

FCC 66-459

BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20554

In the Matter of  
AMENDMENT OF PART 73 OF THE COMMISSION'S  
RULES AND REGULATIONS TO REQUIRE FM  
BROADCAST STATIONS ENGAGING IN MULTI-  
PLEX STEREOPHONIC PROGRAMING OR SCA  
OPERATION TO INSTALL TYPE APPROVED FRE-  
QUENCY AND MODULATION MONITORS CAPA-  
BLE OF MONITORING SUBCARRIER OPERATION

} Docket No. 15404

REPORT AND ORDER

(Adopted May 25, 1966)

BY THE COMMISSION:

1. The Commission has before it for consideration its notice of proposed rulemaking (FCC 64-298) released on April 2, 1964, and comments filed in response thereto by a number of licensees of FM broadcast stations, equipment manufacturers, organizations, and individuals having an interest in the broadcast industry.<sup>1</sup>

2. The notice of proposed rulemaking in this proceeding set forth our belief in the need of FM broadcast stations engaged in stereophonic broadcasting and in the transmission of additional programs under a subsidiary communications authorization, for type approved frequency and modulation monitors to assist them in establishing the technical adequacy of such operations. This belief was generally supported with respect to the need for multiplex modulation monitors.

3. On the other hand, however, most comments questioned the need for a multiplex frequency monitor. The general consensus, as expressed by one party was: "It is unnecessary for a crystal oscillator to continuously check the frequency of a similar crystal oscillator." As an alternative, occasional checks of frequency were suggested to assure proper frequency stability.

4. Upon reexamination of this question, we are not persuaded that a need for frequency monitors in connection with stereophonic broadcasting and the SCA subcarrier operation has been established. We do believe, however, that the licensee must have available a means of determining that the pilot subcarrier and SCA subcarrier frequencies are maintained within proper limits. Our experience in the field of

<sup>1</sup> Comments were filed by the following: Electronic Industries Association, Washington, D.C.; Zenith Radio Corp., Chicago, Ill.; WFPG-FM, Atlantic City, N.J.; WJMD, Bethesda, Md.; Belar Electronics Laboratory, Drexel Hill, Pa.; Collins Radio Co., Dallas, Tex.; Association of Federal Communications Consulting Engineers, Washington, D.C.; McMartin Industries Inc., Omaha, Nebr.; Radio Corp. of America, New York, N.Y.; KEEZ, San Antonio, Tex.; National Association of Broadcasters, Washington, D.C.; Roy H. Trumbull, Corte Madera, Calif.; Robert J. Carpenter, Rockville, Md.; WDET-FM, Detroit, Mich.

television broadcasting is pertinent in this regard. Our conclusion there was that a separate frequency monitor is unnecessary if the licensee checks the operating frequency on a daily basis using a simple procedure which will indicate that the operating frequency is within authorized limits.

5. We reach a similar conclusion in this proceeding as reflected in new paragraphs (i) of section 73.295, and (b) of section 73.297 of the appendix. In this context, however, it becomes necessary to specify a permissible tolerance for variations in the resting frequency of the SCA subcarrier, since there is no reference point in the present rules. The figure chosen (i.e., 500 cycles per second) is, we believe, reasonable and well within the confines of good engineering practice. Sections 73.283, 73.295, 73.583, and 73.595 are being amended to provide for the daily logging of the necessary readings.

6. With respect to modulation monitors, sections 73.253(a), 73.332(b), and 73.553(a) are being amended to recognize the existence of three different types: (a) Those for nonmultiplex operations, as presently provided for; (b) monitors for stereophonic operation; and (c) monitors for SCA operations. We agree with those who commented adversely on our proposal to identify these monitors as class A, B, and C, however, and have modified note 1 to sections 73.253 and 73.553 to refer to them merely as nonmultiplex, stereophonic, and SCA monitors.

