E.R.P. and 500 feet effective antenna height in "Zone I," and no maximum elsewhere—and no minima other than those now in the rules. Other parties supporting this general concept proposed other protected contours—e.g., 1 mv/m for Class A, 0.5 mv/v for Class B, and 0.1 mv/m for Class C stations—and maximum and minimum facilities along the lines proposed in the Notice.

28. The proponents of this plan, vis-a-vis the mileage separation concept as proposed in the Notice, argue that this is the way by which the maximum number of new assignments can be made, whereas, at least with the fairly wide spacings proposed in the

Notice, under a mileage separation scheme relatively few new stations could be assigned in areas where there is present or likely future demand therefor. It is argued that a mileage separation system, based on maximum facilities, is wasteful of spectrum space and amounts to protection of often non-existent "service", since many stations do not now and likely, for economic reasons, never will operate with anything approaching maximum facilities. It is also urged that such a system must necessarily be based on assumed uniform terrain conditions and more or less uniform distribution of cities and population—neither of which conditions in fact exists. Therefore, it is urged, applications should be evaluated individually, on a simple "protected contour" standard, such as the 1 mv/m. Those parties favoring mileage separations as opposed to the "protected contour" concept (which included the N.A.B. and the networks) referred to the pressures for non-complying grants which, it is believed, a "protected contour" concept would always entail; to the possibility of conflict between parties as to the exact location of any given service or interference contour (even using the curves); to the desirability of giving existing stations leeway to increase their facilities; and to the general consideration of over-all efficiency.

29. The AFCCE proposal obviously would permit a greater number of assignments; in fact it may properly be termed a "squeeze-in" proposal, under which any combination of facilities (no matter how small), and directional antenna suppressing radiation in particular directions, would be permitted as long as existing 1 mv/m contours are protected. It must be rejected, for a number of reasons. First, there is the consideration of over-all efficiency of channel use. As far as co-channel and first adjacent channel operations are concerned, any new assignment creates interfering signals over much greater distances than the extent of its service area—thus creating islands of service in the midst of seas of interference. If protection is only to the 1 mv/m contour of existing stations, service outside that contour (which many stations render) will be destroyed. There comes a point of diminishing returns beyond which additional assignments on a channel, even though nominally protecting the 1 mv/m contour of existing stations, result in over-all inefficiency of use. Second, this plan would merely tend to perpetuate an already undesirable situation, by encouraging the "squeezing in" of numerous assignments operating with near-minimum facilities—an inefficient use of channels, especially those designed for use by medium or higher power stations. Third, existing stations (both those now in existence, and those which might be authorized from now on under such a system) would be forever limited to their existing facilities—often the small and (from an assignment standpoint) inefficient facilities referred to above. Especially now that FM shows signs of developing an economic base sufficient to support relatively large scale operations, we do not believe the public interest would be served by such a limitation.

30. To a certain extent, these objections would be met by adoption of some of the variations of this concept urged by others—

protection of existing facilities of some classes to a lower field strength contour, and adoption of a reasonably significant minimum for facilities, at least on some channels. However, none of these would meet the last objection mentioned above—limitation of stations to their present facilities. Moreover, this “protected contour” concept has the same disadvantage as does any plan other than a Table of Assignments, in that it requires the making of assignments on the basis of present “demand,” without consideration of future or other needs which have not yet been crystallized into application form.

31. It is also to be observed that the “protected contour” concept would not even necessarily afford the “go-no go” certainty we believe indispensable. For example—as has happened in the past—the filing of an application seeking a new station, which would approach but not quite cause interference within the 1 mv/m contour of an existing station, may lead to the filing by the existing station of an application for increase in height or power, which if granted would involve interference to or from the new proposal. Under these circumstances obviously a hearing would be required, to determine which application should be granted. It would appear that we would then be in the same position we are now—contour locations would have to be determined, populations counted, other services evaluated, etc. Thus nothing would be gained.

32. For these reasons, we conclude that a plan based only on a “protected contour” concept is not sufficient, and must be rejected. Therefore, we adopt, as the basis of assignments a table of minimum co-channel and adjacent channel mileage separations, discussed below, which we believe to afford the best basis for orderly, efficient, and effective development of the FM broadcast service. This is based on protection of stations of the various classes to a particular service radius, using the curves and signal ratios mentioned above, and assuming the maximum facilities for both existing and proposed stations.

33. We do not conceive that this plan will involve the “waste,” or crippling effect on the development of FM, that AFCCE and others allege. That it may in some instances mean, for the moment, protection of non-existent “service” where stations operate with relatively small facilities, is outweighed by the provision of opportunity for expansion as the economic basis of the medium increases. Terrain factors can be taken into account in such a plan, to the extent appropriate, as discussed below. It does not, as AFCCE argues, involve an assumption as to distribution of population or cities (which could, and as we propose will, be taken into account in a Table of Assignments).

34. AFCCE argues that a mileage separation plan would be both crippling on the one hand, as to “Zone I” (the Northeast), and unnecessary on the other, as to “Zone II” (the rest of the country). It is asserted that under the wide spacings proposed in the Notice, only about eight out of 49 applications pending as of last summer for Zone I facilities could be granted—many fewer than under AFCCE’s

proposal. We do not conceive that use of the criteria adopted herein will have anything like the restrictive effect asserted with respect to this portion of the country. It should be borne in mind that the spacings adopted herein are shorter than those proposed in the Notice, permitting some assignments which could not have been made under our original proposal but can be made under the standards here adopted, consistent with assignment efficiency and the public interest. Analysis of the approximately 50 applications now pending for new stations in Zone I (as of June 1962) indicates that a number of them can be granted under the standards now adopted, a number of others can probably be granted substantially equal facilities on channels other than those requested, and a number could not be granted anyhow, even under the AFCCE proposal, because they involve interference within the 1 mv/m contours of existing stations. It must be borne in mind that in most of Zone I FM assignments are now approaching the saturation point, no matter what basis of assignments is used, as shown by the fact that as of January 18, 1962 there were approximately 580 commercial FM assignments in this area, compared to a total of 644 provided in the Table of Assignments formerly used in the FM service, as amended up to February 12, 1952. Analysis of the approximately 50 applications for new stations in Zone II (as of June 1962) indicates that many of these can be granted under our new standards, others can be accommodated on other channels, and some could not be granted even under the AFCCE's proposal, because of the interference which would be caused. With respect to Zone I-A (Southern California), the situation with respect to the ten pending applications appears to be about the same as Zone I.⁶ In any event, whatever restrictions are entailed by the mileage separation plan adopted here as compared to the AFCCE proposal, in terms of applications which might be granted under it but cannot meet the spacings adopted here, are outweighed by the overall efficiency and preservation of service, and orderly opportunity for expansion, provided by our plan.

35. With respect to Zone II, AFCCE's argument is that there the demand for channels is and will remain substantially less, and therefore the assignment situation is self-correcting and no over-all plan need be adopted. This we believe erroneous. In some parts of Zone II, such as the coastal Pacific Northwest and the area around Dallas-Fort Worth, there is already a tight situation as to possible FM assignments. Moreover, it may be expected that demand will increase in the future, along with interest in FM and population and economic growth. Clearly, if FM is to proceed to orderly development in this portion of the country, now is the time for an over-all plan.

⁶ The total of 110 applications represents no more than about 90 potential grants on any basis, since some of them are mutually exclusive. Of the 110, about 67—80 in Zone I, six in Zone I-A, and 31 in Zone II—would be the first FM stations in their communities, and if granted would thus fulfill one of our important assignment objectives in this and the other broadcast services, provision of a first local outlet. To the extent that these could be granted under a system such as AFCCE's, but cannot be granted (or comparable facilities provided) under our new standards, this is of course *pro tanto* a disadvantage. But, as stated in the text, the disadvantage is outweighed by the advantages accruing from the mileage separation plan adopted here.

36. *The Table of Assignments.* In the July Notice (paragraph 23) we discussed the idea of re-instituting a Table of FM assignments, similar to that in effect from 1945 to 1958. This we rejected, for essentially the same reasons the earlier Table was abandoned, that it appeared to be an unnecessary and cumbersome step in the assignment process. Those parties commenting on this matter appeared to agree.

37. However, on further consideration, we have reached the tentative conclusion that the public interest will best be served by adoption of such a table, just as in television, based on the mileage separations adopted herein, for substantially the same reasons set forth in the Sixth Report in 1952 (see the Sixth Report and Order in Dockets 8736, 8975, 8976, and 9175, released April 14, 1952, paragraphs 12 to 18). Briefly, these are: (1) a pre-engineered Table is the best way to insure efficiency of channel use, better than leaving channel use to the more or less random determination of application filing;⁷ (2) a Table is the best way of making provision for future needs which are not at the moment ripe for expression in application form—e.g., needs of smaller communities, and of areas where support for FM is lacking at the present time; (3) a Table forms a better way of insuring compliance with §307(b) of the Act — calling for fair and equitable distribution of facilities — than does the random application process, which necessarily has to a degree a “first come first served” aspect.

38. The priorities and bases to be used in the Table are discussed in the Further Notice simultaneously adopted. Comments thereon, and upon the basic idea of a Table, are invited.

V. *Zones, Classes of Stations, Maximum and Minimum Facilities Zones*

39. Presently, under §3.202 of the Rules, for the purpose of FM allocations the country is divided into two Areas — Area 1, a portion of the Northeast considerably smaller than present television Zone I, and Area 2, the rest of the country. Our proposal in the Notice (paragraph 35) was—under one alternative, “Plan II”—to expand Area 1 so as to make it roughly co-extensive with television Zone I, extending as far west as the Mississippi. Actually, both at present and under the proposed “Plan II,” the “zone” concept has significance only with respect to the facilities used by high power stations, the maximum permitted being less in Area 1.

40. Some parties favored abolition of zones altogether, as being a more or less arbitrary and discriminatory concept. It was asserted, for example, that stations of considerably more power than the present Area 1 maximum—20 kw E.R.P. and 500 ft. a.a.t., or equivalent—can perform at least as valuable a function in the more populous and crowded Northeast, where there is economic support for large

⁷ For example, in the Notice we raised the idea of *maximum*, as well as *minimum*, separations, designed to insure efficiency of channel use. Further consideration leads us to the view that this fairly complicated concept (which involves adjacent channel as well as co-channel considerations) can best be applied as a general guide in working out a Table, rather than used as a specific rule in dealing with individual applications.

scale operations and high quality programming, as they do in less populous parts of the country. Other parties supported the zone concept, for generally the same reasons mentioned in the Notice—that because of the crowded assignment conditions and closely populated character of the Northeast, there is both little opportunity for and less need for great facility “Class C” stations rendering wide area coverage; whereas in the West, with its sparser population, more widely separated cities, and fewer existing stations, there is both a great need for high power stations providing such coverage, and opportunity for such assignments. As to the appropriate division of the country into zones, most parties commenting favored something along the lines of our proposed “Plan II,” or something corresponding to TV Zones I and II.

41. After due consideration, we conclude that the public interest would best be served by division of the country into three zones, as proposed by AFCCE and ABC. Our conclusion is based upon the differences between the general areas of the country referred to above, which make high powered stations, rendering wide area coverage, both less needed and much less feasible in the Northeast than in the West, where population is sparser and cities are often much further apart. In view of the populous character of the Northeast, with its many cities, it appears that stations operating with facilities in the general order of the present Area 1 maximum should be able to have an adequate basis of economic support. There appears to be no reason, either from the standpoint of the character of the areas or of administrative conveniences, why FM “Area 1” should not be co-extensive with television Zone I. Therefore, as suggested by some of the parties, we are redefining Area 1 to make it and TV Zone I the same.

42. It also appears that conditions in much of California either are or may soon become the same as the Northeast in these respects. Therefore, as AFCCE and ABC suggest, we are defining that portion of California below the 40th parallel of latitude (which lies north of San Francisco) as “Zone I-A.” Assignment rules here will be the same as in Zone I, because of the similarity of conditions.

43. In reaching these conclusions, we have considered two other suggestions as to what the appropriate zones should be. One is that Zone I should include present Area 1 plus any U.S. Census standard metropolitan statistical area, said to be a way of insuring that high power, wide area stations would be assigned only in truly rural areas. This we must reject, both because it would be unduly confusing and subject to change with every Census, and because it would by no means necessarily achieve a desirable result.⁸

44. The other suggestion is based on propagation characteristics. It is urged that we recognize, in FM as in VHF television, the greater tropospheric propagation along the Gulf Coast, and take similar account of the same phenomenon along the Southern California coast south of Santa Maria. Recognizing the merit in both of

⁸ High power stations in standard metropolitan areas, especially in the South and West, may well render a much needed service to wide rural areas having little other service. Moreover, it may be that support from such areas is desirable if high power operations of good quality are to be provided.

these positions from a strictly technical standpoint, we must nonetheless reject them. As to the Gulf Coast area of the South (television Zone III), if adequate opportunity is to be afforded for the development of FM—which, as an aura service, can be expected to support more stations than television—a large number of assignments must be made therein. These cannot be made if we impose minimum mileage separations substantially larger than in the rest of the country, as in television. The great facility “Class C” stations on 60 channels which we provide for herein in Zone II will have, using the spacings selected and the curves, protected service areas substantially larger than their counterpart “Class B” stations in Zone I; and therefore, even if in this area interference is more severe than that indicated by the curves adopted herein, these stations will have adequate protection. There does not appear to be in this area the need for extremely wide area coverage which exists, for example, in the sparsely settled western plains and intermountain areas, so the public will not suffer from the closer spacings. It should also be borne in mind that, whether stations are assigned on a separation basis or via a Table, only a very small percentage of spacings will be at or near the minimum. Using special spacings for a “Zone III” would also considerably complicate whatever assignment process is used, since, unlike television with its one class of stations and only co-channel and first adjacent channel interference problems, FM has two classes of commercial stations and interference considerations are present up to three channels removed. A long series of separations would have to be worked out between Class A and Class C stations on either side of the zone line, up to three channels removed.

45. As to coastal Southern California, this area is already so crowded that probably few additional assignments can be made⁹, at least as to other than low power Class A stations. Therefore the separation used becomes of less importance, and, in order to make whatever assignments are possible, we must adhere to the Zone I spacings.

Classes of commercial stations

46. The FM Rules presently provide for two classes of stations on commercial channels: (1) low power “Class A” stations, operating with no more than 1 kw E.R.P. and 250 ft. antenna height above average terrain, or equivalent, assigned in both Area 1 and Area 2 on Class A channels; and (2) higher power “Class B” stations on 60 Class B channels, operating in Area 1 with no more than 20 kw and 500 feet or equivalent (and in no event more than 20 kw), but with no fixed maximum on facilities in Area 2.¹⁰ In the July Notice, we proposed to retain these classes of stations but to add a third class—larger “Class C” stations, designed to render wide area coverage

⁹ For example, there are 20 Class B assignments within a radius of 40 miles of Los Angeles. In addition, there are 15 Class A assignments in the same area. The San Diego area has 13 Class B assignments.

¹⁰ Section 3.204(a)(2) provides that normally the maximum in Area 2 will be the same as in Area 1, but greater height and power will be encouraged and considered, on an individual basis, where undue interference would not result to existing stations or potential assignments. The NAB pointed out that as of 1961, there were 261 Area 2 Class B stations authorized with power between 20 and 74.9 kw, and 63 with more than 75 kw.

where it is needed. We set forth two alternative proposals for assignment of these stations: "Plan I," under which 20 channels (contiguous in the band) would be used for Class C assignments in both Areas; and "Plan II," under which Class C stations would be assigned only in Area 2, on all of the present 60 Class B channels, and no more Class B assignments would be made in that Area (Area 1 would continue to have Class B assignments).

