monitoring point field strength measurements or antenna proof of performance measurements, and shall be restricted to the minimum time required to accomplish the measurements.

(4) Operating power in the nondirectional mode shall be adjusted to the same power as was utilized for the most recent nondirectional proof of performance covering the licensed facilities.

[50 FR 30947, July 31, 1985]

### § 73.158 Directional antenna monitoring points.

(a) When a licensee of a station using a directional antenna system finds that a field monitoring point, as specified on the station authorization, is no longer accessible or is unsuitable because of nearby construction or other disturbances to the measured field, an application to change the monitoring point location, including FCC Form 302–AM, is to be promptly submitted to the FCC in Washington, DC.

(1) If the monitoring point has become inaccessible or otherwise unsuitable, but there has been no significant construction or other change in the vicinity of the monitoring point which may affect field strength readings, the licensee shall select a new monitoring point from the points measured in the last full proof of performance. A recent field strength measurement at the new monitoring point shall also be provided.

(2) Alternatively, if changes in the electromagnetic environment have affected field strength readings at the monitoring point, the licensee shall submit the results of a partial proof of performance, analyzed in accordance with § 73.154, on the affected radial.

(3) The licensee shall submit an accurate, written description of the new monitoring point in relation to nearby permanent landmarks.

(4) The licensee shall submit a photograph showing the new monitoring point in relation to nearby permanent landmarks that can be used in locating the point accurately at all times throughout the year. Do not use seasonal or temporary features in either the written descriptions or photographs as landmarks for locating field points.

(b) When the description of the monitoring point as shown on the station license is no longer correct due to road or building construction or other changes, the licensee must prepare and file with the FCC, in Washington, DC, a request for a corrected station license showing the new monitoring point description. The request shall include the information specified in paragraphs (a)(3) and (a)(4) of this section, and a copy of the station's current license. A copy of the description is to be posted with the existing station license.

[66 FR 20757, Apr. 25, 2001]

### § 73.160 Vertical plane radiation characteristics, f(θ).

(a) The vertical plane radiation characteristics show the relative field being radiated at a given vertical angle, with respect to the horizontal plane. The vertical angle, represented as θ, is 0 degrees in the horizontal plane, and 90 degrees when perpendicular to the horizontal plane. The vertical plane radiation characteristic is referred to as f(θ). The generic formula for f(θ) is:

$$f(\theta)=E(\theta)/E(O)$$

where:

E(θ) is the radiation from the tower at angle θ.

E(O) is the radiation from the tower in the horizontal plane.

(b) Listed below are formulas for f(θ) for several common towers.

(1) For a typical tower, which is not top-loaded or sectionalized, the following formula shall be used:

$$f(\theta)=\frac{\cos(G\sin\theta)-\cos G}{(1-\cos G)\cos\theta}$$

where:

G is the electrical height of the tower, not including the base insulator and pier. (In the case of a folded unipole tower, the entire radiating structure's electrical height is used.)

(2) For a top-loaded tower, the following formula shall be used:

$$f(\theta) = \frac{\cos B \cos (A \sin \theta) - \sin \theta \sin B \sin (A \sin \theta) - \cos (A + B)}{\cos \theta (\cos B - \cos (A + B))}$$

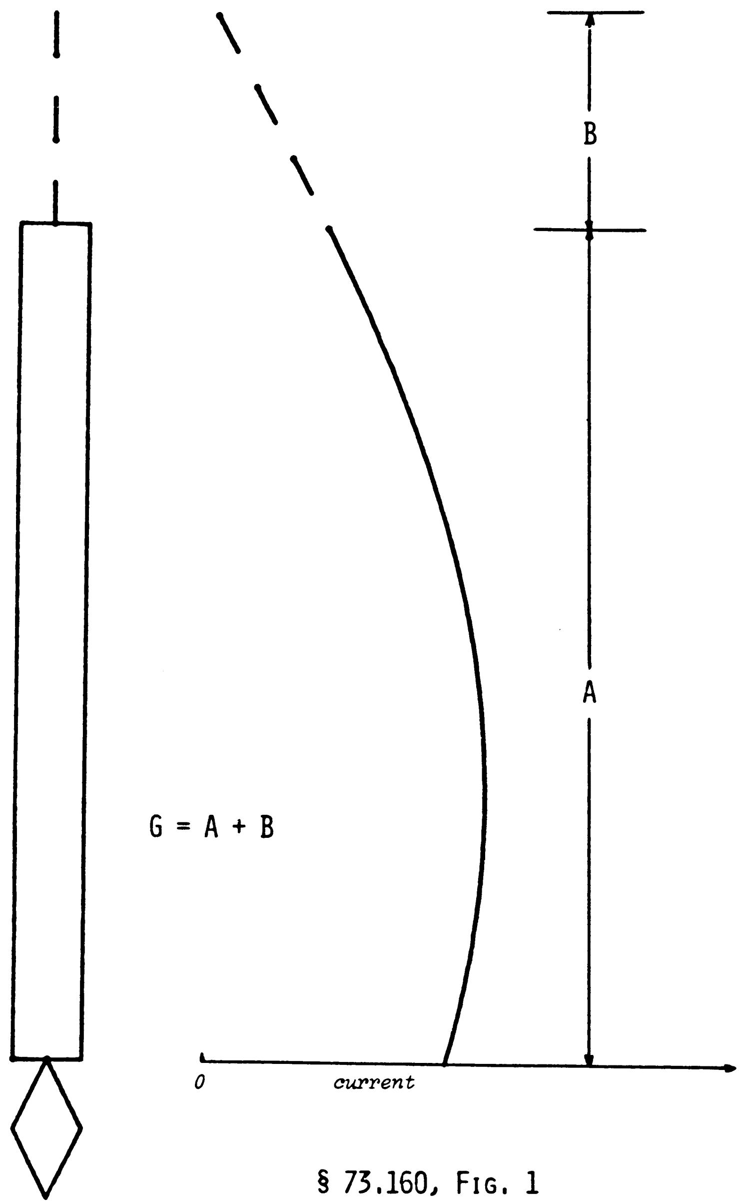
where:

