§ 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.

(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:

(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.

(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
§ 73.53

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 stage of the transmitter, using the following formula:

Where:
Antenna input power = $\text{Ep} \times \text{Ip} \times F$

$\text{Ep} =$ Total DC input voltage of final radio stage.

$\text{Ip} =$ 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:

<table>
<thead>
<tr>
<th>Factor ($F$)</th>
<th>Method of modulation</th>
<th>Maximum rated carrier power</th>
<th>Class of amplifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.70 Plate</td>
<td>1 kW or less</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>0.80 Plate</td>
<td>2.5 kW and over</td>
<td></td>
<td>BC</td>
</tr>
<tr>
<td>0.65 Low level</td>
<td>0.25 kW and over</td>
<td></td>
<td>BC 1</td>
</tr>
<tr>
<td>0.35 Grid</td>
<td>0.25 kW and over</td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>

*All linear amplifier operation where efficiency approaches that of class C operation.


§ 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