7. In adopting our notice of proposed rulemaking in this matter, we had anticipated a relatively short period for the submission of comments and adoption of an appropriate report and order, and had suggested approximately 6 months as the time necessary for manufacturers to obtain type approval of the monitors and to supply FM broadcast stations requiring these new monitors. We note, however, that since the institution of stereophonic broadcasting by FM stations in June of 1961, at least three manufacturers have produced a stereophonic modulation monitor. In examining the specifications of each of these currently produced items we note that none will fully meet the specifications we are here adopting. In view of the equipment modifications which eventually will be necessary, the subsequent submission of the monitors for type approval and the necessary time for stations to obtain the type approved model, we are adopting an effective date of June 1, 1967, and specify this date in note 2 to sections 73.253(a) and 73.553(a). However, because our action in this proceeding has been delayed in consequence of which manufacturers have produced stereophonic and SCA modulation monitors in reliance upon our ultimate adoption of specifications for type approval, and because a considerable number of licensees have purchased and installed these monitors while awaiting our decision in this matter, we are providing in note 2 to section 73.253(a) that these licensees may continue to use such monitors until January 1, 1972. We do this, however, with the understanding that the installation and use of these non-type-approved monitors does not in any way relieve the licensee of the responsibility for maintaining stereophonic or SCA operations in compliance with the appropriate technical rules (see secs. 73.322 and 73.319 of the rules). We do not believe it necessary, however, to set a future effective

tive date for the measurement of stereophonic pilot subcarrier and SCA subcarrier frequencies, as discussed above, because the procedures there are relatively simple and the necessary additional equipment, if not already in possession of the licensee, is readily available.

8. We turn now to a detailed consideration of modulation monitor specifications (sec. 73.332 of the appendix). In general, those who commented in this proceeding were in agreement with these paragraphs as proposed in our notice. We have found it necessary to make changes in certain subparagraphs as described more fully herein, both because of comments received and because of a reexamination of the level of accuracy which we believe necessary and desirable.

9. Subparagraph (1) of paragraph (d), section 73.332, requires that the type approved modulation monitor indicate the modulation percentage of the carrier produced by the main channel (L+R) signal with an accuracy of plus or minus 5 percent for all frequencies from 50 to 15,000 c.p.s. To insure the accuracy of this indication, we have found it necessary to expand the proposed rule to provide that the frequency characteristic be such that the attenuation at the pilot subcarrier frequency (19 kc) is at least 26 db and the attenuation in the frequency range of 23 kc and above where AM subcarrier sideband information is present is at least 46 db. Likewise in subparagraph (2) of paragraph (d) we have expanded the proposed rule, as suggested by McMartin Industries, Inc., to require for measurement of modulation percentage of the carrier produced by the suppressed subcarrier and its sidebands, that the frequency characteristic be such that the attenuation at 19 and 57 kc be at least 26 db and the attenuation at 15,000 cycles and below and at 59 kc and above shall be at least 46 db. These specifications we believe will enable the accuracy of this indication.

10. Similarly, subparagraph (3) specifies the requirement that the modulation monitor indicate the modulation of the carrier by the pilot subcarrier. This subparagraph is adopted as proposed in our notice.

11. Subparagraph (4) of paragraph (d) relating to the measuring of total modulation of the carrier which was contained in the notice of proposed rulemaking as paragraph (d)(9) has been expanded to establish, with greater specificity, the accuracy of the visual peak preset indicating device (more commonly known as the peak flasher). This we find necessary because the peak flasher is normally more accurate in indicating modulation peaks under program conditions because it is a peak indicating device, whereas the modulation meter is a semipeak indicator. Unfortunately, our existing rules (sec. 73.332 (b)) for nonmultiplex modulation monitors, while requiring the peak indicating device, are not specific in defining its accuracy. We do intend at some future date to correct this deficiency. Meanwhile we believe that, since we are herein establishing new classes of modulation monitors, the new units should be examined for type approval under the more specific accuracy requirements.

12. In further consideration of the discussion above, we believe it advisable to indicate our belief, because of the greater accuracy of the peak indicating device in indicating modulation peaks, that when there is disagreement between the peak preset indicator and the semi-

peak modulation meter indications, the peak flasher should be considered the prime indicator. Since this matter was not raised in our notice and since this principle applies equally well to nonmultiplex monitors, we are not now modifying the rules to incorporate a clarification, but intend to do so in the future.

13. As suggested by Collins Radio Co., we have revised subparagraph (5) of paragraph (d), which was paragraph (d)(4) of our notice, to indicate a maximum variation of the frequency characteristic of 1 db and have added subparagraph (d)(5)(iv) to provide for the proper phase relationship between the pilot subcarrier and regenerated 38 kc/s subcarrier in the monitor. We also take this opportunity to change the permissible harmonic distortion from one-half to 1 percent and to specify that the monitor be capable of reading a separation of 35 db with an accuracy of plus or minus 3 db. These changes are both minor relaxations of our original proposal.