A is the physical height of the tower, in electrical degrees, and

B is the difference, in electrical degrees, between the apparent electrical height (G, based on current distribution) and the actual physical height.

G is the apparent electrical height: the sum of A and B; A+B.

See Figure 1 of this section.




§ 73.160, Fig. 1

(3) For a sectionalized tower, the following formula shall be used:

$$f(\theta) = \frac{\{\sin \Delta\,[\cos B \cos (A \sin \theta) - \cos G] + \sin B\,[\cos D \cos (C \sin \theta) - \sin \theta \sin D \sin (C \sin \theta) - \cos \Delta \cos (A \sin \theta)]\}}{\cos \theta\,[\sin \Delta\,(\cos B - \cos G) + \sin B\,(\cos D - \cos \Delta)]}$$

where:

A is the physical height, in electrical degrees, of the lower section of the tower.

B is the difference between the apparent electrical height (based on current distribution) of the lower section of the tower and the physical height of the lower section of the tower.

C is the physical height of the entire tower, in electrical degrees.

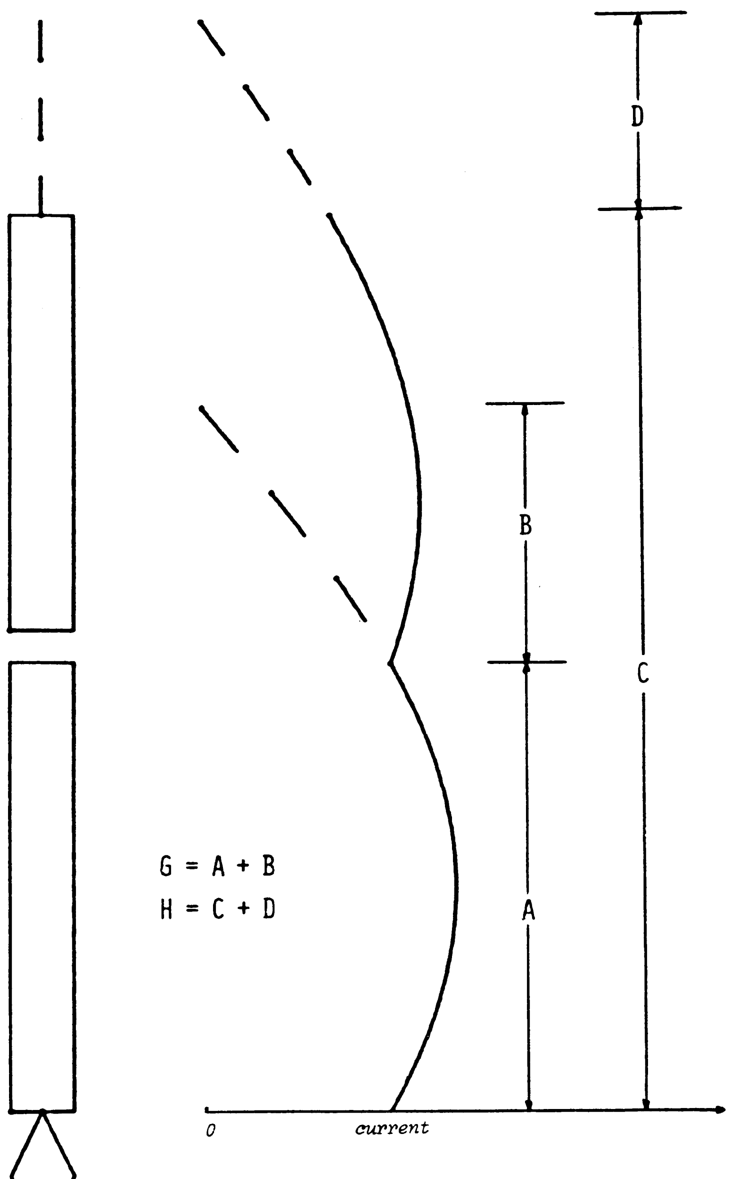
D is the difference between the apparent electrical height of the tower (based on current distribution of the upper section) and the physical height of the entire tower. D will be zero if the sectionalized tower is not top-loaded.

