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

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

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:

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

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.

n Represents the number of elements (towers) in the directional array.

i Represents the i^{th} element in the array.

F_i Represents the field ratio of the i^{th} element in the array.

θ Represents the vertical elevation angle measured from the horizontal plane.

$f_i(\theta)$ represents the vertical plane radiation characteristic of the i^{th} antenna. This value depends on the tower height, as well as whether the tower is top-loaded or sectionalized. The various formulas for computing $f_i(\theta)$ are given in §73.160.

S_i Represents the electrical spacing of the i^{th} tower from the reference point.

φ_i Represents the orientation (with respect to true north) of the i^{th} tower.

φ Represents the azimuth (with respect to true north).

ψ_i Represents the electrical phase angle of the current in the i^{th} tower.

The standard radiation pattern shall be constructed in accordance with the following mathematical expression:

$$E(\phi,\theta)_{std} = 1.05\sqrt{\left[E(\phi,\theta)_{th}\right]^2 + Q^2} \qquad \text{(Eq. 2)}$$

where:

$E(\varphi,\theta)_{std}$ represents the inverse distance fields at one kilometer which are produced by the directional antenna in the horizontal and vertical planes. $E(\varphi,\theta)_{th}$ represents the theoretical inverse distance fields at one kilometer as computed in accordance with Eq. 1, above.

Q is the greater of the following two quantities: $0.025g(\theta)\ E_{rss}$ or $10.0g(\theta)\sqrt{P_{kW}}$

where: