

fences need not be installed if the towers are contained within a protective property fence.

[51 FR 2707, Jan. 21, 1986]

**§ 73.51 Determining operating power.**

(a) Except in those circumstances described in paragraph (d) of this section, the operating power shall be determined by the direct method. The direct method consists of either:

(1) using a suitable instrument for determining the antenna's input power directly from the RF voltage, RF current, and phase angle; or

(2) calculating the product of the licensed antenna or common point resistance at the operating frequency (see § 73.54), and the square of the indicated unmodulated antenna current at that frequency, measured at the point where the resistance has been determined.

(b) The authorized antenna input power for each station shall be equal to the nominal power for such station, with the following exceptions:

(1) For stations with nominal powers of 5 kW, or less, the authorized antenna input power to directional antennas shall exceed the nominal power by 8 percent.

(2) For stations with nominal powers in excess of 5 kW, the authorized antenna input power to directional antennas shall exceed the nominal power by 5.3 percent.

(3) In specific cases, it may be necessary to limit the radiated field to a level below that which would result if normal power were delivered to the antenna. In such cases, excess power may be dissipated in the antenna feed circuit, the transmitter may be operated with power output at a level which is less than the rated carrier power, or a combination of the two methods may be used, subject to the conditions given in paragraph (c) of this section.

(i) Where a dissipative network is employed, the authorized antenna current and resistance, and the authorized antenna input power shall be determined at the input terminals of the dissipative network.

(ii) Where the authorized antenna input power is less than the nominal power, subject to the conditions set forth in paragraph (c) of this section,

the transmitter may be operated at the reduced power level necessary to supply the authorized antenna input power.

(c) Applications for authority to operate with antenna input power which is less than nominal power and/or to employ a dissipative network in the antenna system shall be made on FCC Form 302. The technical information supplied on section II-A of this form shall be that applying to the proposed conditions of operation. In addition, the following information shall be furnished, as pertinent:

(1) Full details of any network employed for the purpose of dissipating radio frequency energy otherwise delivered to the antenna (see § 73.54).

(2) A showing that the transmitter has been type accepted or notified for operation at the proposed power output level, or, in lieu thereof:

(i) A full description of the means by which transmitter output power will be reduced.

(ii) Where the proposed transmitter power output level(s) is less than 90% of the rated power of the transmitter, equipment performance measurements must be made to confirm that the station transmissions conform to the emission limitation specified in § 73.44, under all conditions of program operation.

(iii) A showing that, at the proposed power output level, means are provided for varying the transmitter output within a tolerance of  $\pm 10$  percent, to compensate for variations in line voltage or other factors which may affect the power output level.

(d) When it is not possible or appropriate to use the direct method of power determination due to technical reasons, the indirect method of determining operating power (see paragraphs (e) and (f) of this section) may be used on a temporary basis. A notation must be made in the station log indicating the dates of commencement and termination of measurement using the indirect method of power determination.

(e) The antenna input power is determined indirectly by applying an appropriate factor to the input power to the last radio-frequency power amplifier

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stage of the transmitter, using the following formula:

Where:

$$\text{Antenna input power} = E_p \times I_p \times F$$

$E_p$ =DC input voltage of final radio stage.

$I_p$ =Total DC input current of final radio stage.

$F$ = Efficiency factor.

(1) If the above formula is not appropriate for the design of the transmitter final amplifier, use a formula specified by the transmitter manufacturer with other appropriate operating parameters.

(2) The value of  $F$  applicable to each mode of operation must be determined and a record kept thereof with a notation as to its derivation. This factor is to be established by one of the methods described in paragraph (f) of this section and retained in the station records.

(f) The value of  $F$  is to be determined by one of the following procedures listed in order of preference:

(1) If the station had previously been authorized and operating by determining the antenna input power by the direct method, the factor  $F$  is the ratio of the antenna input power (determined by the direct method) to the corresponding final radio frequency power amplifier input power.

(2) If a station has not been previously in regular operation with the power authorized for the period of indirect power determination, if a new transmitter has been installed, or if, for any other reason, the determination of the factor  $F$  by the method described in paragraph (f)(1) of this section is impracticable:

(i) The factor  $F$  as shown in the transmitter manufacturer's test report, if such a test report specifies a unique value of  $F$  for the power level and frequently used; or

(ii) The value determined by reference to the following table:

Factor(F)	Method of modulation	Maximum rated carrier power	Class of amplifier
0.70	Plate .....	1 kW or less .....	B BC <sup>1</sup>
.80	Plate .....	2.5 kW and over .....	
.35	Low level .....	0.25 kW and over .....	
.65	Low level .....	0.25 kW and over .....	
.35	Grid .....	0.25 kW and over .....	

<sup>1</sup> All linear amplifier operation where efficiency approaches that of class C operation.

(Secs. 4, 5, 303, 48 Stat., as amended, 1066, as amended, 1068, 1082, as amended; 47 U.S.C. 154, 155, 303. Interpret or apply secs. 301, 303, 307, 48 Stat. 1081, 1082, as amended, 47 U.S.C. 301, 303, 307)

[37 FR 7516, Apr. 15, 1972, as amended at 42 FR 36827, July 18, 1977; 42 FR 61863, Dec. 7, 1977; 44 FR 36036, June 20, 1979; 47 FR 28387, June 30, 1982; 48 FR 38477, Aug. 24, 1983; 48 FR 44805, Sept. 30, 1983; 49 FR 3999, Feb. 1, 1984; 49 FR 4210, Feb. 3, 1984; 49 FR 49850, Dec. 24, 1984; 50 FR 24521, June 11, 1985; 52 FR 10570, Apr. 2, 1987]

**§ 73.53 Requirements for authorization of antenna monitors.**

(a) Antenna monitors shall be verified for compliance with the technical requirements in this section. The procedure for verification is specified in subpart J of part 2 of the FCC's rules.

(b) An antenna monitor shall meet the following specifications:

(1) The monitor shall be designed to operate in the 535-1705 kHz band.

(2) The monitor shall be capable of indicating any phase difference between two RF voltages of the same frequency over a range of from 0 to 360°.

(3) The monitor shall be capable of indicating the relative amplitude of two RF voltages.

(4) The device used to indicate phase differences shall indicate in degrees, and shall be graduated in increments of 2°, or less. If a digital indicator is provided, the smallest increment shall be 0.5°, or less.

(5) The device used to indicate relative amplitudes shall be graduated in increments which are 1 percent, or less, of the full scale value. If a digital indicator is provided, the smallest increment shall be 0.1 percent, or less, of the full scale value.

(6) The monitor shall be equipped with means, if necessary, to resolve ambiguities in indication.

(7) If the monitor is provided with more than one RF input terminal in addition to a reference input terminal, appropriate switching shall be provided in the monitor so that the signal at each of these RF inputs may be selected separately for comparison with the reference input signal.

(8) Each RF input of the monitor shall provide a termination of such characteristics that, when connected