G is the sum of A and B; A+B.

H is the sum of C and D; C+D.

$\Delta$ is the difference between H and A; H−A.

See Figure 2 of this section.




§ 73.160, FIG. 2

(c) One of the above f(θ) formulas *must* be used in computing radiation in the vertical plane, unless the applicant submits a special formula for a particular type of antenna. If a special formula is submitted, it must be accompanied by a complete derivation and sample calculations. Submission of values for f(θ) only in a tabular or graphical format (*i.e.*, without a formula) is not acceptable.

(d) Following are sample calculations. (The number of significant figures shown here should *not* be interpreted as a limitation on the number of significant figures used in actual calculations.)

(1) For a typical tower, as described in paragraph (b)(1) of this section, assume that G=120 electrical degrees:

| θ | f(θ) |
|---|---|
| 0 | 1.0000 |
| 30 | 0.7698 |
| 60 | 0.3458 |

(2) For a top-loaded tower, as described in paragraph (b)(2) of this section, assume A=120 electrical degrees, B=20 electrical degrees, and G=140 electrical degrees, (120+20):

| θ | f(θ) |
|---|---|
| 0 | 1.0000 |
| 30 | 0.7364 |
| 60 | 0.2960 |

(3) For a sectionalized tower, as described in paragraph (b)(3) of this section, assume A=120 electrical degrees, B=20 electrical degrees, C=220 electrical degrees, D=15 electrical degrees, G=140 electrical degrees (120+20), H=235 electrical degrees (220+15), and Δ=115 electrical degrees (235 − 120):

| θ | f(θ) |
|---|---|
| 0 | 1.0000 |
| 30 | 0.5930 |
| 60 | 0.1423 |

[46 FR 11993, Feb. 12, 1981]

## § 73.182 Engineering standards of allocation.

(a) Sections 73.21 to 73.37, inclusive, govern allocation of facilities in the AM broadcast band 535–1705 kHz. § 73.21 establishes three classes of channels in this band, namely, clear, regional and local. The classes and power of AM broadcast stations which will be assigned to the various channels are set forth in § 73.21. The classifications of the AM broadcast stations are as follows:

(1) Class A stations operate on clear channels with powers no less than 10kW nor greater than 50 kW. These stations are designed to render primary and secondary service over an extended area, with their primary services areas protected from objectionable interference from other stations on the same and adjacent channels. Their secondary service areas are protected from objectionable interference from co-channel stations. For purposes of protection, Class A stations may be divided into two groups, those located in any of the contiguous 48 States and those located in Alaska in accordance with § 73.25.

(i) The mainland U.S. Class A stations are those assigned to the channels allocated by § 73.25. The power of these stations shall be 50 kW. The Class A stations in this group are afforded protection as follows:

(A) Daytime. To the 0.1 mV/m groundwave contour from stations on the same channel, and to the 0.5 mV/m groundwave contour from stations on adjacent channels.

(B) Nighttime. To the 0.5 mV/m-50% skywave contour from stations on the same channels.

(ii) Class A stations in Alaska operate on the channels allocated by § 73.25 with a minimum power of 10 kW, a maximum power of 50 kW, and an antenna efficiency of 282 mV/m/kW at 1 kilometer. Stations operating on these channels in Alaska which have not been designated as Class A stations in response to licensee request will continue to be considered as Class B stations. During daytime hours a Class A station in Alaska is protected to the 100 μV/m groundwave contour from co-channel stations. During nighttime hours, a Class A station in Alaska is protected to the 100 μV/m-50 percent skywave contour from co-channel stations. The 0.5 mV/m groundwave contour is protected both daytime and nighttime from stations on adjacent channels.

NOTE: In the Report and Order in MM Docket No. 83–807, the Commission designated 15 stations operating on U.S. clear channels as Alaskan Class A stations. Eleven of these stations already have Alaskan Class A facilities and are to be protected accordingly. Permanent designation of the other