of each element, and ground conductivity.

(v) Where waiver of the content of this section is requested, or upon request of the Commission staff, those formulas used for computing $E(\varphi,\theta)_{th}$ and $E(\varphi,\theta)_{std}$. Complete tabulation of final computed data used in plotting patterns, including data for the determination of the RMS value of the pattern, and the RSS field of the array.

(6) The values used in specifying the parameters which describe the array must be specified to no greater precision than can be achieved with available monitoring equipment. Use of greater precision raises a rebuttable presumption of instability of the array. Following are acceptable values of precision; greater precision may be used only upon showing that the monitoring equipment to be installed gives accurate readings with the specified precision.

(i) Field Ratio: 3 significant figures.

(ii) Phasing: to the nearest 0.1 degree.

(iii) Orientation (with respect to a common point in the array, or with respect to another tower): to the nearest 0.1 degree.

(iv) Spacing (with respect to a common point in the array, or with respect to another tower): to the nearest 0.1 degree.

(v) Electrical Height (for all parameters listed in Section 73.160): to the nearest 0.1 degree.

(vi) Theoretical RMS (to determine pattern size): 4 significant figures.

(vii) Additional requirements relating to modified standard patterns appear in §73.152(c)(3) and (c)(4).

(7) Any additional information required by the application form.

(c) Sample calculations for the theoretical and standard radiation follow. Assume a five kilowatt (nominal power) station with a theoretical RMS of 685 mV/m at one kilometer. Assume that it is an in-line array consisting of three towers. Assume the following parameters for the towers:

Tower	Field ratio	Relative phasing	Relative spacing	Relative orientation
1	1.0	−128.5	0.0	0.0
2	1.89	0.0	110.0	285.0
3	1.0	128.5	220.0	285.0

Assume that tower 1 is a typical tower with an electrical height of 120 degrees. Assume that tower 2 is top-loaded in accordance with the method described in §73.160(b)(2) where A is 120 electrical degrees and B is 20 electrical degrees. Assume that tower 3 is sectionalized in accordance with the method described in §73.160(b)(3) where A is 120 electrical degrees, B is 20 electrical degrees, C is 220 electrical degrees, and D is 15 electrical degrees.

The multiplying constant will be 323.6.

Following is a tabulation of part of the theoretical pattern:

Azimuth	0	30	60	Vertical angle
0	15.98	62.49	68.20	
105	1225.30	819.79	234.54	
235	0.43	18.46	34.56	
247	82.62	51.52	26.38	

If we further assume that the station has a standard pattern, we find that Q, for $\theta=0$, is 22.36.

Following is a tabulation of part of the standard pattern:

Azimuth	0	30	60	Vertical angle
0	28.86	68.05	72.06	
105	1286.78	860.97	246.41	
235	23.48	26.50	37.18	
247	89.87	57.03	28.87	

The RMS of the standard pattern in the horizontal plane is 719.63 mV/m at one kilometer.

[36 FR 919, Jan. 20, 1971, as amended at 37 FR 529, Jan. 13, 1972; 41 FR 24134, June 15, 1976; 46 FR 11991, Feb. 12, 1981; 48 FR 24384, June 1, 1983; 51 FR 2707, Jan. 21, 1986; 52 FR 36877, Oct. 1, 1987; 56 FR 64861, Dec. 12, 1991; 57 FR 43290, Sept. 18, 1992]

§73.151 Field strength measurements to establish performance of directional antennas.

(a) In addition to the information required by the license application form, the following showing must be submitted to establish, for each mode of directional operation, that the effective measured field strength (RMS) at 1 kilometer (km) is not less than 85 percent of the effective measured field strength (RMS) specified for the standard radiation pattern, or less than that specified in §73.189(b) for the class of

station involved, whichever is the higher value, and that the measured field strength at 1 km in any direction does not exceed the field shown in that direction on the standard radiation pattern for that mode of directional operation:

(1) A tabulation of inverse field strengths in the horizontal plane at 1 km, as determined from field strength measurements taken and analyzed in accordance with §73.186, and a statement of the effective measured field strength (RMS). Measurements shall be made in the following directions:

(i) Those specified in the instrument of authorization.

(ii) In major lobes. Generally, one radial is sufficient to establish a major lobe; however, additional radials may be required.

(iii) Along additional radials to establish the shape of the pattern. In the case of a relatively simple directional antenna pattern, a total of six radials is sufficient. If two radials would be more than 90° apart, then an additional radial must be specified within that arc. When more complicated patterns are involved, that is, patterns having several or sharp lobes or nulls, measurements shall be taken along as many as 12 radials to definitely establish the pattern(s). Pattern symmetry may be assumed for complex patterns which might otherwise require measurements on more than 12 radials.

(2) A tabulation of:

(i) The phase difference of the current in each element with respect to the reference element, and whether the current leads (+) or lags (−) the current in the reference element, as indicated by the station's antenna monitor.

(ii) The ratio of the amplitude of the radio frequency current in each element to the current in the reference element, as indicated on the station's antenna monitor.

(3) A monitoring point shall be established on each radial for which the construction permit specifies a limit. The following information shall be supplied for each monitoring point:

(i) Measured field strength.

(ii) An accurate and detailed description of each monitoring point. The description may include, but shall not be limited to, geographic coordinates determined with a Global Positioning System receiver.

(iii) Clear photographs taken with the field strength meter in its measuring position and with the camera so located that its field of view takes in as many pertinent landmarks as possible.

(b) For stations authorized to operate with simple directional antenna systems (e.g., two towers) in the 1605–1705 kHz band, the measurements to support pattern RMS compliance referred to in paragraphs (a)(1)(ii) and (a)(1)(iii) of this section are not required. In such cases, measured radials are required only in the direction of short-spaced allotments, or in directions specifically identified by the Commission.

[36 FR 919, Jan. 20, 1971, as amended at 42 FR 36828, July 18, 1977; 49 FR 23348, June 6, 1984; 50 FR 32416, Aug. 12, 1985; 56 FR 64862, Dec. 12, 1991; 63 FR 33876, June 22, 1998; 66 FR 20756, Apr. 25, 2001]

§73.152 Modification of directional antenna data.

(a) If, after construction and final adjustment of a directional antenna, a measured inverse distance field in any direction exceeds the field shown on the standard radiation pattern for the pertinent mode of directional operation, an application shall be filed, specifying a modified standard radiation pattern and/or such changes as may be required in operating parameters so that all measured effective fields will be contained within the modified standard radiation pattern. Permittees may also file an application specifying a modified standard radiation pattern, even when measured radiation has not exceeded the standard pattern, in order to allow additional tolerance for monitoring point limits.

(b) If, following a partial proof of performance, a licensee discovers that radiation exceeds the standard pattern on one or more radials because of circumstances beyond the licensee's control, a modified standard pattern may be requested. The licensee shall submit, concurrently, Forms 301–AM and 302–AM. Form 301–AM shall include an exhibit demonstrating that no interference would result from the augmentation. Form 302–AM shall include