47. The concept of having three general classes of stations drew support from many of the parties. AFCCE opposed it, urging simply maintenance of the *status quo* in this respect, with no maximum in Area 2. Two parties (Zenith and FM Unlimited) urged that there is need for "Class C" stations in both sections of the country, as proposed in our "Plan I"; both urged provision of more than 20 channels therefor. Other parties favored "Plan II," asserting that: (1) it involves less sweeping changes from present practice; (2) in the Northeast (Area 1, as expanded) there is neither great need for nor much opportunity for such higher facility stations; (3) there is need for such assignments in the sparsely settled West, and this may require more than 20 channels; (4) setting aside a band of channels, such as 20, for use by high power stations, gives stations so assigned an undue competitive advantage (in other words, all stations in the same market should as far as possible be relatively equal in facilities.)

48. For the reasons last mentioned and discussed earlier in connection with zones, we conclude that our "Plan II" is more in the public interest and should be adopted. In Zone I, and Zone I-A (California) where conditions are similar, Class A and Class B stations will be assigned, on the channels now specified therefor. In Zone II, which includes most of the country, Class A stations will be assigned on the 20 channels now reserved therefor (see paragraph 25, above), and on the remaining 60 channels Class C stations will be assigned. There will be no new Class B assignments in this area. We have given consideration also to reserving 20 channels for greater facility Class C stations in Zone II only, with Class B assignments on the remaining 40 channels; but we conclude that this would not only be difficult to do effectively (because of existing use of channels in some parts of Zone II, but would lead to an undesirable situation because of the factor of competitive inequality mentioned above. There will always be differences in station facilities, where stations are assigned for different purposes, as we recognized years ago in setting up Classes A and B. But, where nothing much is to be gained, we do not believe the public interest is served by building into our assignment plan competitive superiority for a relatively few stations operating on a limited number of channels.¹¹

¹¹ High Fidelity Broadcasters, Inc., a Maryland Class A FM broadcaster, proposed perhaps the most radical reallocation of any party, including shifting Class A stations to "interleaved" channels (already discussed), removing the reservation of any particular channels for education, having Class B-1 and Class B-2 stations (the former, in Area 1, the same as present Class B, the latter, in Area 2, operating with somewhat greater facilities), and using the 20 percent Class A channels for high-power Class C stations in Area 2 only. This must be rejected, not only because of its great complexity and the problems connected with "interleaving," mentioned above, but because of the factor of competitive inequality just referred to.

Facilities for new commercial stations

49. *Minimum facilities.* As to minimum facilities, the present rules require provision of a 3 mv/m signal over the principal city (§3.311(c)), and otherwise provide only that the rated transmitter power shall not be less than 250 watts for Class A stations and 1 kw for Class B stations (§§3.203(a) and 3.204(a)). As to Class B stations, at least, these minima are of no real significance from an over-all assignment standpoint. Because of the pressure to "squeeze in" stations, the result has been to clutter up many of these channels with a number of small-scale facilities, making for inefficient channel use. It was for this reason that in the Notice we proposed minima, in terms of height and power (or equivalent), for the various classes of stations: 100 watts and 100 ft. for Class A, 1 kw and 250 ft. for Class B, and 20 kw and 500 ft. for Class C.

50. The commenting parties for the most part favored this idea for new assignments (although some suggested it apply only to Class B and Class C stations). Various minima were suggested,¹² including absolute minima on antenna height above average terrain (as well as "equivalence"), and alternative minima where sufficient antenna height might not be feasible. It was also suggested that the minima for Class B and Class C should be higher than the maximum for the next lower class, so there would be no "overlap" of station classifications.

51. As far as new commercial assignments are concerned, we adhere to the view that certain minima should be imposed, but only as to power. In some instances, a station may have a reasonably favorable antenna location with respect to its principal community, and at the same time have a negative antenna height with respect to the average of all eight radials. In this situation it would be unduly burdensome to require increase in power to meet an "equivalence" standard. Adequate safeguards in this respect are provided by our present rules (herein reaffirmed), requiring a signal of at least 3 mv/m over all of the principal community, and where possible location so as to have line of sight over that community. (Sections 3.311 and 3.315). The rule we adopt herein is that—except where antenna height is so great that use of the specified power would exceed the *maximum equivalence standard* (in which case that standard will govern)¹³—new stations must operate with no less than the following effective radi-

¹² Three specific proposals were: Earl Cullum, none for Class A, 10 kw and 250 ft. (or equivalent) for Class B or C. High Fidelity Broadcasters, Inc., Class A, 500 watts and 100 ft. or 100 watts and 250 ft.; Class "B-1" (B's in Area 1), 1.2 kw and 500 ft. or 12 kw and 150 ft.; "B-2" (B's in Area 2) 8 kw and 500 ft. or 60 kw and 200 ft.; Class C, 300 kw and 600 ft. or 100 kw and 1,000 ft. FM Unlimited: Class A, 1 kw and 250 ft. minimum height of 75 ft.; Class B, 20 kw and 500 ft., minimum height a.a.t. of 250 ft.; Class C, 200 kw and 1,000 ft., with minimum height a.a.t. of 1,000 ft.

The minima proposed by High Fidelity are designed to insure that Class A and B stations render urban service at least 50% as far as, and Class C stations at least 85% as far as, they would if operating with maximum facilities—a standard in general considerably higher than that provided by the requirements we adopt herein. But, desirable as this may be from an over-all efficiency standpoint, we believe such high minima would tend to restrict the development of the service.

¹³ These exceptional situations will probably occur mostly in Zone I, where, under the standards adopted below, Class B stations will have maximum facilities of 50 kw and 500 ft. a.a.t., or equivalent. Where antenna height exceeds about 1,250 feet (as it does, for example, with the New York City stations located on the Empire State Building) such stations could not be permitted, much less required, to operate with as much as 5 kw.

ated powers: Class A, 100 watts; Class B, 5 kw; and Class C, 10 kw. These minima are lower than those proposed in the Notice and most of those proposed by the parties; but in our view they are enough to safeguard over-all efficiency and at the same time they are low enough to permit reasonably economical operation and thus encourage the development of the service. Since there will not be Class B and Class C stations in the same area, and since Class A stations operate on separate channels, there is no need for concern about the "overlapping" of facilities of the different classes.

Maximum facilities for commercial stations

52. *Class A.* The July Notice proposed to retain the present maximum on the facilities of low power Class A stations—1 kw and 250 feet above average terrain, or equivalent. No commenting party urged a lower figure; some supported this and others urged higher figures, such as 2.5 kw and 250 feet, 5 kw, or even 10 kw and 250 feet. It was urged that more power is necessary especially in the case of Class A stations located in metropolitan areas near large cities, to overcome man made noise, built-up area conditions, etc., as well as in order to compete with the numerous more powerful Class B stations in the city. We believe there is merit in this argument. Further staff studies have shown that an increase in the maximum facilities of stations on this class can be provided, and at the same time an adequate number of assignments on these channels can be provided for. A maximum of 3 kw and 300 feet above average terrain (or equivalent) appears to be appropriate, and is adopted herein. These facilities, which under the mileage separations adopted below would give a service radius of 15 miles, appear to be great enough to meet the problems resulting from the present restriction, and at the same time not large enough to create serious over-all assignment problems.

53. *Class B.* The July Notice proposed to retain for Class B stations the present Area 1 maximum, 20 kw and 500 feet above average terrain, or equivalent. Some parties supported this figure (as far as Area 1 is concerned, which under our decision herein is the only area where Class B stations would be assigned). Others urged an increase, some going as far as 20 kw or even 100 kw at 1,000 feet. These proposals must be rejected, because, as already mentioned, there is neither great need nor much opportunity for making such high power assignments in Zone I, and if made they would preclude other needed assignments. Of more merit are suggestions made by two parties (CBS and WQR) concerning the need for some increase, particularly in order to afford adequate coverage of metropolitan areas which are expanding rapidly with suburban development. It is pointed out, for example, that from the center of lower Manhattan, (where a number of New York City FM stations are located), it is 23 miles to the furthest point of that city, and the distance to the outer edge of most of the New York-northern New Jersey urbanized area is from 35 to 40 miles. Similar situations prevail in some other cities. Therefore, it is urged, an increase in maximum facilities to 50 kw and 500 feet (or equivalent) should be permitted, in order to permit provision of

a 3 mv/m signal to a distance of 24 miles and a 1 mv/m signal to a distance of 33 miles. We agree with these views, and accordingly are herein amending our rules to provide that the maximum facilities for stations herein classified as Class B (i.e., those stations in Zone I and I-A operating on Class B-C channels) shall be 50 kw E.R.P. and 500 feet above average terrain, or equivalent.

54. *Class C.* As to Class C stations—which under our decision herein will be assigned only in Zone II—these stations, often serving sparsely settled areas where there are relatively few sizeable communities, are expected to render wide area coverage, and therefore must be permitted to operate with great height and power where possible. In the Notice, we proposed a maximum of 100 kw and 2,000 feet above average terrain, or equivalent. The commenting parties who suggested specific figures either supported this or proposed other maxima which are generally comparable (e.g., 200 or 300 kw and 1,000 feet). In this respect, therefore, we affirm the proposal in the Notice, and for Class C stations (i.e., stations in Zone II operating on commercial channels other than Class A) the maximum facilities permitted will be 100 kw and 2,000 feet above average terrain, or equivalent.

55. AFCCE and other parties argued that there should be, as now, no absolute maximum on facilities in Zone II, where (it is asserted) there is and will be less need for assignments than any problems tend to be self-correcting. This contention must be rejected. Not only is the absence of such a restriction completely inconsistent with a mileage separation table and a table of assignments, but, even in the absence of such assignment plans, it permits grants of great height and power which may preclude future needed assignments. In short, it is wasteful, inconsistent with any rational over-all approach, and not in the public interest. All other services are subject to such restrictions, and FM Zone II should be also.

56. Use of E.R.P. greater than the “maximum” specified (where antenna height is low) is discussed below in connection with “equivalence”. For reasons stated, we must reject this concept.

VI. Signals, Protected Areas, and Separations

Signals for service

57. The present FM standards (§3.311(b) of the Rules) provide that in general a signal of 50 uv/m is sufficient for service to rural areas, and a signal of 1 mv/m is required for service to city, factory and business areas, with 3 mv/m required over the station's principal city. In the July Notice we asked for comments about these values, and we specifically proposed to retain the 3 mv/m value as a basis for principal city coverage.

58. From the comments received, which were for the most part general in nature, we see no reason to change these concepts, and they are reaffirmed. Most of the parties commenting favored the 3 mv/m figure for principal city service as appropriate. One party suggested that the corresponding low band television VHF value, 74 dbu (5

mv/m) be used instead; but no data in support of this suggestion was advanced and the suggestion is rejected. For convenience, we adopt the standard of 70 dbu, which corresponds to 3.16 mv/m.

Protected areas

59. In the Notice, the concept of station protection was put in terms of a particular service area radius, within which the station would be protected against objectionable co-channel and first adjacent channel interference. This was to be large enough to permit the station to obtain an adequate basis of economic support and fulfill its particular function (coverage of a city and suburbs, wide area rural coverage, or coverage of a smaller town and environs), and at the same time small enough to permit other co-channel and adjacent channel stations to be spaced sufficiently close so that an adequate number of assignments might be made. The protected radii proposed were: Class A stations, 25 miles; Class B stations, 50 miles; and Class C stations, 100 miles. With the maximum facilities proposed in the Notice, this amounted to protection to the 140 uv/m (43 dbu) contour for Class A stations, to the 178 uv/m (45 dbu) contour for Class B stations, and to the 84 uv/m (38.5 dbu) contour for Class C stations. The co-channel spacings necessary to protect these radii are, respectively, 115, 190, and 300 miles. With respect to second and third adjacent channel interference, we took cognizance of the fact that (because of the negative ratios involved) the area of such interference is small and within it the service lost is completely replaced by the service of the interfering station. Therefore, we proposed that the service radius protected against such interference would be less—10 miles for Class A, 25 miles for Class B, and 35 miles for Class C.

60. As to co-channel and first adjacent channel spacings, some parties (including the N.A.B. and CBS) supported those proposed in the Notice and urged that they not be shortened. However, more parties opposed them as too long. It was asserted that the proposed separations would prevent the making of many needed assignments;¹⁴ that they would mean protection of "service" which in fact does not exist because the average FM receiver is not an expensive one and does not work well for stations over 15 miles away; that the proposed spacings ignore the fact that listeners in "in-between" rural areas, when they have better receivers, often also have directional, rotating receiving antennas which can distinguish between stations; that listeners in these "in-between" areas will suffer because future assignments would have to be too far apart to be received even with a directional antenna; and that, even if the "service" protected is technically usable, the programming of a distant station is probably of little significance to, or used by, listeners. Little specific data in support of these contentions was advanced.

61. Some of the parties offered specific proposals in this area. Earl Cullum proposed that, between co-channel high power stations, the

¹⁴ For example, one party asserted that under the proposed spacings it would be impossible to provide a Class B assignment in Salisbury, Maryland, needed for wide area coverage in this rural region because of the single existing assignment to the Delmarva Peninsula south of Wilmington.

same spacings be used as in television—170 and 190 miles in Zone I and Zone II, respectively, and, between co-channel low power stations, spacings of 85 miles in Zone I and 95 miles in Zone II. This would give the high power stations protection to their 57 dbu (approximately 700 uv/m) contours, a distance of 53 miles in Zone I and 69 miles in Zone II. The low power stations would be protected to their 1 mv/m contours in Zone I, a distance of 18 miles, and to their 57 dbu contours, a distance of 21 miles, in Zone II. Corresponding first adjacent channel spacings would be 125 and 160 miles between high power stations in Zones I and II, respectively, and 45 and 55 miles between low power stations in the respective zones. High Fidelity Broadcasters, Inc., proposed an elaborate set of spacings designed to protect the 0.5 mv/m contour of all stations except Class C stations, which would be protected to their 0.1 mv/m contours. In terms of protected distances, this would mean 15 miles for Class A, 40 or 50 miles for Class B (depending on the zone) and 90 miles for Class C. Another party proposed (without reference to zones) considerably shorter spacings, based on the reasoning referred to in the previous paragraph: 95 miles co-channel and 80 miles adjacent channel between Class B's, and 60 miles co-channel and 45 miles adjacent channel between Class A's. Other suggestions, made by parties proposing only a "protected contour" concept, were for protection to the 1 mv/m contour (AFCCE), or to the 1 mv/m, 0.5 mv/m, and 0.1 mv/m for Class A, B, and C stations respectively (FM Unlimited).

62. Further consideration of this matter, and our staff's studies, have indicated that using the spacings set forth in the Notice, or even spacings as great as those proposed by Earl Cullum, it is simply not possible to make the number of assignments which must be provided if the FM service is to be of optimum value. A compromise was found to be necessary. It was found that a reasonable compromise, affording reasonably adequate protection on the one hand and yet permitting a sufficient number of assignments, is to provide protected service radii for the various classes of stations as follows: Class A, 15 miles; Class B, 40 miles; and Class C, 65 miles. Protection of these radii requires co-channel spacings as follows: between Class A stations, 65 miles; between Class B stations, 150 miles; and between Class C stations, 180 miles.¹⁵ Assuming that the station is operating with maximum facilities provided for above, the spacings selected amount to protection to the following field strength contours: Class A, 927 uv/m; Class B, 562 uv/m; Class C, 944 uv/m. First adjacent channel spacings necessary to afford the same degree of protection are: between B and B, 105 miles; between C and C, 150 miles; between A and B, 65 miles; and between A and C, 105 miles. These minimum mileage separations, together with others necessitated by the plan adopted herein for educational assignments, are set forth in the Table which appears following the discussion of educational assignments. These separations will be used as the basis of our proposed Table of Assignments.