14. When an FM broadcast station is transmitting an SCA program in addition to a stereophonic broadcast an undesirable characteristic which may occur in an improperly adjusted system is crosstalk from the SCA and main channels into the stereophonic subchannel and from the stereophonic subchannel into the main channel. Thus, paragraph (d)(6) is intended to provide the licensee with a means of measuring crosstalk to insure compliance of his operation with the rules. Paragraphs (d)(5) and (d)(7) of the notice have been combined and result in paragraph (d)(6) of the attached appendix. We have found it necessary, however, to specify the crosstalk characteristic and crosstalk indication of the monitor to insure the accuracy of the indication of this parameter.

15. Paragraph (d)(8) relating to suppression of the subcarrier is adopted as proposed except that the indication of suppression is changed from 45 to 46 db and a stipulation is added that the indication of subcarrier suppression must be revealed for the frequency range of subcarrier modulation from 5,000 to 15,000 cycles and for full modulation of the subcarrier. We are adding this additional requirement because our experience in examining stereophonic transmission equipment has demonstrated to us that some stereophonic transmitters are capable of suppressing the 38-kc stereophonic subcarrier to a value of 1 percent (as required by sec. 73.322) under the condition of no modulation but fail to do so when the stereophonic subcarrier is modulated. We believe that a type approved stereophonic modulation monitor should provide a means of measuring stereophonic subcarrier suppression over the frequency and amplitude range of subcarrier modulation specified.

16. In the notice of proposed rulemaking we had suggested in paragraphs (d)(10) and (d)(11) that means be provided for measuring both AM and FM noise. Many who commented questioned the need for such a specification on the basis that this is an occasional proof of performance measurement which can be accomplished, when necessary, using the circuitry of the monitor but an external meter to provide the necessary indication. Upon reexamination, we agree with these comments. FM broadcast stations operating in the monophonic mode normally determine the levels of AM and FM noise in the transmitting

system at least once a year during the annual equipment performance measurements (see sec. 73.254(b)) and while we do not wish to imply that an annual measurement is sufficient to insure compliance with the rule, problems of excessive AM and FM noise do not usually occur when appropriate diligence is exercised. Accordingly, we are deleting the requirement that the modulation monitor provide, internally, a means for measuring AM and FM noise. We are, however, adding a new paragraph to stipulate that when signals are brought out for external metering or monitoring purposes, they shall have all of the characteristics required for internal metering purposes and also that any loading by external circuitry shall have no effect on the monitor's indications.

17. Paragraph (e) of the notice proposed that the stereophonic pilot subcarrier modulation be displayed continuously and independently of the total modulation. The comments received on this proposition were opposed because it is claimed that pilot subcarrier level is relatively constant once properly set and continuous monitoring is unnecessary. We are impressed by these comments and agree that, so long as an indication of pilot subcarrier level is available to the operator upon demand, continuous display of this parameter is unnecessary. Accordingly, paragraph (e) is modified to provide that when switching is utilized to display the parameters set forth in paragraphs (d) (1) through (d) (5) of the appendix, the visual peak flasher for total modulation must be independent of this switching so that it continuously affords an indication of total modulation.

18. With respect to type approval specifications for SCA modulation monitors, paragraph (f) (1) was not contained in our notice but was added because of our belief, as demonstrated by most SCA monitors now being produced, that the licensee engaging in SCA operation desires a single monitor which will exhibit main channel modulation as well as SCA modulation. To insure the accuracy of this main channel indication we have specified that the frequency characteristics be such that the attenuation in the SCA range, from 20 to 75 kc be at least 46 db.

19. Paragraph (f) (2) adopts our proposal for a means of determining modulation of the main carrier by each SCA subcarrier, but we have found it necessary, to insure proper accuracy, to be more specific in delineating the monitor frequency characteristic.

20. Likewise, subparagraph (3) of paragraph (f) relating to the indication of total modulation is adopted as contained in our notice (see par. (f) (2) therein). However, as described in paragraph 12 above, relating to stereophonic monitors, we believe it necessary to establish with greater specificity the operation of the visual peak preset indicating device and have provided additional criteria which this device must meet.

