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COMMUNICATIONS
FORUM

THE FUTURE OF AM BROADCASTING

February 26, 1987

Seminar Notes

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
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Larry D. Eads
FCC

Michael Rau
National Association of Broadcasters (NAB)

THE FUTURE OF AM BROADCASTING

The moderator, Prof. Lippman, introduced the topic for the day by briefly relating the history of AM broadcasting. AM broadcasting, he said, began in 1912, though broadcasting by wire existed in Hungary as early as 1895. Many events have occurred since then to influence the development of broadcasting. Notable with regard to radio in the United States was the realization by F.D.Roosevelt (then in charge of the U.S. Department), soon after World War I, that radio was a good thing for the strategic interests of the U.S. and that all the licenses and patents relating to radio broadcasting were at that time held by foreigners. This prompted the U.S. Government to form a government sponsored monopoly to be the license holder for the patents, specifically for AM broadcasting related patents. The company formed was the Radio Corporation of America (RCA) with three interested companies being involved, namely AT&T, Westinghouse, and General Electric (GE). The company was headed by David Sarnoff who was formerly with Marconi of the United Kingdom. Sarnoff came up with the idea of having a simplified receiver for use by the public. It would have just one knob for tuning (as opposed to the fancy receivers at the time which had several tuning knobs) and one knob for volume control. Then in 1926 RCA founded the National Broadcasting Company (NBC).

Lippman then suggested three developments since the founding of RCA that would have "made Sarnoff turn in his grave."

- (i) FM seems to have won over AM.
- (ii) RCA after successfully getting rid of AT&T, Westinghouse, and GE, to take control of its destiny

has just recently been bought by GE.
(iii) GE is now about to rid itself of Sarnoff's
laboratories in Princeton.

Describing FM, Lippman stated that compared with AM, FM's primary advantage was that it traded bandwidth for fidelity. However, the FM receiver is more expensive, and FM was further disadvantaged when the FCC moved the FM band from 46 MHz to 88MHz. AM is not quite dead and is amenable to many technical, social, and political innovations which, he said, is the reason for discussing its future.

Michael Rau - National Association of Broadcasters (NAB)

Rau's presentation was based on the NAB's efforts to encourage the use of AM broadcasting. He pointed out that since the early 1970s there had been a gradual shift in listening by the national audience (from 70% to 30%) from AM to FM. Most AM listeners at present are the older audiences (over 35 years of age.) The primary reason, he said, was that the public's expectations, as far as quality is concerned, have changed significantly since the 1940s and 1950s but AM broadcasting is still very much like it was then.

Rau pointed out that the NAB has a membership of approximately 5000 radio stations (about half the nation's radio stations) and they have a responsibility to try and reverse this negative trend taken by AM, to serve the AM broadcasters among their members. He asserted that a lot of things could be done to address this problem. One of the main areas that the NAB is

working on is that of promoting the AM stereo concept.

Until 1982 there were as many as five systems and technically each had its own advantages and disadvantages. However, at present there are only two - Motorola, and Kahn, each incompatible. While many believe that the Motorola system is winning, a recent survey of broadcasters considering AM stereo revealed that many preferred choosing the Kahn system. Also, he said, some argue that the present Kahn system broadcasters have a larger listening audience than the average Motorola system broadcaster. The problem in this area is that there is yet no market standard even after five years of AM stereo operation. As a result, only 10% of the nations stations are broadcasting in AM stereo and growth has been very slow. That is why the NAB is trying its best to stimulate the market to go faster. However, they can't push for any single system as they would then contravene antitrust regulations. Meanwhile, he said, two large manufacturers, Pioneer and Radio-Shack, have stopped producing AM stereo radios. But Delco (GM) still manufactures about 22,000 sets per day (of which 5,000 are Motorola stereo.) No Kahn receivers are available. Therefore the NAB, instead of pushing for a particular system is trying to promote the AM stereo concept on the basis that the AM stereo receiver is much better than a common receiver or the AM mono receiver.

Rau then showed a audio-visual presentation that the NAB had developed to sell the concept of AM stereo to its stations. The presentation was a picture history of AM and it contrasted the quality of AM mono and AM stereo. It showed also

the rise in FM, and why AM stereo is important to the future of broadcasting.