¹⁵ Mileage separations have in all cases been rounded out to the nearest five-mile figure, whether higher or lower than the exact value determined from the curves and ratios.

63. It is recognized that the spacings, protected radii and protected contours just mentioned are considerably less than those proposed in the Notice and by some of the parties. This is particularly true with respect to wide area Class C stations, for which we originally proposed protection out to a distance of 100 miles, the 84 uv/m (38 dbu) contour if maximum facilities are used, with co-channel spacing of 300 miles. Such wide separations turned out to be incompatible with making an adequate number of Class C assignments. It must be borne in mind that, in any Table of Assignments, few spacings will actually be at or very close to the minimum, so that on the average, and in the majority of cases, the degree of protection afforded will be higher. This may be expected to be true, for example, in most of the sparsely populated plains and mountain West, where there are not enough sizeable communities to require a large number of closely spaced Class C assignments, and where, therefore a substantially greater degree of protection to each Class C station can be afforded. Concomitantly, this of course is the area where wide area coverage is particularly valuable, because of the distance between communities. In this respect, the situation is, as the AFCCE pointed out, self-correcting.¹⁶ In sum, we conclude the separations mentioned to be those most appropriate for the optimum development of the FM service.

64. As to second and third adjacent channel interference, our proposal to have a smaller radius protected against such interference (on the basis of the "substitution of service" concept) drew some support but more opposition. It was asserted, for example, that one station does not necessarily equal another, even as between two commercial stations, and that this is true *a fortiori* where one of the stations is non-commercial educational (a situation which could arise between an educational station on Channel 218, 219 or 220, and a commercial station on Channel 221, 222, or 223). One suggested compromise was that a new station two or three channels removed should not be required to afford the existing station absolute protection to the same protected contour as would a new co-channel station, but *at least it should have to be located outside of that contour* (e.g., under the AFCCE's proposal, a new station two or three channels removed would have to be located outside of the existing station's 1 mv/m contour).

65. After consideration, we conclude that the last-mentioned suggestion is appropriate for adoption. We agree that our earlier concept of a substantially smaller protected service radius against second and third adjacent channel interference is perhaps extreme, and a greater degree of protection should be afforded. On the other hand, there must be taken into account (1) the need for making numerous assignments; (2) the fact that these interference situations do represent a complete substitution of service technically and at least to some de-

¹⁶ Conditions in the various parts of Zone II are somewhat different, in that the Midwest and South are more populous, with more closely spaced communities. At one point in the staff's study, consideration was given to creation of additional "zones" to take this difference into account. However, it appeared that this would substantially complicate the assignment process, and that whatever differences exist can be accommodated because of the factors set forth in the text.

gree as a matter of listening reality; (3) the fact that the areas of interference involved—occurring immediately around the transmitter of the interfering station—are relatively small; (4) the fact that at least some receivers are capable of dealing with 400 or 600 kc interference;¹⁷ and the fact that, under this concept, the existing station would be protected, if not completely to the same service radius as against co-channel interference, at least for a very substantial distance. Therefore, the separations adopted here (which will form the basis of our proposed Table of Assignments) will provide that stations on second and third adjacent channels to existing stations must be located further therefrom than the “protected” distances specified above—15 miles where the existing station is Class A, 40 miles where it is Class B, and 65 miles where it is Class C.

66. In adopting the separations specified, we have in large part rejected the contentions mentioned above, that FM receivers are for the most part inexpensive and not really of good quality, and that we should take this into account by providing extremely short separations. No data was advanced in support of this, and other parties asserted that receivers are steadily improving. In any event, we must agree with the point made by AFCCE and Zenith, that an assignment plan should be based on receivers of reasonably good quality. To sacrifice other important values, simply in order to base a plan on the cheapest and least satisfactory receivers in common use, would not serve the public interest. It would tend to remove any incentive for the development and purchase of better receivers.

VII. The Educational Channels

67. In the July Notice (paragraph 30) we did not propose any basic changes in the present allocation of the lowest 20 channels of the FM band (except in Alaska) for noncommercial educational use.

68. The comments upon the educational aspect of FM were of two general types. One group of comments proposed abolishing the educational reservation, or modifying it. Earl Cullum suggested that it be abolished, with, if necessary, provision of specific channel reservations by way of a Table of Educational Assignments. Zenith suggested eliminating the 20-channel reservation, with all 100 channels to be divided into three bands according to the height and power of stations operating therein, and in each band certain channels reserved for education. FM Unlimited urged (as part of an over-all reshuffling of existing stations) that the educational band be opened to non-educational but “non-commercial” facilities, such as municipal and religious stations.¹⁸ Intercollegiate Broadcasting System, an organization of “campus” stations, urged that educational stations, or at least the low power 10 watt ones, be permitted to operate on a com-

¹⁷ One party urged, as reason for low protection against 2nd and 3rd channel interference, the idea that two elements of receiver quality, sensitivity and selectivity, go hand in hand, so that a receiver capable of getting a station at some distance can also deal with such interference. This may or may not be generally true (no supporting data was given). To the extent it is, it supports the concept adopted here.

¹⁸ FM Unlimited's proposal, which also involves some actual deletion of existing stations, is part of a plan to free much of the FM band for a wholesale reshuffling of stations.

mercial but "non-profit" basis, so as to enable colleges to recoup the cost of operating the station and provide a means of training students in commercial, as well as non-commercial, broadcast operations.

69. While there is merit in some of these suggestions, we are of the view that none of them should be adopted. Zenith's proposal, while perhaps of some merit as an initial plan, is too complex for adoption at this point. As to Cullum's suggestion, it is apparent that a band of 20 channels is necessary for accommodation of the present and future needs of the educational FM service. For reasons discussed below (paragraph 70) a Table of Assignments in this service appears desirable. The FM Unlimited proposal would involve an unwarranted encroachment upon the educational band. It may be, as asserted, that the service of other kinds of "non-commercial" stations (e.g., WNYC-FM, the New York City municipal station) bears some similarity to the service rendered by some educational stations; but this is not completely true, and, as mentioned, the 20-channel band appears none too large for the needs of educational institutions and groups *per se*. For example, in the New York City-Newark area there are already five educational assignments, the maximum which can be made in 20 channels. The last suggestion, concerning "non-profit" but commercial operation, in our view must be rejected. This would involve an undue and inappropriate dilution of the concept of non-commercial educational broadcasting, would probably result—as far as the listener is concerned—in simply turning so much of this band over to regular commercial operations, and might involve accounting problems as to what is or is not "non-profit". In our judgment, operations in this band must remain not only non-profit but non-commercial.

70. The second group of comments, from educational groups, related to the manner of use of the 20 reserved channels. The chief point urged by these parties, including the National Association of Educational Broadcasters (NAEB), the University of Michigan (WUOM), and the National Educational Television and Radio Center (NET), was the need for *flexibility* in this service. It was pointed out that educational stations are located less with respect to centers of population than are commercial stations, and there is often need for a particular location so as to implement a state-wide or area-wide educational network. Therefore, it was asserted, there should be no Table of Assignments in this service, there should be no minimum separations but applications should be handled on the basis of interference considerations only—the same basis proposed by the AFCCE for commercial assignments, protection of the 1 mv/m contour—and there should be no maximum on facilities, other than for the 10 watt stations. WUOM pointed out that in its case relatively great facilities used at Ann Arbor enabled it to serve the Detroit area much better than it could otherwise do. As to minimum facilities, some of these parties urged none, and another urged a minimum of 100 watts and 100 feet above average terrain for other than the 10 watt stations.

71. We recognize that there is merit in some of these suggestions, and therefore we do not propose to adopt a Table of Assignments in

the educational service. This does not mean, however, that some restrictions may not be necessary in order to insure the most efficient and optimum development of the service. However—except for the highest three educational channels which are adjacent to commercial channels, discussed in the next paragraph—we do not adopt at this time any restrictions as to maximum facilities or minimum separations. A Further Notice will be issued shortly in this proceeding, proposing whatever general educational FM assignment rule changes appear to be most in the public interest.

72. As to the three channels at the top of the educational band, Channels 218, 219 and 220, other considerations apply. These are within 600 kc of commercial Channels 221, 222 and 223, and authorizing educational stations thereon without regard to mileage separation and with no limit on facilities would mean problems in making commercial assignments on these channels, which is already difficult in some areas. Therefore, as to these channels, we must apply the same standards adopted for commercial stations, insofar as adjacencies to the commercial channels are concerned. For this purpose, educational stations on Channels 218, 219 and 220 will be classified as follows: (1) stations operating with no more than 10 watts rated transmitted power will be classified as "Class D" stations; and (2) all *other* stations on these channels will be classified just as would commercial stations of the same height and power at the same location—i.e., if authorized with no more than 3 kw E.R.P. and no more coverage than the equivalent of 3 kw and 300 feet antenna height a.a.t., they will be classified as Class A stations; and if authorized with greater power or coverage they will be classified as Class B stations if in Zones I or I-A, or as Class C stations if in Zone II. New educational stations on Channels 218, 219 and 220 must meet the applicable minimum mileage separations with respect to existing commercial stations on Channels 221, 222 and 223, just as would a commercial station of the same class at the same location. In the case of Class D stations, these separations are based on assumptions of 10 watts E.R.P. and 100 feet effective antenna height. New Commercial assignments on Channels 221, 222 and 223 will of course have to meet the same spacings with respect to existing adjacent channel educational stations on Channels 218 to 220. Class D stations on Channels 218, 219 and 220 will be limited to 10 watts transmitter power; all other new stations thereon will be limited to the maximum specified for Class B or Class C commercial stations, depending on the zone in which they are located.

73. The above criteria will govern the grant of educational applications for Channels 218, 219 and 220, and applications not meeting these criteria will not hereafter be accepted for filing. With respect to the educational band in general, our interim processing procedure adopted in December 1961 did not impose any restrictions on applications for these frequencies. Pending further consideration of the appropriate basis for making assignments on these channels, we will continue the same procedure, except that: (1) applications for the three top channels, 218, 219 and 220, will be subject to the facilities

limitations and separations with respect to adjacent channel commercial stations just mentioned; and (2) no application will be granted where it would cause interference within the 1 mv/m contour of another station on the reserved channels, as determined on the basis of the F (50, 50) and F (50, 10) curves used under the interim procedure. Section 1.356 of the Rules is amended accordingly.

74. The discussion herein is of course confined to use of the 20 channels reserved for educational use. Noncommercial educational stations may, as they have in the past, apply for operation on the 80 unreserved channels, in which case they will be subject to the rules applicable to stations on these channels.

VIII. The Table of Minimum Mileage Separations

75. Set forth below is the Table of Minimum Mileage Separations between stations up to 600 kc removed. In every case, the reciprocal separation, not shown, is the same (e.g., C to A is the same as A to C). Some separations—B to C, and vice versa—are set forth for use in computations involving stations on either side of zone lines (a Class B in Zone I or I-A, and a Class C in Zone II).

Minimum separations (miles) Class of station and frequency separation (kc/s)

	Class A				Class B				Class C				10-watt educational			
	Co-Ch.	200	400	600	Co-Ch.	200	400	600	Co-Ch.	200	400	600	Co-Ch.	200	400	600
A.....	65	40	15	15	-----	65	40	40	-----	105	65	65	-----	30	15	15
B.....	-----	-----	-----	-----	150	105	40	40	170	135	65	65	-----	-----	40	40
C.....	-----	-----	-----	-----	-----	-----	-----	-----	180	150	65	65	-----	-----	65	65
D.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

IX. Equivalence; Terrain Factors

76. Our present rules (§§3.203 and 3.204) provide that, where stations operate with antenna height above average terrain greater than the "maximum" provided for their class and zone, they shall reduce power so that their 1 mv/m contours extend no further than they would if operating with the "maximum" antenna height and maximum E.R.P. In the Notice (paragraph 53) we pointed out that greater height increases service more than it does interference, and therefore—since interference is the limiting factor in station assignments—it might well be that the test for "equivalence," or permissible power with great antenna height, should be based on the co-channel interference contour (0.1 mv/m) instead of the 1 mv/m "service" contour.

77. A number of commenting parties supported this proposal. However, one, Earl Cullum, pointed out that, while use of the 0.1 mv/m contour would provide adequate co-channel protection, it would not do so in the case of adjacent channel operations. Our staff's analysis confirm this. For example, assume a Class B station operating with 50 kw E.R.P. and 500 feet above average terrain and a first adjacent channel Class A station at a spacing of 70 miles operating

with 3 kw and 300 feet. If the Class B station increases antenna height to 2,000 feet, using its 1 mv/m contour as the criterion it would be limited to 1.6 kw (2 dbk) power, and would protect the Class A station to about 16 miles. On the other hand, if the Class B's new 0.1 mv/m contour is to be the basis, that station could radiate 20 kw (13 dbk) power, and would protect the Class A station only to about 10 miles. Further study shows that no other contour would be substantially better. Therefore, the rules adopted herein provide that, as heretofore, equivalence (the E.R.P. permissible when antenna height is greater than that specified as the maximum standard) will be determined by the distance to the 1 mv/m contour.

78. In connection with equivalence, commenting parties raised two points which merit discussion. Under the present rules, as to Class A stations everywhere, Class B stations in Area 1, and "normally" as to Class B stations in Area 2, the E.R.P. specified as part of the "maximum" facilities is also an absolute maximum regardless of antenna height (e.g., in Area 1, the "maximum" height and power are 20 kw and 500 feet; 20 kw is also the maximum E.R.P. which may be employed regardless of height). It was urged by some parties that where antenna height is less than the "maximum," more power than the "maximum" be permitted. Zenith and one other party proposed increase in power at lower antenna heights without restriction as long as the "equivalence" maximum is not exceeded. FM Unlimited proposed fixed but relatively high maximum powers under these conditions (5 kw for Class A, 100 kw for Class B, and 500 kw for Class C).

79. Superficially, this idea has some plausibility; but on analysis we conclude that it should not be adopted. First, comparing a given increase in height with a given increase in E.R.P., an increase in height increases service more than it does interference, whereas an increase in power increases interference more than it does service. Therefore, we should obviously encourage improvement in service through greater height rather than greater power, and affording an opportunity for power increase, without limit or at least to a greater extent, would work in the other direction. Second, it must be borne in mind that the propagation curves adopted herein, while they are reasonably satisfactory and appear to be the best available, are not an exact tool. They are merely a prediction on a statistical basis of what will occur. Actual interference may exist, to particular listeners at particular locations, even where under the curves as adopted there would be no "objectionable interference" within the ratios and other provisions of the rules. Since this is so, and bearing in mind the close relationship which the amount of E.R.P. has to interference, we cannot permit an increase in power so as to reach the "equivalence" standard, on the basis of these curves.

80. The second general concept advanced by some of the parties is that the "equivalence" concept should be based not on height above the average of terrain along all eight radials, as it is now, but should be based on height above terrain in particular directions. Earl Cullum suggests that it should be based on the *greatest* antenna height above average terrain (2 to 10 miles) along any radial and that "cutting

back" in power should be required only in those directions where the height above terrain exceeds the "maximum", this to be done by directional antennas. Another party also took note of antenna locations on the side of a mountain range overlooking the principal city, and suggested that the critical radial should be that over the city.

81. These concepts have not been used hitherto either in FM or television, and we conclude that they should not be adopted now. Both approaches present substantial practical problems. In the case of the Cullum suggestion, in order to have any significance at all the showing would presumably have to include not only height along each of the eight radials now used, but, since these in themselves do not necessarily represent the lowest terrain, the application would have to show the terrain in many directions—a very difficult thing to prepare and evaluate. The proposal concerning the radial over the principal city overlooks the fact that this particular radial may not be the crucial one as far as interference to existing stations is concerned. Since the present approach has proved at least reasonably satisfactory, we have concluded to retain it.¹⁹ As to Cullum's suggestion that "cut-back" be required only in directions where antenna height is greater than the "maximum", this would involve the same complications mentioned above.

