(f) Installation of the multiplex transmitting equipment must conform with the requirements of § 73.1690(e).

[47 FR 25345, June 11, 1982, as amended at 49 FR 34015, Aug. 28, 1984; 51 FR 41629, Nov. 18, 1986; 51 FR 44478, Dec. 10, 1986]

§ 73.128 AM stereophonic broadcasting.

(a) An Am broadcast station may, without specific authority from the FCC, transmit stereophonic programs upon installation of type accepted stereophonic transmitting equipment and the necessary measuring equipment to determine that the stereophonic transmissions conform to the modulation characteristics specified in paragraphs (b) and (c) of this section. Stations transmitting stereophonic programs prior to March 21, 1994 may continue to do so until March 21, 1995 as long as they continue to comply with the rules in effect prior to March 21, 1994.

(b) The following limitations on the transmitted wave must be met to insure compliance with the occupied bandwidth limitations, compatibility with AM receivers using envelope detectors, and any applicable international agreements to which the FCC is a party:

(1) The transmitted wave must meet the occupied bandwidth specifications of § 73.44 under all possible conditions of program modulation. Compliance with requirement shall be demonstrated either by the following specific modulation tests or other documented test procedures that are to be fully described in the application for type acceptance and the transmitting equipment instruction manual. (See § 2.983(d)(8) and (j)).

(i) Main channel (L+R) under all conditions of amplitude modulations for the stereophonic system but not exceeding amplitude modulation on negative peaks of 100%.

(ii) Stereophonic (L − R) modulated with audio tones of the same amplitude at the transmitter input terminals as in paragraph (b)(i) of this section but with the phase of either the L or R channel reversed.

(iii) Left and Right Channel only, under all conditions of modulation for the stereophonic system in use but not exceeding amplitude modulation on negative peaks of 100%.

(c) Effective on December 20, 1994, stereophonic transmissions shall conform to the following additional modulation characteristics:

(1) The audio response of the main (L+R) channel shall conform to the requirements of the ANSI/EIA–549–1988, NRSC–1 AM Preemphasis/Deemphasis and Broadcast Transmission Bandwidth Specifications (NRSC–1).

(2) The left and right channel audio signals shall conform to frequency response limitations dictated by ANSI/EIA–549–1988.

(3) The stereophonic difference (L − R) information shall be transmitted by varying the phase of the carrier in accordance with the following relationship:

$$\phi = \tan^{-1}\left(\frac{m(L(t) - R(t))}{1 + m(L(t) + R(t))}\right)$$

where:

L(t)=audio signal left channel,

R(t)=audio signal right channel,

m=modulation factor, and

$m_{peak}(L(t)+R(t))=1$ for 100% amplitude modulation,

$m_{peak}(L(t)-R(t))=1$ for 100% phase modulation.

(4) The carrier phase shall advance in a positive direction when a left channel signal causes the transmitter envelope to be modulated in a positive direction. The carrier phase shall likewise retard (negative phase change) when a right channel signal causes the transmitter envelope to be modulated in a positive direction. The phase modulation shall be symmetrical for the condition of difference (L − R) channel information

sent without the presence of envelope modulation.

(5) Maximum angular modulation, which occurs on negative peaks of the left or right channel with no signal present on the opposite channel (L(t)=−0.75, R(t)=0, or R(t)=−0.75, L(t)=0) shall not exceed 1.25 radians.

(6) A peak phase modulation of +/−0.785 radians under the condition of difference (L−R) channel modulation and the absence of envelope (L+R) modulation and pilot signal shall represent 100% modulation of the difference channel.

(7) The composite signal shall contain a pilot tone for indication of the presence of stereophonic information. The pilot tone shall consist of a 25 Hz tone, with 3% or less total harmonic distortion and a frequency tolerance of +/− 0.1 H_2, which modulates the carrier phase +/− 0.05 radians peak, corresponding to 5% L−R modulation when no other modulation is present. The injection level shall be 5%, with a tolerance of +1, −1%.