Rau noted that there is a big difference between AM stereo and AM mono radio. A significant fundamental difference is the operating bandwidth. AM stereo operates at 7-8 KHz bandwidth whereas AM mono operates at 3-4 KHz. He claimed that the slide show has been moderately successful with a few more stations converting to AM stereo in the last year or so. The cost of putting in an AM stereo modulator he estimated to be in the region of \$10,000. In addition, some technical adjustments have to be made to the station - the frequency and phase characteristics of the transmitter have to be linear. Also, the antenna system would require adjustments.

Rau said that the NAB, as part of its efforts to promote AM broadcasting, formed a committee of top broadcast engineers to technically improve AM broadcasting. In addition to AM stereo, they came up with the following recommendations:

(i) Improve the technology of the AM antenna design. The basic design of AM antennas are the same as those used in the 1930s. 85% of the energy leaving the transmitter goes into the sky and doesn't reach the receiver. Instead it causes increased interference with other broadcasts (particularly at night.) The NAB called for new antenna designs (from the industry) that could handle this problem and has chosen to set up two experimental antennas to test their effectiveness in reducing skywave radiation and increasing groundwave radiation.

(ii) Write standards to control further increases in electrical interference to AM reception. Even some new

technology fluorescent light bulbs, he said, are prone to cause electrical interference to AM reception.

(iii) Work with receiver manufacturers to improve AM receiver response (minimizing adjacent channel interference.) In this regard, the NAB set up a National Radio Systems Committee (NRSC) to develop an interim voluntary national quality standard. The NRSC came up with specifications which when implemented will improve the fidelity of AM sound, increase U.S. AM stations' service areas, and promulgate new high-fidelity AM receivers. The details of the specifications are as follows:

- (a) Modified 75uS AM broadcast transmission pre-emphasis (exhibit A)
- (b) Complimentary 75uS AM receiver de-emphasis (exhibit B)
- (c) 10 KHz AM transmission bandwidth - to minimize interference (exhibit C)
- (d) 5 year review provision

Some of the participating receiver manufacturers, he said, are Delco (GM), Ford, Chrysler, GE, Pioneer, Sony, Matsushita and Jensen. The standard took about two years to develop and was adopted on January 10th, 1987.

The NAB is also working closely, he said, with the FCC in allocation, rule changes, development of synchronous transmitters, etc., to improve AM broadcasting.

Larry D. Eads - Federal Communications Commission

While Rau addressed AM broadcasting from the perspective of the industry, Eads took the government's view on AM broadcasting and discussed what he saw as the government's

plans relating to AM broadcasting. The FCC's rules, he said, had a direct effect on the industry's ability to respond to changing environments as well as the increasing costs faced by broadcasters. The Commission does not plan to involve itself in subsidies or help to individual broadcaster but rather the industry as a whole.

Eads looked at the problem faced by AM broadcasting on two planes - economic, and technical. The economic problem is seen, he said, in the relatively lower prices of AM radio stations, and also in some of the recent bankruptcies experienced by AM stations. Both are caused by the significant shift of the listening audience from AM to FM. The foundation of the problem, he asserted, is technical in that the perceived and possibly the real quality of AM broadcasting is lower than FM. This is particularly true of music broadcasts. As a result, many AM channels have turned to conducting sports, talk shows etc, rather than music. The government, he said, will therefore focus on both technical and economic issues.

Eads stated that rules limit flexibility AM, he said, is the oldest regulated broadcast service (since 1927), however, it has not been reviewed thoroughly for over fifty years. The FCC is now conducting a review with the hope of adequately changing the rules to reduce the obstacles faced by AM. Two issues that the government proposes to examine are the 'ownership rules,' and the 'main studio and program origination rules.' One of the outcomes of changing the 'ownership rules,' he suggested, could be the possibility of "running AM and FM out of the same station," thereby deriving economies of scale. As for the 'main

studio and program origination rules,' there is the possibility of "doing away with the main studio rule," giving station owners better scope for cost effectiveness and similarly with the 'program origination rule.' However, these issues, he reminded, are politically sensitive and could give rise to considerable debate.

Moving onto technical issues, Eads added that this too could become "political football." Even within AM regulation, historically there has been a three tier structure of allocation:

- clear channel (wide area) - very few stations
- regional channel (city and surrounding suburbs)-lower power
- local stations (small town, local communities)-lowest power

A different category altogether is the 'daytimer.' This cuts across all of the above and has much more stations (because they carry a lesser distance.) It is difficult, he said, to satisfy all these groups, because each has its own viewpoints and preferences. As a result, there are constant clashes even in the technical issues.