Terrain factors

82. A number of commenting parties urged—sometimes in opposition to the idea of a Table of Separations, sometimes in connection with equivalence, as discussed above, and sometimes in general—that in any assignment plan we should retain some degree of flexibility to take into account terrain factors, e.g., the fact that an intervening mountain range between two co-channel stations will both limit the service of each and prevent the signal of the other from being as much of an interference factor as it might otherwise be.

83. As mentioned above, it would be possible to take such factors into account in a mileage separation or table of assignment plan. However, after considering this matter we are of the view that they should not be taken into account, for the present, to any extent beyond what they now are, in the calculation of over-all height above average terrain on the basis of the height from 2 to 10 miles along each of eight radials. There is at this time not sufficient data to determine with any degree of precision the effect of intervening terrain upon either desired or undesired signals. It may be true as a general proposition that an intervening mountain range will cut down propagation; but this is not true in all situations. There are gaps in such ranges through which signals may travel; there are reflected signals; and it is even possible, if the geometry of the intervening barrier is favorable, to obtain an obstacle gain over it. Moreover, there is no reasonably simple way by which such factors can be taken into account, in connection with the type of plan adopted here or any other (such as "protected contours"). Measurements we have already concluded

¹⁹ Even in the relatively few cases where computation on the basis of an individual radial would make a substantial difference, the difference would not amount to more than a few miles in the limit to co-channel or adjacent channel stations.

to be out of the question. Occasionally, in television, the showing of more radials, or of longer radials (e.g., 2 to 30 miles) has been suggested, but these ideas have never been accepted because it did not appear that enough would be gained to justify the substantial additional effort involved on all sides. The same appears to be true in the present case. Therefore, the minimum spacings, and heights, powers, and equivalence standards, adopted herein will apply to all types of terrain until such future time as sufficient information is available which will enable us to predict with some precision the effect of terrain on signal strengths.²⁰

X. Directional Antennas and Polarization

Directional antennas

84. In the Notice herein (paragraph 65(b)), we asked for comments concerning use of directional operations in the FM service—what requirements should be adopted, what degree of suppression is feasible, for what purpose should they be permitted (e.g., whether they should be used as an assignment tool), and what form of assignment plan can be adopted to take such installations into account.

85. With respect to the major question involved—the relationship of such installations to station assignment principles—there was sharp division of opinion in the comments. Some parties, such as AFCCE, would employ DA's wherever possible in order to protect existing contours and "squeeze in" assignments. Earl Cullum would use them, where appropriate on a case-to-case basis, to provide low power assignments rendering needed service and protecting high power stations. Other parties (generally those favoring our proposal of mileage separations, such as the NAB) urged that they be permitted where useful in order to avoid wasting service over water, improving service toward cities, etc., but not as an assignment tool—i.e., not for suppressing radiation in a particular direction so as to reduce the required spacing between stations.

86. We are of the view that directional antennas should be permitted, and even encouraged, in the FM service, but only for the purpose of improving service in the ways mentioned, and not as an assignment tool. Therefore, it is our view that they should *not* be used as a device for reducing the co-channel and adjacent channel spacings mentioned above. Not only would such a use obviously be incompatible with the preparations of a table of the assignments, but it would tend to thwart the orderly and efficient development of the medium generally. In our view, directional antennas must be used only on the basis they do not radiate, in any horizontal or zenith direction, more than the maximum power permissible for an omnidirectional opera-

²⁰ One of the parties making this terrain argument (KING) mentions certain particular inter-city separations as being appropriate for this type of treatment—Seattle-Spokane, San Francisco-Reno, and Salt Lake City and Grand Junction to Denver, Colorado Springs and Pueblo. In all cases, the spacings we adopt herein would permit co-channel assignments in these cases.

The matter is also of less significance when it is realized, as one party pointed out, that by and large the areas of the West where this could be a real consideration are those of relatively little need for close assignments, since there are fewer communities.

tion; and stations will not be assigned at substandard spacings simply because, by directionalizing, they "protect" existing stations.

87. Our proposed rules concerning directional antennas are set forth in the Further Notice. Comments thereon are invited. Meanwhile, we are amending the rule concerning the showing required of applicants specifying DA's, to make it conform to the TV rule (§3.685(f)), requiring a showing in both horizontal and vertical planes (see Appendix B, new §3.316(c)). Pending adoption of rules in this area, no application will be accepted where the maximum-to-minimum ratio is more than 15 db.

88. As to the extent of suppression which is feasible, commenting parties favored from 15 db to 20 db maximum-to-minimum ratio. One party suggested 50 to one (power), which is 17 db. Our proposal in this respect, set forth in the Further Notice, is for 15 db, which appears feasible and safe.

Polarization

89. Our present Rules (§3.316) presently provide that horizontal polarization shall be standard, but they also provide for elliptical or circular polarization, with the supplemental vertical component in such cases not to exceed the horizontal E.R.P. of the station. In other words—a point apparently not fully understood—FM stations can now use as much vertical polarization as horizontal, up to the E.R.P. specified in their authorizations. If a station as a Class B station in Area 1 may now radiate a maximum of 20 kw E.R.P., it may radiate 20 kw in both the horizontal and vertical planes if it receives authority for such operation. Thus, any station wishing to provide a vertical component to improve reception by auto whip antennas may do so. Some of the parties urged us to encourage vertical or circular polarization. Others, urging the wider range of horizontal signals which is of benefit to "fringe" area reception, opposed any change in the rules, at least until some measurements have been analyzed and the result indicates justification for a change. We are not persuaded that at present any change in our rules is warranted, and propose none.

90. One party, expressing doubt as to the meaning of the rule in the respect mentioned above, suggested that if the rule means that a power equal to the authorized E.R.P. may be radiated in both planes, wider spacing between spacings might be necessary in order to avoid interference. The rule interpretation mentioned is of course correct (as mentioned above); but, in the absence of further data on this subject and considering the need for making numerous station assignments, we are not disposed to lengthen spacings beyond those set forth herein.

XI. Questions Concerning Existing Stations

91. In the July Notice (paragraphs 55 to 57) we raised questions concerning the relationship between the proposed mileage separation plan and existing facilities. In this connection, the chief questions are the following:

(a) What should be done with respect to existing stations which operate with more than the facilities which will be permitted for new

40 F.C.C.

stations of their zone and class—e.g., stations in Buffalo, Chicago, etc., and stations in California, now operating with facilities greater than 50 kw and 500 feet which will be the maximum for new stations in Zones I and I-A.

(b) Is there an approximate basis upon which existing stations may be permitted to expand their facilities herein with respect to other existing stations.

(c) What should be done with respect to existing stations on Class B and Class C channels which operate with facilities smaller than the new minimum adopted.

92. Commenting parties advanced various ideas in this connection. It was urged, by WBEN, the license of a Buffalo station operating with facilities much greater than the Zone I facilities specified herein) that existing stations should be given the maximum possible degree of protection. It was also urged that existing stations, often deserving of consideration as pioneers in an economically disadvantageous service, should be permitted to go to maximum facilities, on another channel if necessary, and should not be held strictly to a "go-no go" standard as new stations should. The NAB took the position that expansion should be provided for. Some parties urged that expansion of existing facilities be permitted only where it would not worsen interference conditions. It was urged that existing Class B and C stations be required to meet the minimum specified for their class within a year, or move to a lower class.

Existing stations of great height and power

93. Under our present rules, stations are normally protected against objectionable interference out to their 1 mv/m contours, with the location of both that contour and the various co-channel and adjacent channel interference contours being determined by use of Figure 1 of § 3.333 of the rules and the interference ratios mentioned above. (See § § 3.203 (a), 3.204 (a), and 3.313).²¹ As to second and third adjacent channel assignments (400 and 600 kc removed), §3.313(c) provides that stations normally will not be assigned at such separations in the same or nearby cities, but that stations may be authorized in nearby cities on second or third adjacent channels "where necessary in order to promote an equitable and efficient distribution of facilities."

94. As mentioned above, we are herein including in Zone I and I-A, with limitation on new Class B stations to 50 kw and 500 feet, large areas which have hitherto been part of "Area 2" with no absolute restriction on height and power. These areas include Illinois, Indiana, Ohio, western Pennsylvania and New York, a portion of New England, most of Virginia, parts of Michigan and Wisconsin, and most of California. In these areas, numerous stations have in the past been authorized with facilities substantially greater than 50 kw 500 foot maximum adopted here, or its equivalent. In Zone I, assigned to cities such as Chicago and Buffalo, there are 19 commercial stations operating with facilities such that, under the new curves adopted here, their 1 mv/m contours are located further from their transmit-

²¹ As to the significance of § 3.204 (a), see the decision of the Court of Appeals in *American Broadcasting-Paramount Theaters, Inc. v. FCC*, _____ F. 2d _____, 23 Pike & Fischer R.R. 2020 (1962).

ters than the 40 mile protected service radius adopted herein as the basis for assigning Class B stations. These distances range up to 55 miles in the case of a station at Buffalo (operating with 110 kw E.R.P. and height above average terrain of 1,350 feet). In the Zone I-A portion of California there are even more such assignments because of the numerous high elevations, some 35 commercial stations having 1 mv/m contours more than 40 miles from their transmitters. The largest such distance is 77 miles in the case of a station at Santa Barbara (operating with 105 kw and 3,210 feet antenna height). In new Zone II there are three commercial stations operating with facilities so great that their 1 mv/m contours lie further than 65 miles from the transmitter. In all of the new zones, there are other stations which operate with facilities more than the new maxima but less than the stations just referred to.

95. The existence of these stations raises a question as to how they should be treated in relation to the new assignment principles adopted herein.²² On the one hand, it might be argued that they should retain their present great facilities and be protected on that basis, where necessary being afforded, by special separation requirements, protection greater than that afforded generally herein to stations of their class. This would preserve existing service. On the other hand, it might be contended that they should be required to cut back in antenna height and/or power, so as to operate with no more than the maximum adopted herein for their class. This would have the double advantage of permitting more new assignments, in some instances, than would greater protection, and of removing the competitive inequality which exists when a limited number of stations operate with much greater facilities than others.

96. With respect to the extent of protection to be afforded, we conclude that these stations should not be protected to any greater extent than that afforded by the general mileage separations adopted herein. This may result in some derogation of existing service in a few cases, if new assignments are made at or nearly at the minimum spacings adopted; but, as mentioned before, it is not likely that a large proportion of new assignments will be made as such close spacings. If it works out that many new assignments are made at near-minimum distances from existing stations, any resulting loss in service will be more than counterbalanced by the gain in over-all FM service resulting from the new facilities which can thus be provided.²³ We do not

²² If a limit on facilities of educational stations on the 20 reserved channels is adopted, a similar question might arise with respect to six such stations in Zones I and I-A whose 1 mv/m contours lie further than 40 miles from their transmitters. This will be dealt with in the Further Notice to be issued concerning assignment rules for the reserved channels.

²³ As far as possible co- or first adjacent channel interference from new assignments is concerned, the possible effect is less than that indicated by the figures as to number of stations given above. This is because the spacings adopted herein are designed to protect a contour lower than the 1 mv/m contour, particularly in the case of Class B stations. In terms of the possibility of interference within the 1 mv/m contours of these super-maximum stations, it appears that it exists only with respect to 7 commercial stations in Zone I, 26 in Zone I-A, and three in Zone II, and to five educational stations in Zones I and I-A, even if assignments are made at the minimum applicable spacings and the new stations operate with maximum facilities. As to second and third adjacent channel interference, as already mentioned the impact of such interference is substantially less than that from co-channel or first adjacent channel stations. It would be inappropriate for us to extend in these cases any greater degree of protection than already decided on with respect to all stations—simply that the new station must be located outside of the existing station's protected service radius.

conceive it to be in the public interest to perpetuate the advantage enjoyed by these super-maximum stations, if it means a restriction on the provision of needed new facilities and optimum development of this medium. In considering the question of whether these stations should be required to cut back in power or height, we must balance whatever loss of service would be involved against the likely advantages—more service from new assignments, and removal of competitive inequalities. We do not now decide this question. As set forth in the Further Notice herein, comments are invited as to whether the continued existence of these super-maximum facilities tends to thwart the full development of the FM service, and whether, therefore, steps should be taken to require these stations to cut back in power or height.

97. *Channel shifts.* Whether or not a Table of Assignments is to be ultimately adopted herein, applications for changes in channel of existing stations must necessarily be treated as application for new stations. This is obviously required if a Table of Assignments is to be worked out, and is appropriate in any event, since a change in channel represents a new use of a different frequency, requiring consideration of new potential problems and possible uses of the channel. Therefore, the rules adopted herein treat applications for change in the channel of an existing station just like applications for new stations.

98. *Expansion of existing facilities.* For a number of reasons mentioned above, it is desirable for existing stations in some situations to increase their antenna height and/or effective radiated power. It is for this reason that we have increased the maximum for facilities in Zone I to 50 kw E.R.P. The question remains as to whether, considering the large number of stations, especially in Zone I, which are located at separations with respect to other stations less than those provided herein, increases could be permitted for such stations on some appropriate basis. We have concluded that permitting increases in facilities under these circumstances—i.e., changes in height or power which would extend the station's 1 mv/m contour further when it is already "short" to other co-channel or adjacent channel stations—would merely result generally in further deterioration of existing service, and that such increases should not be permitted. Accordingly, the rules adopted herein provide that increases in facilities will be permitted only where the station applying meets the required spacings with respect to other stations.²⁴ However, the new rules provide for increases in height accompanied by decrease in power, or vice versa, where location of the 1 mv/m contour would not lie further from the transmitter than presently.

²⁴ Consideration was given to permitting "across the board" increases, where all stations involved in a chain of short separations apply for equal increases and thus the ratio between signals would not be changed. But this would involve tremendous complications, as we have seen in the past in connection with the AM Class IV increase to 1 kilowatt; and, moreover, would tend to create in some cases an undesirable degree of competitive inequality (for instance, where only one of several stations similarly located could work out such an "across the board" increase). It is doubtful, in any event, how many stations could take advantage of such a system.

99. *Changes in transmitter location.* Changes in transmitter location will not be permitted where the effect would be to shorten the spacing toward any co-channel or adjacent channel station (up to 600 kc removed) below that specified herein.

100. *Wholesale channel shifts and deletions.* Some parties, notably FM Unlimited, Inc., suggested that existing stations should be moved in large numbers, in order to effectuate what is believed to be optimum use of the FM band. FM Unlimited urged that: (1) all Class A stations, and all Class B stations now assigned to the Class A channels, which would be contiguous from Channel 221 to 240; (2) stations on Class B and Class C channels (which would be used in all parts of the country) should be shifted, so that in adjacent metropolitan areas—e.g., New York-Philadelphia, Chicago-Milwaukee, and Los Angeles-San Diego—these stations would operate on channels no less than 400 kc apart; (3) “non-commercial” operations now in the commercial FM band (e.g., WNYC-FM, New York City) should be shifted to the educational band; and (4) where existing stations would not be accommodated in the course of such shifts, “marginal” operations, notably stations existing mostly for the purpose of conducting multiplex operations, should be deleted.

101. We have already dealt with, and rejected, some aspects of this proposal, including the idea of a contiguous band of Class A channels and of shifting “noncommercial” but non-educational operations into the reserved channels. With respect to the remainder, we conclude that the suggestions do not have enough merit to warrant consideration, at least in this proceeding. The proposal to assign Class B and Class C channels to the major cities mentioned on a 400 kc separation basis ignores completely the needs of substantial communities in between which would be reduced largely to Class A channels. With respect to wholesale shifts, this of course would involve a certain amount of confusion to listeners and broadcasters, and there is no reason to believe the result would be worth the effort.

