§ 73.190 Engineering charts and related formulas.

(a) This section consists of the following Figures: 2, r3, 5, 6a, 7, 8, 9, 10, 11, 12, and 13. Additionally, formulas that are directly related to graphs are included.

(b) Formula 1 is used for calculation of 50% skywave field strength values.

**FORMULA 1.** Skywave field strength, 50% of the time (at SS+6):

\[ F_{c}(50) = (97.5 - 20 \log D) - \left(2 \pi + 4.95 \tan^{2} \phi_{M} \right) \frac{D}{1000} \text{ dB(µV/m)} \]  

Where:

- \( a_{r} \) is the geographic latitude of the transmitting terminal (degrees)
- \( b_{r} \) is the geographic longitude of the transmitting terminal (degrees)
- \( a_{b} \) is the geographic latitude of the receiving terminal (degrees)
- \( b_{b} \) is the geographic longitude of the receiving terminal (degrees)
- \( a_{M} \) is the geographic latitude of the midpoint of the great-circle path (degrees) and is given by:
- \( b_{M} \) is the geographic longitude of the midpoint of the great-circle path (degrees) and is given by:

(c) Formula 2 is used for calculation of 10% skywave field strength values.

**FORMULA 2.** Skywave field strength, 10% of the time (at SS+6):

\[ F_{c}(10) = F_{c}(50) + \Delta \text{ dB(µV/m)} \]  

Where:

- \( \Delta = 6 \) when \( |F_{ad}| < 40 \)
- \( \Delta = 0.2 |F_{ad}| - 2 \) when \( 40 \leq |F_{ad}| \leq 60 \)
- \( \Delta = 10 \) when \( |F_{ad}| > 60 \)

(d) Figure 6a depicts angles of departure versus transmission range. These angles may also be computed using the following formulas:
\[ \theta^\circ = \tan^{-1}\left( k_n \cot \left( \frac{d}{444.54} \right) - \frac{d}{444.54} \right) \]

Where:
- \( d \) = distance in kilometers
- \( n = 1 \) for 50% field strength values
- \( n = 2 \) or 3 for 10% field strength values

and where
- \( K_1 = 0.00752 \)
- \( K_2 = 0.00938 \)
- \( K_3 = 0.00565 \)

NOTE: Computations using these formulas should not be carried beyond 0.1 degree.

(e) In the event of disagreement between computed values using the formulas shown above and values obtained directly from the figures, the computed values will control.
Figure 5

EFFECTIVE FIELD FOR ALL HEIGHTS - 100 MV/M

VERTICAL RADIATION PATTERNS FOR DIFFERENT HEIGHTS OF VERTICAL WIRE ANTENNAS

(SINUSOIDAL CURRENT DISTRIBUTION)

RADIATED POWER - 1 KW
ANGLES OF DEPARTURE VERSUS TRANSMISSION RANGE

1 for use in computing 50% signals
2 and 3 for use in computing 10% signals

\[ \theta = \tan^{-1}\left( k_n \cot \frac{d}{444.54}\right) - \frac{d}{444.54} \]

where:
- \( k_1 = 0.00752 \) (\( h_a = 96.56 \) km)
- \( k_2 = 0.00938 \) (\( h_a = 120.70 \) km)
- \( k_3 = 0.00563 \) (\( h_a = 72.42 \) km)
§ 73.190

47 CFR Ch. I (10–1–11 Edition)

ANTENNAS FOR AM BROADCAST STATIONS

MINIMUM VERTICAL HEIGHT OF ANTENNAS PERMITTED TO BE INSTALLED (A, B, & C):

A. CLASS A STATIONS (EXCEPT ALASKAN), OR
A MINIMUM EFFECTIVE FIELD INTENSITY OF 362 mw/m² FOR 1 kW @ 1 KM

B. WHERE IT IS SHOWN THAT AN ANTENNA OF MORE THAN 152 METERS CANNOT BE APPROVED AT ANY LOCATION WITHIN A METROPOLITAN AREA BECAUSE OF AIR TRAFFIC CONSIDERATION, A HEIGHT OF 152 METERS WILL BE ACCEPTED.

CLASS B, C, D STATIONS, OR
A MINIMUM EFFECTIVE FIELD INTENSITY OF 250 mw/m² FOR 1 kW @ 1 KM

C. CLASS C STATIONS, OR A MINIMUM EFFECTIVE FIELD INTENSITY OF 241 mw/m² FOR 1 kW @ 1 KM
(100 WATTS, 75 mw/m² & 250 WATTS, 125 mw/m²)

D. 8250 WAVELENGTH

E. 8500 WAVELENGTH

F. 8825 WAVELENGTH

Figure 7
Figure 8
PERMISSIBLE DAYTIME RADIATION
FOR CLASS II STATIONS

500 KC

Watts per Meter

Distance from 0.1 MV Contour in Miles

Azimuth

Figure 9
PERMISSIBLE DAYTIME RADIATION
FOR CLASS II STATIONS

1000 KC

Millivolts Per Meter

Distance from G.I. M./M. Contour in Miles

Azimuth

Figure 10
PERMISSIBLE DAYTIME RADIATION FOR CLASS II STATIONS

1600 KC

Figure 11
Subpart B—FM Broadcast Stations

§73.201 Numerical designation of FM broadcast channels.

The FM broadcast band consists of that portion of the radio frequency spectrum between 88 MHz and 108 MHz. It is divided into 100 channels of 200 kHz each. For convenience, the frequencies available for FM broadcasting (including those assigned to non-commercial educational broadcasting) are given numerical designations which are shown in the table below:

<table>
<thead>
<tr>
<th>Frequency (Mc/s)</th>
<th>Channel No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>88.1</td>
<td>201</td>
</tr>
<tr>
<td>88.3</td>
<td>202</td>
</tr>
</tbody>
</table>