21. Paragraph (f) (4) is adopted as proposed in paragraph (f) (3) of the notice.

22. The crosstalk measuring means proposed in paragraph (f) (4) of the notice is adopted with clarified wording and a specification for the required crosstalk characteristic of the monitor, and appears as paragraph (f) (5) of the attached appendix.

23. Paragraph (f) (6) of section 73.332 was not included in our notice, but has been added, as we have described in paragraph 16, in connection with stereophonic modulation monitors, to permit external metering or monitoring provided that any loading by external circuitry shall have no effect on the monitor's indication.

24. Paragraph (g) is adopted as proposed in our notice with the added stipulation, as described in paragraph 17 above, that the peak preset indicator (peak flasher) of total modulation must be independent of any switching functions and must afford a continuous display.

25. Sections 73.553, 73.583, 73.595, and 73.596 are amended in similar fashion to that described above to conform the monitor requirements for noncommercial educational FM stations to those for commercial FM stations with the exception that note 2 to section 73.553 does not permit the continued use, until January 1, 1972, of those non-type-approved monitors which were purchased and installed prior to July 5, 1966. Because of the limited number of noncommercial educational FM broadcast stations engaging in stereophonic and SCA operations, we do not feel this exemption is necessary, and we will grant waivers for these stations upon request.

26. We call attention to the fact that we have taken the opportunity, while amending sections 73.297 and 73.596 relating to stereophonic broadcasting, to delete the requirement that stations so operating shall notify us of the hours of stereophonic broadcasting and any change therein. At the time of adoption of the original rule, we felt it desirable to be informed as to the extent of stereophonic broadcasting. At the present time we believe such operation is progressing in satisfactory fashion, and see no further need to be informed of the hours of stereophonic broadcasting. Since this is a relaxation of an existing requirement, we find that prior notice of such change would serve no public purpose.

27. Certain of the comments submitted by the National Association of Broadcasters (NAB) expressed a view that the adequacy of existing nonmultiplex monitors should be examined as part of this proceeding. We have, in cooperation with the broadcast industry, examined several different types of modulation monitors under actual operating conditions and have reached the conclusion that our rules relating to nonmultiplex monitors should be modified. However, in order not to delay this proceeding further, we have decided to establish specifications for stereophonic and SCA modulation monitors now, and, at an early date, we plan to reexamine the specifications for nonmultiplex monitors.

28. When questioning the performance of existing nonmultiplex monitors, NAB also doubted the propriety of our actions in issuing certain violation notices for excessive modulation (violation of sec. 73.268). The point in dispute concerns our use of measuring equipment which differs from the modulation monitor we require to be installed at broadcast stations. In this connection, we point out that our present rules require that each monitor be equipped with both a modulation peak indicating device and a semipeak indicator (secs. 73.332(b) (2) and (3)). We observe that the NAB comment presumes that only the semipeak indicator is used for setting modulation

levels and appears to overlook the peak-reading device. Our emphasis, on the other hand, is with the latter device which is intended to deal with those transient peaks of program material which cannot be indicated reliably by the semipeak meter. The disputed violation notices concerned the transient peaks of frequent recurrence which exceeded the peak modulation levels permitted under section 73.268 of our rules. The facilities we use in enforcing the provisions of this section include a cathode ray oscilloscope accurately calibrated in terms of modulation peak amplitudes. We believe that this method, which stresses modulation measurement in terms of peak amplitudes, is fully consistent with the provisions of section 73.332(b) (2).

29. Examination of the instruction books supplied with most existing type approved modulation monitors reveals that users of this equipment are cautioned to calibrate the monitors properly and to use discretion in relying on the meter and peak flasher indications of the monitor under program conditions. We believe, from our study of the problem, that few discrepancies occur between the indications revealed by the Commission's monitoring equipment and the station modulation monitor indications if due consideration is given to proper calibration of the modulation monitor.

30. For the reasons stated above, we are of the opinion that it is in the public interest to adopt the proposals set forth in the notice, as revised in the manner discussed above.

31. Authority for the adoption of the amendments herein is contained in sections 4(i), 303 (f), (e), and (r) of the Communications Act of 1934, as amended.

32. In view of the foregoing, *It is ordered*, That, effective July 5, 1966, part 73 of the Commission's rules and regulations *Are amended* and the proceeding *Is terminated*.