102. *Continued operation with sub-minimum facilities.* As mentioned above, one of the problems with the development of FM, particularly on the channels designed for higher power operations, is the existence thereon of stations operating with very small facilities. This raises the question of what should be done about existing stations operating with less than the minimum herein specified for new stations of a particular class—a question especially pertinent since we are adopting as a basis of assignments a mileage separation table based on maximum facilities for both existing and proposed stations.

103. For the present, we have decided to leave this matter without taking any action to require existing stations to increase facilities. First, particularly as to Zone I, it is not clear how many stations can increase their height and/or power substantially, under our mileage separation rules adopted herein. It would not be appropriate to adopt for existing stations a rule which a number of them could not comply with. Second, where increases are possible, consistent with the rules adopted herein, we believe stations so situated can be expected to take steps to improve their facilities voluntarily—especially since they will

be faced with the existence of substantial co-channel and adjacent channel operations, and will suffer substantial interference from them if they continue to operate with small height and power. We will continue to study this situation, and if it appears that a large number of such stations, which could increase facilities, do not do so, then we will consider the possibility of show cause proceedings looking toward either an increase in facilities or shift to a Class A channel if one is available.

XII. Pending and Subsequently Filed Applications

104. Adoption of the assignment plan decided upon herein raises the question of how pending applications, and those to be filed later, shall be treated during the continuance of this proceeding and work on a Table of Assignments. It is obvious that work on a Table cannot proceed satisfactorily while at the same time we continue to grant applications for facilities which (though they meet our "interim" processing criteria) do not meet the spacings on which the Table must be based. The same principle applies even if a Table is not finally adopted, since we would be making grants in violation of the spacings which we have concluded to be most appropriate for the optimum development of this service. Therefore, we have decided upon the following procedures as appropriate pending final adoption of a Table or other resolution of this proceeding.

(a) Pending applications for new stations, channel changes, or increased facilities will be acted on, and new applications will be accepted for filing, *only* if they meet the spacings set forth herein with respect to co-channel and adjacent channel stations (up to 600 kc removed),²⁵ as well as the other requirements of the rules, e.g. as to maximum and minimum facilities.

Where applications have been or are accepted for filing but cannot be granted because of conflict with the mileage separation rules, they will be held pending until decision as to a Table of Assignments (e.g., where two applications meet all mileage separations with respect to existing stations, but would be at short spacings with respect to each other, and therefore both cannot be granted). Applications on file not meeting the spacings with respect to existing stations may be amended, notwithstanding any other provision of the rules. Applications not meeting the spacings, and not amended by the time this proceeding is terminated, will then be dismissed.

(b) With respect to pending applications for new stations which do not meet the spacings, in the preparation of the Table of Assignments every great effort consistent with the public interest will be made to find an assignment for such applicants—particularly where their applications were filed before we announced our interim "freeze" procedure in December, and especially the approximately 30 which were on file before July 5, 1961, when we initiated the present over-all consideration of a new FM assignment system (some of

²⁵ The spacings to be complied with are, of course, those with respect to the actual transmitter sites of existing stations.

these are in hearing; where applications are mutually exclusive of course provision will be made for only one assignment, unless the general priorities adopted for preparation of the Table indicate that more assignments are warranted). Efforts will also be made to find assignments (on the same or another channel) to take care of applications filed from now on, during the pendency of this proceeding (subject to the conditions as to acceptance mentioned above).

(c) Pending the adoption of rules concerning directional antennas (see the Further Notice of Proposed Rule Making herein), no application will be acted on or accepted where the proposed maximum-to-minimum ratio exceeds 15 db.

XIII. Relationship With Canadian FM Assignments

105. One of the reasons why a Table of Assignments for U.S. FM stations is desirable is that Canada has clearly indicated that it intends to promulgate a Table for use in its own assignments, and a U.S. Table would make it easier for assignments near the border on both sides to be worked out.

106. The final basis of assignment and protection standards between U.S. and Canadian FM stations has yet to be worked out in future conferences. Persons contemplating filing applications for U.S. FM stations before the final resolution of this proceeding, for places within 250 miles of the Canadian border, should bear in mind possible Canadian problems.

XIV. Other Matters

Assignment on the basis of programming; duplication

107. In the earlier Notice, we raised the question of whether "duplication" by FM stations of the programming of their AM affiliates is in the public interest and should be permitted to continue, or should be limited, if not prohibited entirely. There were numerous comments on this point, sharply divided. We do not here decide this matter. We have this question under consideration, and a Notice of Proposed Rule Making on this subject may be issued shortly.

108. Related to this is the argument, urged by some parties, that *FM assignments should be made on the basis of programming*—e.g., that Class A, Class B, or Class C assignments should be made on the basis of a showing by the applicant as to how he will make use of the assignment sought to serve the public—a matter of particular importance with Class C stations, designed to serve wide areas. FM Unlimited's suggestion that "marginal" stations should be deleted has also been noted; that party also suggested shifts in station channel and classification on the basis of the program service rendered.

109. These arguments have some merit, and are being seriously considered. However, we believe it is not presently appropriate here—in connection with a proceeding which is basically technical in nature—to enter into the complex area of the interrelationship between the basic assignment process and programming. As mentioned, we are considering matters of this sort, and it is possible that some

proposal in this area will be forthcoming. Meanwhile, there are other, existing ways by which this matter can be approached, for example, filing an application in competition with renewal, where a party believes the licensee has not adequately programmed in the light of the type of assignment he holds.

110. We believe it likely, however, that the over-all development of the FM service would benefit from one change in the assignment rules which might involve non-technical considerations; and accordingly, it is proposed in the Further Notice adopted herein. This is a rule providing that, if a Table of Assignments is adopted for FM, and a construction permit or license is later voluntarily relinquished by the holder thereof (or is taken away in a revocation or renewal proceeding), *the channel will automatically cease to be assigned to the community specified in the Table and in the permit or license*, and the Commission will give notice thereof and institute rule making as to where the channel may be best assigned. In other words, to the extent channels cease to be used and become available, their use so as to best serve the public interest should automatically come into question. This may be of considerable significance, for example, if we should decide that extensive AM-FM duplication is not in the public interest, in which case perhaps a number of AM-FM licensees engaged in total or near-total duplication would surrender their authorizations.

Operator rules and monitors

111. In the 1961 Notice we asked for comments on non-allocation matters such as operator rules and monitors. There were comments in both areas. These matters are being handled by consideration separate from this proceeding, and action in these areas will be taken shortly.

Miscellaneous suggestions and arguments

112. One party asked us to take steps to regulate the quality of phonograph cartridges and tapes used in FM stations, so as to insure real "high fidelity". This is a difficult area, involving technical and policy considerations. Our principal concern in the technical regulation of broadcast stations has been in the radiated signal and its possible effects on other users of the radio spectrum, and our rules and standards have been directed toward providing the best possible broadcast service by prescribing standards for the transmitting equipment. In the case of the aural broadcast services, this equipment is considered to extend from the input microphone to the transmitting antenna. We have not prescribed general standards of quality for studio equipment or program sources. It would be difficult, if not impossible, to write detailed rules covering every piece of studio equipment, recordings, etc., and we do not believe it appropriate to attempt it. However, it is the licensee's responsibility to maintain a technically sound operation in these respects as in others. We have found that, with respect to technical quality, broadcasters generally have attempted to provide the best consistent with the economics of the market and the state of the art. In the past we have in appro-

priate cases called the attention of licensees to listener complaints regarding defective studio equipment, and we will continue this practice.

113. Some other suggestions made by the commenting parties deserve brief comment. One was that the class designation of FM stations—"A" and "B"—should be reversed, on the ground that usually "Class A" like "Grade A," signifies a preferable things as compared to "Class B" or "Grade B," and that time-buyers are misled in this respect. Were we starting from scratch, this might have some merit. But, at this point, we believe reversing the classification designations would cause more confusion than it could be worth. It might also tend to imply an invidious distinction against "community" stations which is not warranted. We do not believe the situation generally is as serious as this party (a Class B licensee) asserts, or that we would be warranted in taking this action.

114. The same party also protested against the "inequality" caused in his area by the fact that he, as an Area 1 Class B station, must compete with more powerful Area 2 stations located fairly close by and penetrating his market. This kind of "inequality" of course will exist wherever there are two zones, between stations close to the line between them; and, indeed, a certain amount of inequality is inevitable unless *all* stations are to operate with approximately the same facilities. We do not believe that from the standpoint of the over-all public interest this is a serious problem, and, in any event, to the extent it is, the "inequality" is outweighed by the desirability of having different zones to reflect different population and assignment conditions.²⁶

115. One party urged that the interference burden on Class B stations in the same market from Class A stations—which is said to affect some more than others by virtue of their position in the band with respect to the Class A channels—should be equalized by reassigning the "A" stations in a given market at strict 1600 kc intervals, which assertedly would result in each Class B station having one, but only one, Class A adjacent channel interference problem. There is no specific data given as to how this would work and obviously it would cut down the availability of Class A assignments. Therefore, and also because of the undesirability of shifting existing stations mentioned above, we must reject this suggestion.

116. Two other suggestions relate to assignments. One, from a Richmond, Va., Class B station, is that a "Class C" station in that city—the state capital—should have a 100 mile protected service radius. In this respect we must adhere to our earlier judgment, that only Class B stations should be assigned in Zone I; the public interest will be better served by the more numerous assignments thus made possible. On the other hand, a Palo Alto, Calif., Class A station, which has a pending application for a Class B assignment which would cause objectionable interference to two adjacent channel San Fran-

²⁶ The particular area involved in this comment (Scranton-Wilkes-Barre in Area 1, and Williamsport in Area 2), will be of course now entirely within Zone I. Whether this will enable the Scranton-Wilkes-Barre station to improve its competitive position does not appear, but we have provided for an increase in the Zone I maximum.

cisco stations, argues against any restrictions whatsoever (asserting the need for an increase in its power in order to provide for stereo operation). We have at length herein discussed why more protection, and a more orderly development of the FM service, is desirable, and therefore this contention must be rejected.²⁷

117. Intercollegiate Broadcasting System, Inc. (an organization of "campus" radio stations) urged that, if we do not adopt its proposal for commercial but "non-profit" operation in the educational band, we permit such operation by 10 watt stations to be assigned on the 20 Class A commercial channels. This suggestion must be rejected, because such use of the Class A channels—on which numerous assignments must be made to accommodate the needs of smaller communities—is completely inconsistent with efficient use of these channels.

118. In the July Notice, we proposed to adopt for the purpose of dealing with multiple ownership situations, a rule that commonly owned stations would not be authorized where there would be overlap of the 2 mv/m contours. This matter is not dealt with herein, being currently the subject of a rule-making proceeding regarding overlap generally.

119. A number of parties urged that before adopting rules in the FM station assignment area, we should put out a further notice of rule making, with more specific proposals. In light of our decision herein—which is for the most part along the lines indicated in the July Notice and the appendix thereto—we are of the view that except to the extent mentioned above and reflected in the Further Notice below, further rule making is unnecessary and would not be in the public interest. Interested parties have had ample opportunity to comment on many aspects of FM allocations, including specific proposals of the sort adopted herein. Further opportunity, which would involve necessarily considerable time, need not and should not be afforded except in the respects mentioned. The time has come when the future course of the FM service and FM station assignments must be determined.

XV. Conclusions and Order

120. For reasons set forth above, we have decided upon certain changes in the rules relating to the FM broadcast service, which are adopted herewith. In certain respects—the procedure relating to acceptance and action on applications pending the final resolution of this proceeding, and the showing to be required in applications specifying directional antennas—these are procedural, and therefore no notice of proposed rule making is required, under the provisions of Section 4 of the Administrative Procedure Act. In any event, the public interest clearly requires that these actions be taken. Clearly, it would be inappropriate to accept or grant applications conflicting with the mileage separations as to existing stations or other standards adopted herein. If work on a Table of Assignments is to proceed in an orderly fashion, any grant must be subject to a change in channel

²⁷ It may be that the increase in maximum Class A power adopted herein will solve these problems without change in channel.

if more over-all assignment efficiency would result. As to the directional antenna requirements, it would be inappropriate to grant applications likely conflicting with a standard which may be adopted, or to accept applications not even complying with the most lenient standard under consideration. In order to avoid a flood of non-complying applications, it is necessary to make the Procedural rule concerning processing (§1.356) effective as quickly as possible.

121. In view of the foregoing, and pursuant to authority contained in Sections 4(i) and 303(r) of the Communications Act of 1934, as amended, *It is ordered*, That, effective August 8, 1962, Section 1.356 of the Commission's Rules *Is amended* as set forth in Appendix A hereto; and

122. *It is further ordered*, That, effective September 10, 1962, the provisions of Subparts B and C of Part 3 of the Commission's Rules *Are amended* as set forth in Appendix B hereto.

FEDERAL COMMUNICATIONS COMMISSION,
BEN F. WAPLE, *Acting Secretary*.

STATEMENT OF COMMISSIONER FREDERICK W. FORD IN WHICH
CHAIRMAN MINOW CONCURS

I am in agreement with the Report and Order, but I would not favor the issuance of it or the Further Notice of Proposed Rulemaking at this time. I would delay the issuance of the Report and Order until a tentative allocation table could be prepared and included in the Notice of Proposed Rulemaking which should be released simultaneously with the Report and Order.

APPENDIX A

Effective August 8, 1962, paragraph (c) of § 1.356, and the Note following that section, are amended to read as follows:

§ 1.356 PROCESSING OF FM AND NONCOMMERCIAL EDUCATIONAL FM BROADCAST APPLICATIONS.

* * * * *

(c) Except as provided in the Note to this section, if, upon examination, the Commission finds that the public interest, convenience and necessity will be served by the granting of an application for FM broadcast facilities (Class A, Class B, Class C or noncommercial educational), the same will be granted. If, on the other hand, the Commission is unable to make such a finding and it appears that a hearing may be required, the procedure set forth in § 1.362 will be followed.

NOTE.—During further consideration of the matters and issues in Docket No. 14185 (pertaining to the revision of the FM broadcast rules), applications for FM broadcast authorizations (on both commercial and noncommercial educational channels, whether in or out of hearing status, and regardless of the date they were or may be tendered for filing) will be subject to the following procedures, notwithstanding any provision of the FM broadcast rules or of this section to the contrary:

(a) *Maximum and minimum facilities.* No application for construction permit for a new station, change in channel, or increase in facilities on the same channel will be granted, and after August 8, 1962, no such application will be accepted for filing, unless the facilities of the proposed station meet the maximum and minimum requirements for facilities for stations of its class set forth in § 3.204, § 3.209, or § 3.504 of this chapter, as amended July 25, 1962, effective September 10, 1962: *Provided, however*, That, no provisions as to minimum

facilities apply to noncommercial educational stations operating on the channels specified in § 3.501 of this chapter, or to grant or acceptance of applications by any existing station for increase in facilities on its present channel; and no provisions as to maximum facilities apply to noncommercial educational stations on channels 201 to 217, inclusive, set forth in § 3.501 of this chapter.

(b) *Directional antennas.* No application for construction permit for a new station, change in channel, or existing facilities on the same channel will be granted, and after August 8, 1962, no such application will be accepted for filing, where it proposes a directional antenna with a maximum-to-minimum ratio of more than 15 db.

(c) *Minimum mileage separations.* The minimum mileage separations set forth in § 3.205 of this chapter (as amended July 25, 1962, effective September 10, 1962) apply to all applications for construction permits for new stations, changes in channel, or increases in facilities, on FM channels 221 through 300 listed in § 3.201 of this chapter, as follows:

(1) No application will be accepted for filing after August 8, 1962, unless the proposed station is located so as to meet said separations with respect to all co-channel and adjacent-channel (up to 600 kc/s removed) stations authorized as of August 8, 1962;

(2) No application (regardless of when filed) will be granted unless the proposed station is located so as to meet said separations with respect to all co-channel and adjacent-channel (up to 600 kc/s removed) stations authorized or proposed in other now pending or subsequently accepted applications.

