

frequency and of equal or lower amplitude is applied to any other selected RF input terminal, indications shall be provided meeting the following specifications.

(i) The accuracy with which any difference in the phases of the applied signals is indicated shall be $\pm 1^\circ$, or better, for signal amplitude ratios of from 2:1 to 1:1, and $\pm 2^\circ$, or better, for signal amplitude ratios in excess of 2:1 and up to 5:1.

(ii) The repeatability of indication of any difference in the phases of the applied signals shall be $\pm 1^\circ$, or better.

(iii) The accuracy with which the relative amplitudes of the applied signals is indicated, over a range in which the ratio of these amplitudes is between 2:1 and 1:1, shall be ± 2 percent of the amplitude ratio, or better, and for amplitude ratios in excess of 2:1 and up to 5:1, ± 5 percent of the ratio, or better.

(iv) The repeatability of indication of the relative amplitudes of the applied signals, over a range where the ratio of these amplitudes is between 5:1 and 1:1, shall be ± 2 percent of the amplitude ratio, or better.

(v) The modulation of the RF signals by a sinusoidal wave of any frequency between 100 and 10,000 Hz, at any amplitude up to 90 percent shall cause no deviation in an indicated phase difference from its value, as determined without modulation, greater than $\pm 0.5^\circ$.

(12) The performance specifications set forth in paragraph (c)(13) of this section, shall be met when the monitor is operated and tested under the following conditions.

(i) After continuous operation for 1 hour, the monitor shall be calibrated and adjusted in accordance with the manufacturer's instructions.

(ii) The monitor shall be subjected to variations in ambient temperature between the limits of 10 and 40°C; external meters furnished by the manufacturer will be subjected to variations between 15 and 30°C.

(iii) Powerline supply voltage shall be varied over a range of from 10 percent below to 10 percent above the rated supply voltage.

(iv) The amplitude of the reference signal shall be varied over the operating range specified by the manufac-

turer, and in any case over a range of maximum to minimum values of 3 to 1.

(v) The amplitude of the comparison signal shall be varied from a value which is 0.2 of the amplitude of the reference signal to a value which is equal in amplitude to the reference signal.

(vi) Accuracy shall be determined for the most adverse combination of conditions set forth above.

(vii) Repeatability shall be determined as that which may be achieved under the specified test conditions over a period of 7 days, during which no calibration or adjustment of the instrument, subsequent to the initial calibration, shall be made.

(viii) The effects of modulation of the RF signal shall be separately determined, and shall not be included in establishing values for accuracy and repeatability.

(c) A station determined to have a critical directional antenna must use an antenna monitor having high tolerance characteristics determined on an individual basis, and specified on the station authorization. Such monitors are not subject to the authorization of paragraph (a), however they may be used only at the station for which they were specified.

NOTE: In paragraph (b)(1) of this section, the requirement that monitors be capable of operation in the 535-1705 kHz band shall apply only to equipment manufactured after July 1, 1992. Use of a monitor in the 1605-1705 kHz band which is not approved for such operation will be permitted pending the general availability of 535-1705 kHz band monitors if a manufacturer can demonstrate, in the interim, that its monitor performs in accordance with the standards in this section on these 10 channels.

(Secs. 4, 5, 303, 48 Stat., as amended, 1066, 1068, 1082 (47 U.S.C. 154, 155, 303))

[38 FR 1917, Jan. 19, 1973, as amended at 49 FR 3999, Feb. 1, 1984; 49 FR 29069, July 18, 1984; 50 FR 32416, Aug. 12, 1985; 50 FR 47054, Nov. 14, 1985; 51 FR 2707, Jan. 21, 1986; 56 FR 64859, Dec. 12, 1991; 57 FR 43290, Sept. 18, 1992; 60 FR 55480, Nov. 1, 1995; 63 FR 36604, July 7, 1998]

§ 73.54 Antenna resistance and reactance measurements.

(a) The resistance of an omnidirectional series fed antenna is measured at either the base of the antenna without intervening coupling or

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tuning networks, or at the point the transmission line connects to the output terminals of the transmitter. The resistance of a shunt excited antenna may be measured at the point the radio frequency energy is transferred to the feed wire circuit or at the output terminals of the transmitter.

(b) The resistance and reactance of a directional antenna shall be measured at the point of common radiofrequency input to the directional antenna system. The following conditions shall obtain:

(1) The antenna shall be finally adjusted for the required radiation pattern.

(2) The reactance at the operating frequency and at the point of measurement shall be adjusted to zero, or as near thereto as practicable.

(c)(1) The resistance of an antenna shall be determined by the following procedure: A series of discrete measurements shall be made over a band of frequencies extending from approximately 25 kHz below the operating frequency to approximately 25 kHz above that frequency, at intervals of approximately 5 kHz. The measured values shall be plotted on a linear graph, with frequency as the abscissa and resistance as the ordinate. A smooth curve shall be drawn through the plotted values. The resistance value corresponding to the point of intersection of the curve and the ordinate representing the operating frequency of the station shall be the resistance of the antenna.

(2) For a directional antenna, the reactance of the antenna shall be determined by a procedure similar to that described in paragraph (c)(1) of this section.

(d) A letter of notification must be filed with the FCC in Washington, DC, Attention: Audio Services Division, Mass Media Bureau, when determining power by the direct method pursuant to § 73.51 and must specify the antenna or common point resistance at the operating frequency. The following information must also be kept on file at the station:

(1) A full description of the method used to make measurements.

(2) A schematic diagram showing clearly all components of coupling cir-

cuits, the point of resistance measurement, the location of the antenna ammeter, connections to and characteristics of all tower lighting isolation circuits, static drains, and any other fixtures connected to and supported by the antenna, including other antennas and associated networks. Any network or circuit component used to dissipate radio frequency power shall be specifically identified, and the impedances of all components which control the level of power dissipation, and the effective input resistance of the network must be indicated.

(e) AM stations using direct reading power meters in accordance with § 73.51, can either submit the information required by paragraph (d) of this section or submit a statement indicating that such a meter is being used. Subsequent station licenses will indicate the use of a direct reading power meter in lieu of the antenna resistance value in such a situation.

[34 FR 18305, Nov. 15, 1969, as amended at 37 FR 7517, Apr. 15, 1972; 45 FR 26062, Apr. 17, 1980; 49 FR 49850, Dec. 24, 1984; 50 FR 32416, Aug. 12, 1985; 51 FR 2707, Jan. 21, 1986; 51 FR 26250, July 22, 1986; 63 FR 33876, June 22, 1998]

§ 73.57 Remote reading antenna and common point ammeters.

Remote reading antenna and common point ammeters may be used without further authority according to the following conditions:

(a) Remote reading antenna or common point ammeters may be provided by:

(1) Inserting second radio frequency current sensing device directly in the antenna circuit with remote leads to the indicating instruments.

(2) Inductive coupling to radio frequency current sensing device for providing direct current to indicating instrument.

(3) Capacity coupling to radio frequency current sensing device for providing direct current to indicating instrument.

(4) Current transformer connected to radio frequency current sensing device for providing direct current to indicating instrument.

(5) Using transmission line current meter at transmitter as remote reading