Some of the other technical issues that the FCC will be addressing for the first time in 50 years are the technical parameters - What should protection ratios be? What kind of protection should be provided for stations? (i.e. what signal levels should be protected, what power levels should be allowed etc.) Is 'clear channel' service needed anymore? These, Eads said, are some of the issues coming up before the Commission in the very near future.

In closing, Eads mentioned two other areas that the FCC is investigating - synchronous transmitters (ST), and the use of

FM translators. STs are widely used in Europe. However, in the U.S. very few have been used in the past. Currently there is one being used by a station in Worcester, Massachusetts (WBZA.) The FCC authorized three experimental operations in Hawaii, Las Vegas, and Albuquerque. The Commission's intention is to find out the technical parameters (e.g. interference levels) and gather information as part of its rule making process. It feels that there is a possibility of increasing service area and protecting the service area from interference using STs. FM translators, are capable of picking up an FM broadcast and converting it to AM. The NAB however, he said, is not in favor of such translators.

SPEAKERS' COMMENTS AND ANSWERS TO QUESTIONS

A comment was made by a member of the audience that one of the desirable features of AM is that it is better for small communities than FM.

A question was raised about the possible future auctioning of broadcast frequencies, particularly with reference to the current proposal to allow auctioning of non-broadcast spectrum. Eads responding stated that though auctioning posed some advantages it was politically very difficult to "pull off."

Responding to the question of the possibility of transmitting non-broadcast information using AM frequencies, Lippman said that the issue is one of AM being used for private

rather than public broadcasting. This in effect, he said, would not be in the interest of the public to warrant such authorization. Eads confirmed this opinion when responding to the question of voice versus non-voice data transmission using AM. The problem now, he said, is that the dividing lines between various reserved portions of the spectrum are becoming fuzzy, and gentle moves are being made to cross borders thus yielding flexibility. However, as for AM, since it has been reserved for public broadcast it will be a disservice to public interest if private data transmission is allowed. He also added that there currently is such a proposal "on the table." Rau's opinion on the proposal was that it would be illegal.

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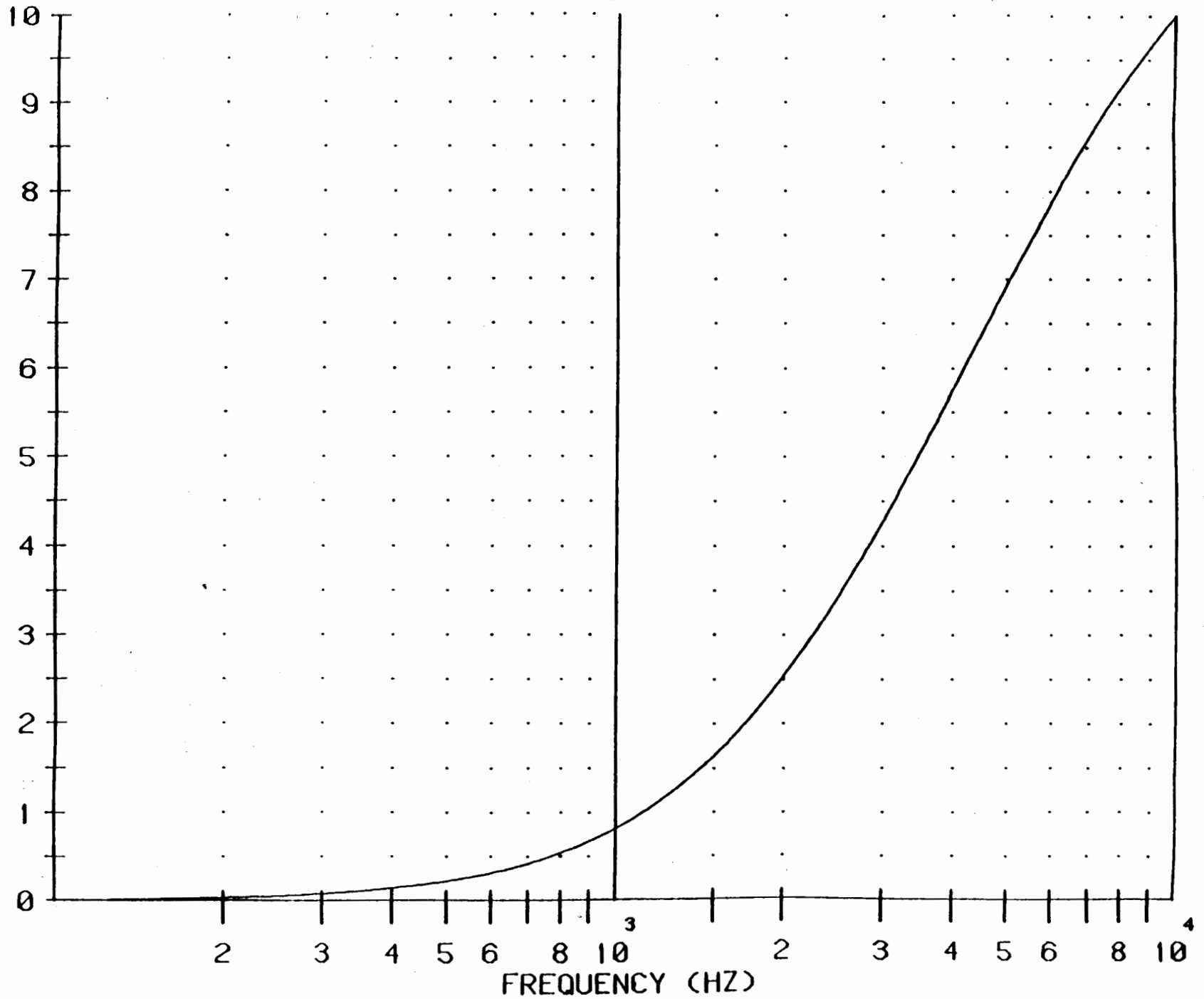