(3) Applications on file or later accepted, which cannot be granted pursuant to the provisions of paragraphs (a), (b), or (c) of this note (e.g., applications involving short separations only with facilities proposed in other pending applications), will be held pending.

(d) *Consideration pending decision as to an FM Table of Assignments.* Pending decision as to the matter of adopting a Table of Assignments for the 80 FM commercial channels, and preparing and promulgating such a Table if it is concluded to be in the public interest, applications which are now on file or are later accepted, but which cannot be granted under the provisions of paragraphs (a), (b), or (c) of this note will be held pending. In the preparation of a Table, effort will be made to find assignments to accommodate such applications, on the same or other channels (except where they are clearly mutually exclusive with each other, such as two applications for the same channel in the same small community, in which only one FM assignment would be warranted under general assignment principles). Particular effort will be made to find assignments to take care of requests in applications on file as of the date of the adoption of this note (July 25, 1962) and especially, those applications filed before July 5, 1961 (the date of release of the document instituting the over-all FM allocation proceeding). If and when a Table is adopted, applications inconsistent therewith (as then on file, taking into account amendments, if any) or otherwise inconsistent with the provisions of subpart B of Part 3 of this chapter will then be dismissed. If it is decided not to adopt a Table, consideration will be given as to how to treat applications then on file which involve no conflicts with existing stations but only with other pending applications.

(e) *Amendment of applications.* Notwithstanding any other provision of this part, any application for FM broadcast facilities may be amended, at any time pending final disposition of Docket No. 14185, with respect to channel, height, power, or transmitter location, so as to bring it into compliance with the rules adopted in Part 3 of this chapter on July 25, 1962 (effective September 10, 1962), or a tentative Table of Assignments when proposed.

(f) *Applications for changes in transmitter sites.* Applications for changes in the transmitter sites of existing stations operating on channels 221 through 300 specified in § 3.201 of this chapter will not be granted, and after August 8, 1962, will not be accepted for filing, where grant thereof would shorten the mileage separation between the applicant station and other co-channel or adjacent-channel stations, and the resulting spacing would be less than that specified in § 3.205 of this chapter (as amended July 25, 1962, effective September 10, 1962).

(g) *Noncommercial educational stations.* With respect to grant and (after August 8, 1962) acceptance of applications for construction permits for new

or changed facilities on the channels reserved in § 3.501 of this chapter for educational use, the following restrictions will apply in addition to those specified in paragraph (b) of this Note):

(1) Applications for facilities on channels 218, 219, and 220 must meet the following criteria:

(i) The facilities requested must not exceed the maximum facilities specified in § 3.209 of this chapter (as amended July 25, 1962, effective September 10, 1962) for Class B or Class C commercial stations, depending on the zone in which the requested facilities would be located.

(ii) The requested facilities must be located, with respect to existing adjacent-channel stations on channels 221, 222, and 223, at no less than the minimum mileage separations specified for stations of their class in §§ 3.205 and 3.504 of this chapter (as amended July 25, 1962, effective September 10, 1962).

(iii) Where the application is for change in transmitter site, the move must not shorten the separation between the station and other co-channel and adjacent-channel stations, if the result would be a spacing less than that specified in § 3.205 of this chapter (as amended July 25, 1962, effective September 10, 1962).

(2) No application for facilities on any channel specified in § 3.501 of this chapter will be granted (or accepted after August 8, 1962) if the facilities requested would cause objectionable interference within the 1 mv/m contour of any co-channel or adjacent-channel station. The following standards shall be used to determine the existence of objectionable interference:

(i) The distance to the 1 mv/m contour shall be determined by use of Figure 1 of § 3.333 of this chapter (as amended July 25, 1962, effective September 10, 1962).

(ii) The distance to the applicable interference contour shall be determined by the F(50,10) curve published with the Commission's Order, FCC 61-1447, adopted December 6, 1961, setting forth the interim procedure for processing FM applications and amending § 1.356.

(iii) Objectionable interference will be considered to exist where, on the basis of the curves referred to in this subparagraph, the undesired signal of a co-channel signal exceeds one-tenth of the desired signal, the undesired signal of a station 200 kc/s removed exceeds one-half of the desired signal, the undesired signal of a station 400 kc/s removed exceeds 10 times the desired signal, or the undesired signal of a station 600 kc/s removed exceeds 100 times the desired signal.

APPENDIX B

Effective September 10, 1962, subparts B and C of Part 3 of the Rules are amended as set forth below.

1. In "Classification of FM Broadcast Stations and Allocation of Frequencies," §§ 3.202-3.205 are deleted, and new §§ 3.202-3.210 are added, as follows:

§ 3.202 INTERNATIONAL AGREEMENTS AND OTHER RESTRICTIONS ON USE OF CHANNELS.

(a) Authorizations issued by the Commission for FM broadcast facilities will be subject to the provisions of any agreements entered into by the United States with Canada concerning FM assignments and authorizations. The Commission may decide after consultation with Canada that an application should not be granted; or if, pursuant to an agreement providing for timely objection after grant, Canada files such objection, the Commission may on its own motion set aside the grant pending consideration. The Commission will give notice of the filing of such objections.

(b) The frequency 89.1 Mc/s (channel 206) is reserved in the New York City metropolitan area for the use of the United Nations with the equivalent of an antenna height of 500 feet above average terrain and effective radiated power of 20 kilowatts, and the Commission will make no assignments which would cause objectionable interference with such use.

(c) In Alaska, the frequency band 88-100 Mc/s is allocated exclusively to Government radio services and the non-Government fixed service. The frequencies 88.1 through 99.9 Mc/s (channels 201 through 260) will not be assigned in Alaska for use by FM broadcast stations.

(d) In Hawaii, the frequency band 98-108 Mc/s is allocated for non-broadcast use. The frequencies 98.1 through 107.9 Mc/s (channels 251 through 300) will not be assigned in Hawaii for use by FM broadcast stations.

§ 3.203 ZONES.

For the purpose of allocation and assignment, the United States is divided into three zones as follows:

(a) Zone 1 consists of that portion of the United States located within the confines of the following lines drawn on the United States Albers Equal Area Projection Map (based on standard parallels $29\frac{1}{2}^{\circ}$ and $45\frac{1}{2}^{\circ}$; North American datum): Beginning at the most easterly point on the State boundary line between North Carolina and Virginia; thence in a straight line to a point on the Virginia, West Virginia boundary line located at North latitude $37^{\circ} 49'$ and West Longitude $80^{\circ} 12' 30''$; thence westerly along the southern boundary lines of the States of West Virginia, Ohio, Indiana, and Illinois to a point at the junction of the Illinois, Kentucky, and Missouri State boundary lines; thence northerly along the western boundary line of the State of Illinois to a point at the junction of the Illinois, Iowa, and Wisconsin State boundary lines; thence easterly along the northern State boundary line of Illinois to the 90th meridian; thence north along this meridian to the 43.5° parallel; thence east along this parallel to the 71st meridian; thence in a straight line to the intersection of the 69th meridian and the 45th parallel; thence east along the 45th parallel to the Atlantic Ocean. When any of the above lines pass through a city, the city shall be considered to be located in Zone I. (See Figure 1 of § 3.699.)

(b) Zone IA consists of that portion of the State of California which is located south of the 40th parallel.

(c) Zone II consists of Alaska, Hawaii, Puerto Rico, the Virgin Islands, and the rest of the United States which is not located in either Zone I or Zone IA.

§ 3.204 CLASSES OF COMMERCIAL CHANNELS, AND STATIONS OPERATING THEREON.

(a) *Class A channels and stations.*

(1) Except as provided in § 3.202, the following frequencies are designated as Class A channels and are assigned for use, in all zones, by Class A stations only:

Frequency (Mc)	Channel No.	Frequency (Mc)	Channel No.
92.1	221	100.1	261
92.7	224	100.9	265
93.5	228	101.7	269
94.3	232	102.3	272
95.3	237	103.1	276
95.9	240	103.9	280
96.7	244	104.9	285
97.7	249	105.5	288
98.3	252	106.3	292
99.3	257	107.1	296

(2) A Class A station is a station which operates on a Class A channel, and is designed to render service to a relatively small community, city, or town, and the surrounding rural area.

(3) A Class A station will not be authorized to operate with effective radiated power greater than 3 kilowatts (4.8 dbk), and the coverage of a Class A station shall not exceed that obtained from 3 kilowatts effective radiated power and antenna height above average terrain of 300 feet. For provisions concerning minimum facilities, and concerning reduction in power where antenna height above average terrain exceeds 300 feet, see § 3.209.

(b) *Class B-C channels and Class B and Class C stations.*

(1) Except for the channels specified in paragraph (a)(1) of this section, all of the channels listed in § 3.201 from 222 through 300 (92.3 through 107.9 Mc/s) are classified as Class B-C channels, and (subject to the restrictions set forth in § 3.202) are assigned for use in Zones I and I-A by Class B stations only, and for use in Zone II by Class C stations only (there are no Class C stations in Zones I or I-A and no Class B stations in Zone II).

(2) A Class B station is a station which operates on a Class B-C channel in Zone I or Zone I-A, and is designed to render service to a sizable community, city, or town, or to the principal city or cities of an urbanized area, and to the surrounding area.

(3) With respect to Class B stations authorized after September 10, 1962, no such station will be authorized with effective radiated power greater than 50 kilowatts (17 dbk), and the coverage of a Class B station authorized after that date shall not exceed that obtained from 50 kilowatts effective radiated power and 500 feet antenna height above average terrain. For provisions concerning minimum power, and concerning reduction in power where antenna height above average terrain exceeds 500 feet, see § 3.209.

(4) A Class C station is a station which operates on a Class B-C channel in Zone II, and is designed to render service to a community, city, or town, and large surrounding area.

(5) With respect to Class C stations authorized after September 10, 1962, no such station will be authorized with effective radiated power greater than 100 kilowatts (20 dbk), and the coverage of a Class C station authorized after that date shall not exceed that obtained from 100 kilowatts effective radiated power and antenna height above average terrain of 2,000 feet. For provisions concerning minimum power, and reduction in power where antenna height above average terrain exceeds 2,000 feet, see § 3.209.

§ 3.205 MINIMUM MILEAGE SEPARATIONS BETWEEN CO-CHANNEL AND ADJACENT-CHANNEL STATIONS ON COMMERCIAL CHANNELS.

(a) No application for a new station, change in the channel of an existing station, or (except as provided in paragraph (b) of this section) increase in antenna height or effective radiated power, or change in location of an existing station, will be granted unless the proposed facilities will be located at least as far from the transmitter sites of other co-channel and adjacent-channel stations (both existing and proposed) as the distances specified in this paragraph. Proposed stations of the respective classes shown in the left-hand column of the following table shall be located no less than the distance shown from co-channel stations and first adjacent-channel stations (200 kc removed) and second and third adjacent-channel stations (400 and 600 kc removed) of the classes shown in the remaining columns of the table. The distances shown between stations of different classes apply regardless of which is the proposed station under consideration (e.g., distances shown from a new Class A station to an existing Class C station are also the distances between a new Class C and an existing Class A station). The distances between Class B and Class C stations apply only across zone lines. The adjacent-channel spacings listed also apply: (1) to applications for noncommercial educational facilities on Channels 218, 219, or 220, with respect to other stations on Channels 221, 222, or 223; (2) to applications for facilities on Channels 221, 222, or 223 with respect to noncommercial educational stations on Channels 218, 219, or 220 (for classification of noncommercial educational stations, see § 3.504).

Class of station and frequency separation (kc/s)

Class of Sta.	Class A				Class B				Class C				10-watt educational				
	Co-Ch.	200	400	600	Co-Ch.	200	400	600	Co-Ch.	200	400	600	Co-Ch.	200	400	600	
Class A.....	65	40	15	15	---	65	40	40	---	105	65	65	---	30	15	15	
Class B.....	---	---	---	---	150	105	40	40	---	170	135	65	65	---	---	40	40
Class C.....	---	---	---	---	---	---	---	---	---	180	150	65	65	---	---	65	65
10-watt educational.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

NOTE.—Intermediate frequency amplifiers of most FM broadcast receivers are designed to operate on 10.7 megacycles. For this reason the assignment of two stations in the same area, one with a frequency of 10.6 or 10.8 megacycles removed from that of the other, will be avoided if possible.

(b) Where an existing station is located less than the minimum distances specified in paragraph (a) of this section with respect to co-channel or adjacent-channel stations:

(1) It may apply for increases in antenna height, or in effective radiated power up to the maximum specified in § 3.204 for its class, if the application for increase is accompanied by a request to decrease power or antenna height so that the station's 1 mv/m contour (located pursuant to Figure 1 of § 3.333) will be no further from the station's transmitter than with its present facilities.

(2) It may apply for permission to move transmitter site, but this will not be granted if it would increase the amount by which the station is located at sub-standard separation.

(c) The zone in which the transmitter of an FM station is located or proposed to be located determines the applicable rules with respect to minimum required spacings.

§3.206 REFERENCE POINTS AND DISTANCE COMPUTATIONS.

(a) Station separations in licensing proceedings shall be determined by the distance between the coordinates of the proposed transmitter site in one community and the coordinates of an authorized site for the pertinent channel in the other community.

(b) The distance between reference points is considered to be the length of the hypotenuse of a right triangle, one side which is the difference in latitude of the reference points and the other side the difference in longitude of the two reference points, and shall be computed by the method set forth in this paragraph. (This method is appropriate for determining distances up to 220 miles, and for such distance will normally be more accurate than using spherical trigonometry without correction for the spheroidal shape of the earth. However, its accuracy deteriorates rapidly at distances beyond 300 miles and this method should not be used to compute greater distances.)

(1) Determine the difference in latitude and the difference in longitude between the two reference points. Convert these two differences into degrees and decimal parts of a degree in accordance with Table I of § 3.698.

(2) Determine the middle latitude of the two reference points to the nearest second of latitude (average the latitudes of the two points).

(3) Multiply the difference in latitude by the number of miles per degree of latitude difference obtained from Table II of § 3.698 for the appropriate middle latitude (interpolate linearly). This determines the north-south distance in statute miles (L_n).

NOTE.—In determining necessary distance computations for Alaska, Hawaii, and the Territories, the appropriate mileage per degree may be obtained by linear interpolation of the data given on pages 1246 and 1247 of the tables in publication H. O. No. 9 (Bowditch-American Practical Navigator—1958 Edition) of the U.S. Navy Department, Hydrographic Office. This publication may be purchased from the Government Printing Office, Washington 25, D.C.

(4) Multiply the difference in longitude by the number of miles per degree of longitude difference obtained from Table III of § 3.698, for the appropriate middle latitude (interpolate linearly). This determines the east-west distance in statute miles (L_e).

(5) Determine the distance between the two reference points by the square root of the sum of the squares of the distances obtained in subparagraphs (3) and (4) of this paragraph, using sufficient decimal figures to determine the distance to the nearest mile; i.e.,

$$D = (L_n^2 + L_e^2)^{1/2}$$

where:

D=Distance in statute miles.

L_n =North-South distance in statute miles.

L_e =North-South distance in statute miles.

§ 3.207 PROJECTION FROM INTERFERENCE

(a) Permittees and licensees of FM broadcast stations are not protected from any interference which may be caused by the grant of a new station, or of authority to modify the facilities of an existing station, in accordance with the provisions of this subpart.

(b) The nature and extent of the protection from interference accorded to FM broadcast stations is limited solely to the protection which results from the minimum assignment and station separation requirements and the rules with respect to maximum powers and antenna heights set forth in this subpart.