(8) The composite signal shall be described by the following expression:

$$E_c = A_c\left[1 + m\sum_{n=1}^{\infty} C_{sn}\cos\left(\omega_{sn}\ t + \phi_{sn}\right)\right]\cdot$$

$$\cos\left[\omega_c t + \tan^{-1}\frac{m\sum_{n=1}^{\infty} C_{dn}\cos\left(\omega_{dn}t + \phi_{dn}\right) + .05\sin 50\pi t}{1 + m\sum_{n=1}^{\infty} C_{sn}\cos\left(\omega_{sn}t + \phi_{sn}\right)}\right]$$

where:

A=the unmodulated carrier voltage

m=the modulation index

C_{sn}=the magnitude of the nth term of the sum signal

C_{dn}=the magnitude of the nth term of the difference signal

ω_{sn}=the nth order angular velocity of the sum signal

ω_{dn}=the nth order angular velocity of the difference signal

ω_c=the angular velocity of the carrier

$$\phi_{sn} = \text{the angle of the nth order term} = \tan^{-1}\left[\frac{B_{sn}}{A_{sn}}\right]$$

$$\phi_{dn} = \text{the angle of the nth order term} = \tan^{-1}\left[\frac{B_{dn}}{A_{dn}}\right]$$

A_{sn} and B_{sn} are the n^{th} sine and cosine coefficients of C_{sn}

A_{dn} and B_{dn} are the n^{th} sine and cosine coefficients of C_{dn}

[58 FR 66301, Dec. 20, 1993]

§ 73.132 Territorial exclusivity.

No licensee of an AM broadcast station shall have any arrangement with a network organization which prevents or hinders another station serving substantially the same area from broadcasting the network's programs not taken by the former station, or which prevents or hinders another station serving a substantially different area from broadcasting any program of the network organization: *Provided, however,* That this section does not prohibit arrangements under which the station is granted first call within its primary service area upon the network's programs. The term ''network organization'' means any organization originating program material, with or without commercial messages, and furnishing the same to stations interconnected so as to permit simultaneous broadcast by all or some of them. However, arrangements involving only stations under common ownership, or only the rebroadcast by one station or programming from another with no compensation other than a lump-sum payment by the station rebroadcasting, are not considered arrangements with a network organization. The term ''arrangement'' means any contract, arrangement or understanding, expressed or implied.

[42 FR 16422, Mar. 28, 1977]

§ 73.150 Directional antenna systems.

(a) For each station employing a directional antenna, all determinations of service provided and interference caused shall be based on the inverse distance fields of the standard radiation pattern for that station. (As applied to nighttime operation the term ''standard radiation pattern'' shall include the radiation pattern in the horizontal plane, and radiation patterns at angles above this plane.)

(1) Parties submitting directional antenna patterns pursuant to this section and § 73.152 (Modified standard pattern) must submit patterns which are tabulated and plotted in units of millivolts per meter at 1 kilometer.

NOTE: Applications for new stations and for changes (both minor and major) in existing stations must use a standard pattern.

(b) The following data shall be submitted with an application for authority to install a directional antenna:

(1) The standard radiation pattern for the proposed antenna in the horizontal plane, and where pertinent, tabulated values for the azimuthal radiation patterns for angles of elevation up to and including 60 degrees, with a separate section for each increment of 5 degrees.

(i) The standard radiation pattern shall be based on the theoretical radiation pattern. The theoretical radiation pattern shall be calculated in accordance with the following mathematical expression:

$$E(\phi,\theta)_{th} = \left| k \sum_{i=1}^{n} F_i \, f_i(\theta) \sqrt{S_i} \cos\theta \cos(\phi_i - \phi) + \psi_i \right| \qquad \text{(Eq. 1)}$$

where:

$E(\varphi,\theta)_{th}$ Represents the theoretical inverse distance fields at one kilometer for the given azimuth and elevation.

k Represents the multiplying constant which determines the basic pattern size. It shall be chosen so that the effective field (RMS) of the theoretical pattern in the horizontal plane shall be no greater than the value computed on the assumption that nominal station power (see § 73.14) is delivered to the directional array, and that a lumped loss resistance of one ohm exists at the current loop of each element of the array, or at the base of each element of electrical height lower than 0.25 wavelength, and no less than the value required by § 73.189(b)(2) of this part for a station of the class and nominal power for which the pattern is designed.