EXHIBIT A

NRSC Interim Voluntary National Standard
Modified 75us AM Standard Pre-Emphasis Curve

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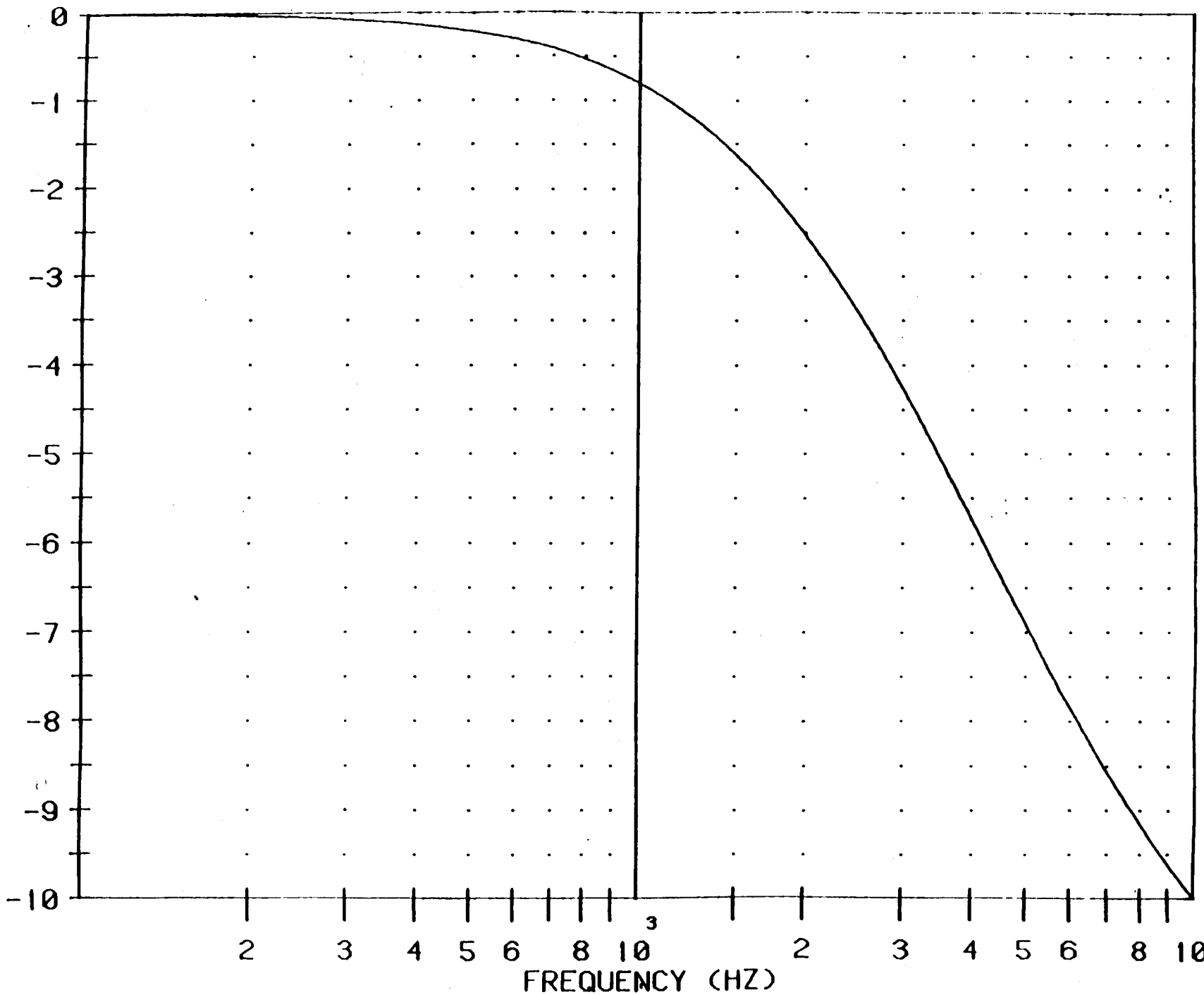
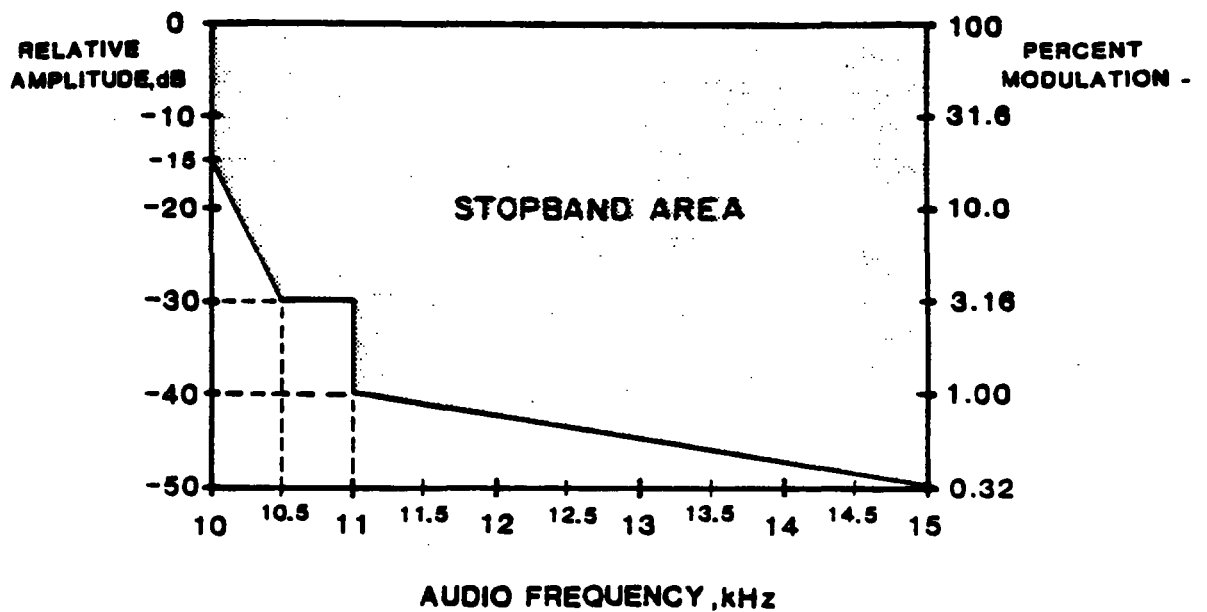


EXHIBIT B

Interim Voluntary National Standard
Modified as AM Standard De-Emphasis Curve

NRSC 10 kHz AM Bandwidth Specification

**NRSC STOPBAND SPECIFICATION
(AUDIO ENVELOPE INPUT SPECTRUM TO AM TRANSMITTER)**



January, 1987