§ 3.208 STATION LOCATION AND PROGRAM ORIGINATION.

(a) (1) Except as provided in paragraph (b) of this section, each FM broadcast station will be licensed to serve primarily a particular city, town, political subdivision, or community which will be specified in the station license and the station will be considered to be located in such place.

(2) Each station shall maintain a studio, which will be known as the main studio, in the place where the station is located: *Provided*, That the main studio may be located at the transmitter site whether or not the transmitter site is in the place where the station is located.

(3) A majority (computed on the basis of duration and not number) of a station's programs or, in the case of a station affiliated with a network, two-thirds of such station's non-network programs, whichever is smaller, shall originate from the main studio or from other studios or remote points situated in the place where the station is located.

(b) (1) Stations will be licensed to serve more than one city, town, political subdivision, or community only where a satisfactory showing is made that each such place meets all the requirements of this subpart with respect to the location of main studios; that the station can and will originate a substantial number of local live programs from each such place; and that the requirements as to origination of programs contained in paragraph (a) of this section would place an unreasonable burden on the station if it were licensed to serve only one city, town, political subdivision, or community.

(2) A station licensed to serve more than one place shall be considered to be located in and shall maintain main studios in each such place.

(3) With respect to such station, the requirements in paragraph (a) of this section as to origination of programs shall be satisfied by the origination of programs from any or all of the main studios, other studios, or remote points situated in any or all of the places in which the main studios are located.

(c) The transmitter of each FM broadcast station shall be so located that, on the basis of the effective radiated power and antenna height above average terrain employed, a minimum field strength of 70 decibels above one microvolt per meter, or 3.16 millivolts per meter, will be provided over the entire principal community to be served.

§ 3.209 POWER AND ANTENNA HEIGHT REQUIREMENTS.

(a) *Minimum requirements.*

(1) Except as provided in paragraph (b) (2) of this section, the minimum effective radiated power shall be, for stations of the respective classes, as follows:

Class A.....	100 watts (-10 dbk).
Class B.....	5 kw (7 dbk).
Class C.....	10 kw (10 dbk).

(2) No minimum antenna height average terrain is specified.

(b) *Maximum power and antenna height.*

(1) The maximum effective radiated power in any direction, and maximum antenna height for equivalence purposes, shall be as follows for the various classes of stations:

	Maximum power	Maximum antenna height (feet above average terrain)
Class A.....	3 kw (4.8 dbk).....	300
Class B.....	50 kw (17.0 dbk).....	500
Class C.....	100 kw (20.0 dbk).....	2,000

(2) Antenna heights may be used exceeding those specified in this paragraph for equivalence purposes, provided effective radiated power is reduced in the amount less than the normal minimum specified in paragraph (a) (1) of this section. Where, under Figure 3 of § 3.333, effective radiated power must be reduced to an amount less than the normal minimum specified in paragraph (a) (1) of this section for the class of station involved, the effective radiated power determined by Figure 3 of § 3.333 shall be the minimum for the station involved.

(c) *Determination of applicable rules.* The zone in which the transmitter of an FM station is located or proposed to be located determines the applicable rules with respect to the class of station, and thus the minimum and maximum requirements as to facilities.

(d) *Existing stations.* Pending resolution of the issues in Docket No. 14185, stations authorized as of September 10, 1962, which do not conform to the requirements of this section, may continue to operate as authorized; but any application to change facilities will be subject to the provisions of this section, except that the minimum power specified in paragraph (a) of this section shall not apply to an application to increase facilities.

§ 3.210 ADMINISTRATIVE CHANGES IN AUTHORIZATIONS.

(a) In the issuance of FM broadcast station authorizations, the Commission will specify the transmitter output power and effective radiated power in accordance with the following tabulation:

Power (watts or kw) :	<i>Rounded out to nearest figure (watts or kw)</i>
1 to 3.....	.05
3 to 10.....	.1
10 to 30.....	.5
30 to 100.....	1
100 to 300.....	5
300 to 1,000.....	10

(b) Antenna height above average terrain will be specified in accordance with the following tabulation:

Antenna height above average terrain :	<i>Rounded out to nearest figures (feet)</i>
0 to 100.....	1
100 to 300.....	5
over 300.....	10

§ 3.251 [Deletion]

2. In "Equipment," § 3.251 is deleted.

3. In "Technical Operation," § 3.267(a) (3) is amended to read as follows:

§ 3.267 OPERATING POWER; DETERMINATION AND MAINTENANCE OF.

(a) * * *

(3) The efficiency factor, F, shall be established by the transmitter manufacturer for each type of transmitter for which he submits data to the Commission, over the entire operating range of powers for which the transmitter is designed, and shall be shown in the instruction books supplied to the customer with each transmitter. In the case of composite equipment, the factor F shall be furnished to the Commission with a statement of the basis used in determining such factor.

§ 3.272 [Deletion]

3a. In "Technical Operation," § 3.272 is deleted.

§ 3.301 [Deletion]

4. In "FM Technical Standards," § 3.301 is deleted.

5. In "FM Technical Standards," §§ 3.310 and 3.311 are amended to read as follows:

§ 3.310 DEFINITIONS.

(a) *Frequency modulation.*

Antenna height above average terrain. The average of the antenna heights above the terrain from 2 to 10 miles from the antenna for the eight directions spaced evenly for each 45 degrees of azimuth starting with True North. (In general, a different antenna height will be determined in each direction from the antenna. The average of these various heights is considered the antenna height above the average terrain. In some cases less than 8 directions may be used. See § 3.313(d).) Where circular or elliptical polarization is employed, the antenna height above average terrain shall be based upon the height of the radiation center of the antenna which transmits the horizontal component of radiation.

Antenna power gain. The square of the ratio of the root-mean-square free space field strength produced at one mile in the horizontal plane, in millivolts per meter for one kilowatt antenna input power to 137.6 mv/m. This ratio should be expressed in decibels (db). (If specified for a particular direction, antenna power gain is based on the field strength in that direction only.)

Center frequency. The term "center frequency" means:

(1) The average frequency of the emitted wave when modulated by a sinusoidal signal.

(2) The frequency of the emitted wave without modulation.

Effective radiated power. The term "effective radiated power" means the product of the antenna-power (transmitter output less transmission line loss) times (1) the antenna power gain, or (2) the antenna field gain squared. Where circular or elliptical polarization is employed, the term effective radiated power is applied separately to the horizontal and vertical components of radiation. For allocation purposes, the effective radiated power authorized is the horizontally polarized component of radiation only.

FM Broadcast band. The band of frequencies extending from 88 to 108 megacycles per second, which includes those assigned to noncommercial educational broadcasting.

FM broadcast channel. A band of frequencies 200 kc/s wide and designated by its center frequency. Channels for FM broadcast stations began at 88.1 Mc/s and continue in successive steps of 200 kc/s to and including 107.9 Mc/s.

FM Broadcast station. A station employing frequency modulation in the FM broadcast band and licensed primarily for the transmission of radiotelephone emissions intended to be received by the general public.

Field strength. The electric field strength in the horizontal plane.

Free space field strength. The field strength that would exist at a point in the absence of waves reflected from the earth or other reflecting objects.

Frequency Modulation. A system of modulation where the instantaneous radio frequency varies in proportion to the instantaneous amplitude of the modulating signal (amplitude of modulating Signal to be measured after pre-emphasis, if used) and the instantaneous radio frequency is independent of the frequency of the modulating signal.

Frequency swing. The instantaneous departure of the frequency of the emitted wave from the center frequency resulting from modulation.

Multiplex transmission. The term "multiplex transmission" means the simultaneous transmission of two or more signals within a single channel. Multiplex transmission as applied to FM broadcast stations means the transmission of facsimile or other signals in addition to the regular broadcast signals.

Percentage modulation. The ratio of the actual frequency swing to the frequency swing defined as 100 percent modulation, expressed in percentage. For FM broadcast stations, a frequency swing of ± 75 kilocycles is defined as 100 percent modulation.

(b) **Stereophonic broadcasting.**

Cross-talk. An undesired signal occurring in one channel caused by an electrical signal in another channel.

FM stereophonic broadcast. The transmission of a stereophonic program by a single FM broadcast station utilizing the main channel and a stereophonic sub-channel.

Left (or right) signal. The electrical output of a microphone or combination of microphones placed so as to convey the intensity, time, and location of sounds originating predominantly to the listener's left (or right) of the center of the performing area.

Left (or right) stereophonic channel. The left (or right) signal as electrically reproduced in reception of FM stereophonic broadcasts.

Main channel. The band of frequencies from 50 to 15,000 cycles per second which frequency-modulate the main carrier.

Pilot subcarrier. A subcarrier serving as a control signal for use in the reception of FM stereophonic broadcasts.

Stereophonic separation. The ratio of the electrical signal caused in the right (or left) stereophonic channel to the electrical signal caused in the left (or right) stereophonic channel by the transmission of only a right (or left) signal.

Stereophonic subcarrier. A subcarrier having a frequency which is the second harmonic of the pilot subcarrier frequency and which is employed in FM stereophonic broadcasting.

Stereophonic subchannel. The band of frequencies from 23 to 53 kilocycles per second containing the stereophonic subcarrier and its associated sidebands.

(c) *Facsimile.*

Available line. The portion of the total length of scanning line that can be used specifically for picture signals.

Index of cooperation. The product of the number of lines per inch, the available line length in inches, and the reciprocal of the line-use ratio (e.g., $105 \times 8.2 \times 8/7 = 984$).

Line-use ratio. The ratio of the available line to the total length of scanning line.

Optical density. The logarithm (to the base 10) of the ratio of incident to transmitted or reflected light.

Rectilinear scanning. The process of scanning an area in a predetermined sequence of narrow straight parallel strips.

§ 3.311 FIELD STRENGTH CONTOURS.

(a) Applications for FM broadcast authorization must show three field strength contours. These are the 70 dbu (3.16 mv/m), 60 dbu (1 mv/m), and 34 dbu (50 uv/m). These contours indicate only the approximate extent of coverage over average terrain and in the absence of interference. Under actual conditions, the true coverage may vary greatly from these estimates because the terrain over any specific path is expected to be different from the average terrain on which the field strength chart was based. Because of these factors the estimated contours give no assurance of service to any specific percentage of receiver locations within the distances indicated.

(b) The field strength contours provided for in this section shall be considered for the following purposes only:

(1) In the estimation of coverage resulting from the selection of a particular transmitter site by an applicant for an FM broadcast station.

(2) In connection with problems of coverage arising out of application of § 3.240.

(3) In determining compliance with paragraph (a) of this section concerning the minimum field strength to be provided over the principal community to be served.

6. In "FM Technical Standards," present § 3.313 is deleted, and new § 3.313 is added, as follows:

§ 3.313 PREDICTION OF COVERAGE.

(a) All predictions of coverage made pursuant to this section shall be made without regard to interference and shall be made only on the basis of estimated field strengths.

(b) Predictions of coverage shall be made only for the same purposes as relate to the use of field strength contours as specified in § 3.311.

(c) (1) In predicting the distance to the field strength contours, the F (50, 50) field strength chart, Figure 1 of § 3.333, shall be used. The 50 percent field strength is defined as that value exceeded for 50 percent of the time. The F (50, 50) chart gives the estimated 50 percent of the locations in decibels above 1 microvolt per meter. The chart is based on an effective power of 1 kilowatt radiated from a half-wave dipole in free space, which produces an unattenuated field strength at 1 mile of about 103 db above 1 microvolt per meter (137.6 millivolts per meter).

(2) To use the chart for other powers, the sliding scale associated with the chart should be trimmed and used as the ordinate scale. This sliding scale is placed on the chart with the appropriate gradation for power in line with the horizontal 40 db line on the chart. The right edge of the scale is placed in line with the appropriate antenna height gradations, and the chart then becomes direct reading (in uv/m and in db above 1 uv/m) for this power and antenna height. Where the antenna height is not one of those for which a scale is provided, the signal strength or distance is determined by interpolation between the curves connecting the equidistant scale. Dividers may be used in lieu of the sliding scale. In predicting the distance to the field strength contours, the ef-

fective radiated power to be used is that in the horizontal plane in the pertinent direction. In predicting other field strengths over areas not in horizontal plane, the effective radiated power to be used is the power in the direction of such areas; the appropriate vertical plane radiation pattern must, of course, be considered in determining this power.

(d) The antenna height to be used with this chart is the height of the radiation center of the antenna above the average terrain along the radial in question. In determining the average elevation of the terrain, the elevations between 2 and 10 miles from the antenna site are employed. Profile graphs shall be drawn for 8 radials beginning at the antenna site and extending 10 miles therefrom. The radials should be drawn for each 45 degrees of azimuth starting with True North. At least one radial must include the principal community to be served even though such community may be more than 10 miles from the antenna site. However, in the event none of the evenly spaced radials include the principal community to be served and one or more such radials are drawn in addition to the 8 evenly spaced radials, such additional radials shall not be employed in computing the antenna height above average terrain. Where the 2 to 10 mile portion of a radial extends in whole or in part over a large body of water or extends over foreign territory but the 50 uv/m contour encompasses land area within the United States beyond the 10 mile portion of the radial, the entire 2 to 10 mile portion of the radial shall be included in the computation of antenna height above average terrain. However, where the 50 uv/m contour does not so encompass United States land area and (1) the entire 2 to 10 mile portion of the radial extends over large bodies of water or foreign territory, such radial shall be completely omitted from the computation of antenna height above average terrain, and (2) where a part of the 2 to 10 mile portion of a radial extends over large bodies of water or over foreign territory, only that part of the radial extending from the 2 mile sector to the outermost portion of land area within the United States covered by the radial shall be employed in the computation of antenna height above average terrain. The profile graph for each radial should be plotted by contour intervals of from 40 to 100 feet and, where the data permits, at least 50 points of elevation (generally uniformly spaced) should be used for each radial. In instances of very rugged terrain where the use of contour intervals of 100 feet would result in several points in a short distance, 200- or 400-foot contour intervals may be used for such distances. On the other hand, where the terrain is uniform or gently sloping the smallest contour interval indicated on the topographic map should be used, although only relatively few points may be available. The profile graphs should indicate the topography accurately for each radial, and the graphs should be plotted with the distance in miles as the abscissa and the elevation in feet above mean sea level as the ordinate. The profile graphs should indicate the source of the topographical data employed. The graph should also show the elevation of the center of the radiating system. The graph may be plotted either on rectangular coordinate paper or on special paper which shows the curvature of the earth. It is not necessary to take the curvature of the earth into consideration in this procedure, as this factor is taken care of in the charts showing signal strengths. The average elevation of the 8-mile distance between 2 and 10 miles from the antenna site should then be determined from the profile graph for each radial. This may be obtained by averaging a large number of equally spaced points, by using a planimeter, or by obtaining the median elevation (that exceeded for 50 percent of the distance) in sectors and averaging those values.

(e) In cases where the terrain in one or more directions from the antenna site departs widely from the average elevation of the 2 to 10 mile sector, the prediction method may indicate contour distances that are different from what may be expected in practice. For example, a mountain ridge may indicate the practical limit of service although the prediction method may indicate otherwise. In such cases the prediction method should be followed, but a supplemental showing may be made concerning the contour distances as determined by other means. Such supplemental showing should describe the procedure employed and should include sample calculations. Maps of predicted coverage should include both the coverage as predicted by the regular method and as predicted by a supplemental method. When measurements of area are required,

these should include the area obtained by the regular prediction method and the area obtained by the supplemental method. In directions where the terrain is such that negative antenna heights or heights below 100 feet for the 2 to 10 mile sector are obtained, a supplemental showing of expected coverage must be included together with a description of the method employed in predicting such coverage. In special cases, the Commission may require additional information as to terrain and coverage.

§ 3.314 [DELETION]

7. In "FM Technical Standards", § 3.314 is deleted.

8. In "FM Technical Standards", § 3.315 is amended to read as follows:

§ 3.315 TRANSMITTER LOCATION

(a) The transmitter location shall be chosen so that, on the basis of the effective radiated power and antenna height above average terrain employed, a minimum field strength of 70 decibels above one microvolt per meter (dbu), or 3.16 microvolts per meter, will be provided over the entire principal community to be served.

(b) The transmitter location should be as near the center of the proposed service area as possible consistent with the applicant's ability to find a sufficient elevation to provide service throughout the area. Location of the antenna at a point of high elevation is necessary to reduce to a minimum the shadow effect on propagation due to hills and buildings which may reduce materially the intensity of the station's signals in a particular direction. The transmitting site should be selected consistent with the purpose of the station, i.e., whether it is intended to serve a small city, a metropolitan area, or a large region. Inasmuch as service may be provided by signals of 1 mv/m or greater field strengths in metropolitan areas, and inasmuch as signals as low as 50 uv/m may provide service in rural areas, considerable latitude in the geographical location of the transmitter is permitted; however, the necessity for a high elevation for the antenna may render this problem difficult. In general, the transmitting antenna of a station should be located at the most central point at the highest elevation available. In providing the best degree of service to an area, it is usually preferable to use a high antenna rather than a lower antenna with increased transmitter power. The location should be chosen that line-of-sight can be obtained from the antenna over the principal city or cities to be served; in no event should there be a major obstruction in this path.

(c) The transmitting location should be selected so that the 1 mv/m contour encompasses the urban population within the area to be served. It is recognized that topography, shape of the desired service area, and population distribution may make the choice of a transmitter location difficult. In such cases consideration may be given to the use of a directional antenna system, although it is generally preferable to choose a site where a nondirectional antenna may be employed.

(d) In cases of questionable antenna locations it is desirable to conduct propagation tests to indicate the field intensity expected in the principal city or cities to be served and in other areas, particularly where severe shadow problems may be expected. In considering applications proposing the use of such locations, the Commission may require site tests to be made. Such tests should include measurements made in accordance with good engineering practice, and full data thereon must be supplied to the Commission. The test transmitter should employ an antenna having a height as close as possible to the proposed antenna height, using a balloon or other support if necessary and feasible. Information concerning the authorization of site tests may be obtained from the Commission upon request.

(e) Present information is not sufficiently complete to establish "blanket areas" of FM broadcast stations, which are defined as those areas adjacent to the transmitters in which the reception of other stations is subject to interfer-

ence due to the strong signal from the other stations. Where it is found necessary to locate the transmitter in a residential area where blanketing problems may appear to be excessive, the application must include a showing concerning the availability of other sites. The authorization of station construction in areas where blanketing problems appear to be excessive will be on the basis that the applicant will assume full responsibility for the adjustment of the applicant's station.

(f) Cognizance must of course be taken regarding the possible hazard of the proposed antenna structure to aviation and the proximity of the proposed site to airports and airways. Procedures and standards with respect to the Commission's consideration of proposed antenna structures which will serve as a guide to persons intending to apply for radio station licenses are contained in Part 17 of this chapter (Construction, Marking, and Lighting of Antenna Structures).

9. In "FM Technical Standards", paragraph (c) of § 3.316 is amended to read as follows:

§ 3.316 ANTENNA SYSTEMS.

(c) Applications proposing the use of directional antenna systems must be accompanied by the following:

- (1) Complete description of the proposed antenna system.
- (2) Orientation of array with respect to True North; time phasing of fields from elements (degrees leading or lagging); space phasing of fields from elements (in feet and degrees); and ratio of fields from elements.
- (3) Horizontal and vertical plane radiation patterns showing the free space field strength in millivolts per meter at 1 mile and effective radiated power, in dbk, for each direction. The method by which the radiation patterns were computed or measured shall be fully described, including formulas used, equipment employed, sample calculations and tabulations of data. Sufficient vertical plane patterns shall be included to indicate clearly the radiation characteristics of the antenna above and below the horizontal plane.
- (4) Name, address, and qualifications of the engineer making the calculations.

10. In "FM Technical Standards", paragraph (a)(1) of § 3.317 is amended to read as follows:

§ 3.317 TRANSMITTERS AND ASSOCIATED EQUIPMENT

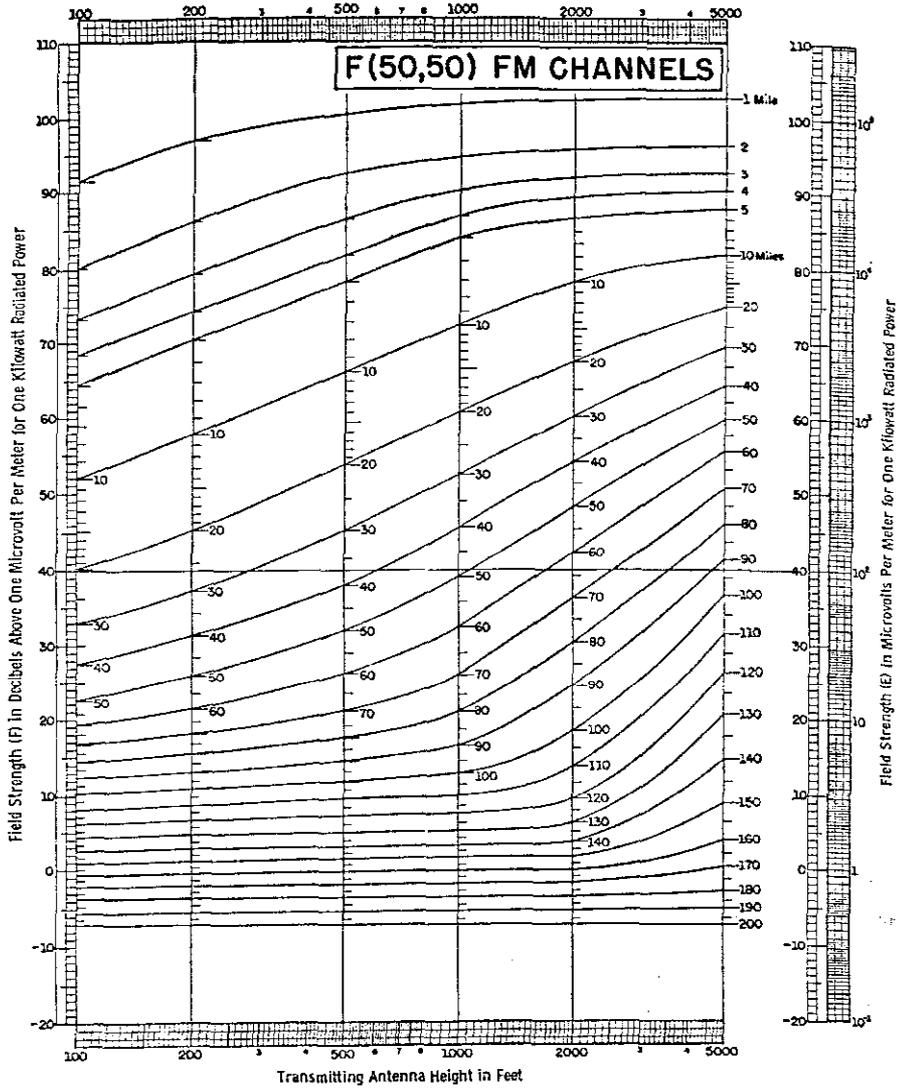
(a) *Electrical performance standards.* * * *

- (1) The transmitter shall operate satisfactorily in the operating power range with a frequency swing of 75 kilocycles per second, which is defined as 100 percent modulation.

11. In "FM Technical Standards", §3.333 is amended, Figure 1 is amended, and Figure 3 is added, as follows:

§ 3.333 ENGINEERING CHARTS.

This section consists of the following Figures 1, 2, and 3.

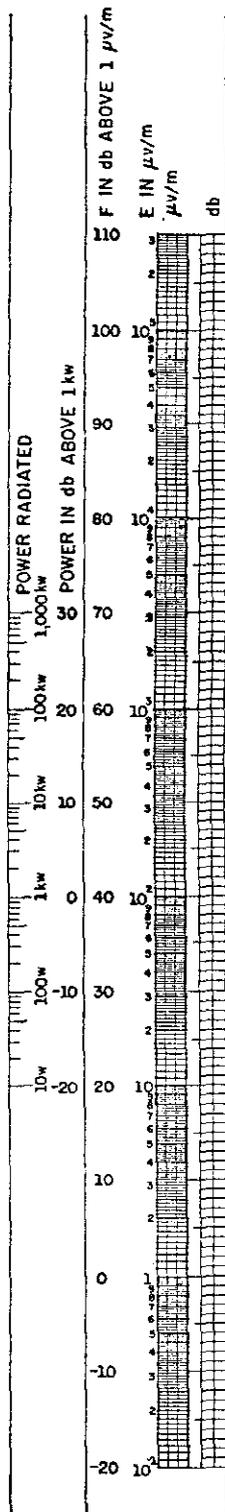


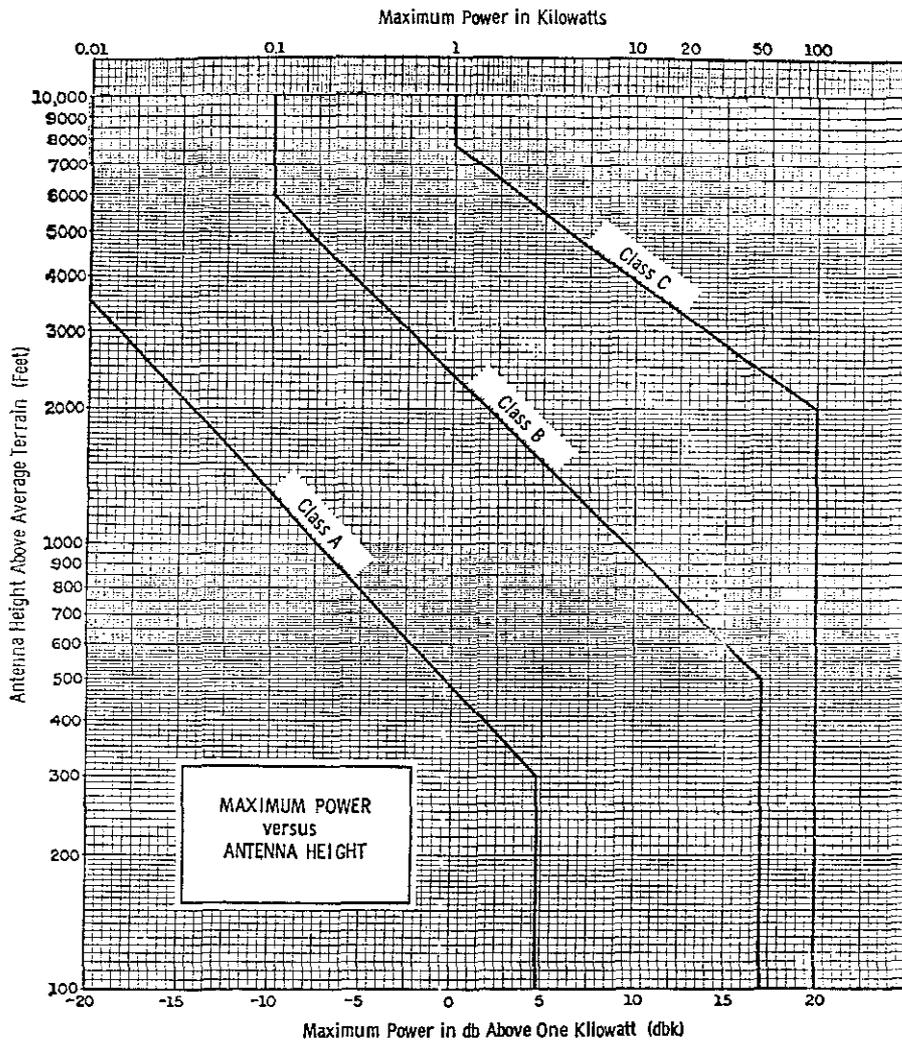
F.M. CHANNELS
 ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT OF THE POTENTIAL
 RECEIVER LOCATIONS FOR AT LEAST 50 PERCENT OF THE TIME
 AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

FCC § 3.333, FIGURE 1 as amended eff. 9-10-62.

40 F.C.C.

Sliding Scale for use with Figure 1, § 3.333.





FCC § 3.333, FIGURE 3 as adopted eff. 9-10-62.

40 F.C.C.

12. In Subpart C of Part 3, "Noncommercial Education FM Broadcast Stations", §§ 3.504 and 3.505 are deleted, and new §§ 3.504 and 3.505 are added, as follows:

§ 3.504 ZONES, CLASSES OF STATIONS, USE OF CHANNELS, FACILITIES, AND MINIMUM MILEAGE SEPARATIONS BETWEEN STATIONS.

(a) *Zones.* For the purpose of assignment of noncommercial educational FM stations, the United States is divided into three zones, Zone I, Zone I-A, and Zone II, having the boundaries specified in § 3.203.

(b) *Classes of stations.* Noncommercial educational stations operating on the channels specified in § 3.501 are divided into four classes, as follows:

(1) A Class D educational station is one operating with no more than 10 watts transmitter power output. Class D stations may be assigned in all zones, on any of the channels specified in § 3.501.

(2) Noncommercial educational stations with more than 10 watts transmitter output are classified as Class A, Class B, or Class C, depending on the effective radiated power and antenna height above average terrain, and the zone in which the station's transmitter is located, on the same basis as provided in § 3.204 for stations on the non-reserved FM channels. Where a station is authorized with more than 3 kilowatts (4.8 dbk) effective radiated power, or coverage greater than that obtained by the equivalent of 3 kilowatts effective radiated power and 300 feet antenna height above average terrain, it is classified as a Class B station if its transmitter is located in Zone I or Zone I-A, and as a Class C station if its transmitter is located in Zone II. Class A stations may be assigned in all zones.

(c) *Use of channels.* All classes of noncommercial educational stations may be assigned to any of the channels set forth in § 3.501.

(d) *Facilities.*

(1) No minimum effective radiated power or antenna height is specified for stations operating on the channels specified in § 3.501.

(2) On Channels 218, 219 and 220 specified in § 3.501, no Class B or Class 2 educational station will be authorized with effective radiated power greater than that specified in § 3.209(b)(1) for the respective class of station, and the maximum effective radiated power permissible shall also be subject to the provisions of § 3.209 (b)(2).

(e) *Minimum mileage separations.* No application for a new station, or new station, or change in channel or transmitter site or increase in facilities of an existing station, will be granted unless the proposed facilities will be located so as to meet the adjacent channel mileage separations specified in § 3.205(a) for the class of station involved with respect to stations on Channels 221, 222, and 223 listed in §3.201 (except where in the case of an existing station the proposed facilities fall within the provisions of § 3.205(b)).

(f) *Existing stations.* Stations authorized as of September 10, 1962, which do not meet the requirements of paragraphs (d) and (e) of this section, may continue to operate as authorized; but any application to change facilities will be subject to the provisions of this section.

13. In Subpart C of Part 3 "Noncommercial Educational FM Broadcast Stations", § 3.505 is amended to read as follows:

§ 3.505 STANDARDS OF GOOD ENGINEERING PRACTICE.

All noncommercial educational stations operating with more than 10 watts transmitter output power shall be subject to all of the provisions of the FM Technical Standards contained in Subpart B of this part. Class D educational stations shall be subject to the definitions contained in § 3.310 of Subpart B of this part, and also to those other provisions of the FM Technical Standards which are specifically made applicable to them by the provisions of this subpart.

§ 3.551 [DELETION]

14. In Subpart C of Part 3 "Noncommercial Educational FM Broadcast Stations", § 3.551 is deleted.