RECOMMENDATION 468-4*

MEASUREMENT OF AUDIO-FREQUENCY NOISE VOLTAGE LEVEL IN SOUND BROADCASTING

(Question 50/10)

(1970-1974-1978-1982-1986)

The CCIR,

CONSIDERING

(a) that it is desirable to standardize the methods of measurement of audio-frequency noise in broadcasting, in sound-recording systems and on sound-programme circuits;

(b) that such measurements of noise should provide satisfactory agreement with subjective assessments,

UNANIMOUSLY RECOMMENDS

that the noise voltage level be measured in a quasi-peak and weighted manner, using the measurement system defined below:

1. Weighting network

The nominal response curve of the weighting network is given in Fig. 1b which is the theoretical response of the passive network shown in Fig. 1a. Table I gives the values of this response at various frequencies.

The permissible differences between this nominal curve and the response curve of the measuring equipment, comprising the amplifier and the network, are shown in the last column of Table I and in Fig. 2.

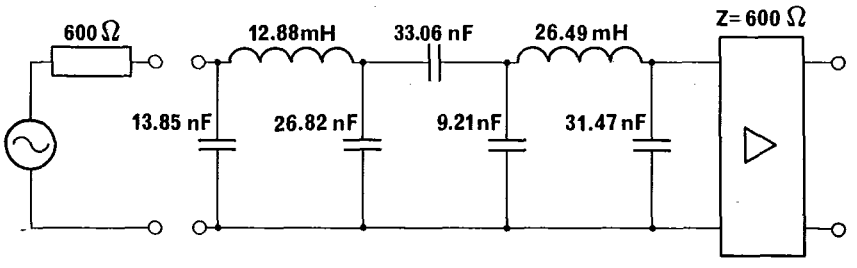

FIGURE 1a – *Weighting network, simple form*

(A constant-resistance realization is described in Annex I)

A tolerance of at most 1% on the component values and a Q-factor of at least 200 at 10 000 Hz are sufficient to meet the tolerances given in Table I.

(The difference between the responses at 1000 Hz and 6300 Hz may be adjusted more precisely by a small adjustment of the 33.06 nF capacitor or by a different approach using an active filter [CCIR, 1982-86a].)

* This Recommendation should be brought to the attention of the CMTT.

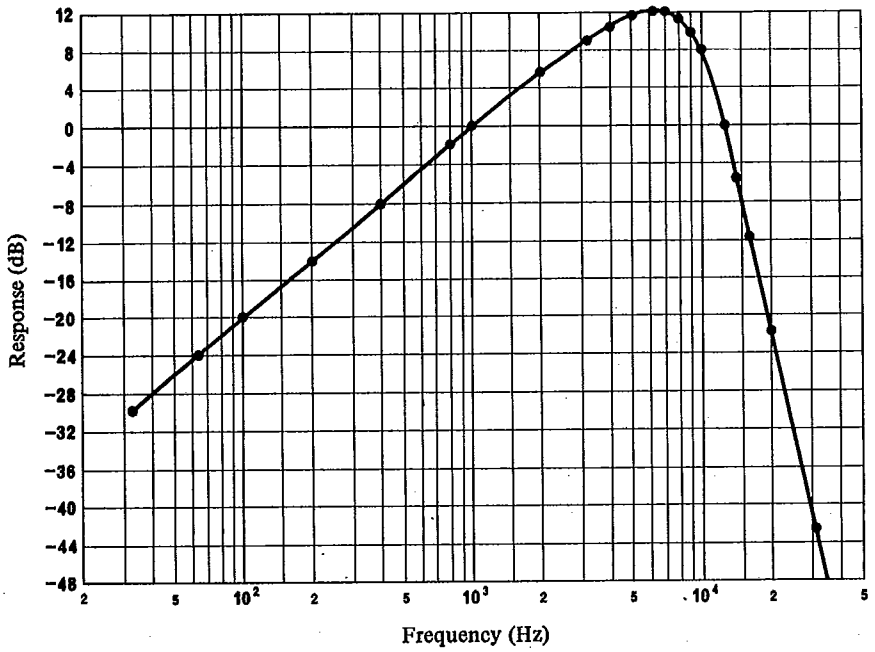

FIGURE 1b – *Frequency response of the weighting network shown in Fig. 1a*

TABLE I

Frequency (Hz)	Response (dB)	Proposed tolerance (dB)
31.5	−29.9	±2.0
63	−23.9	±1.4(1)
100	−19.8	±1.0
200	−13.8	±0.85(1)
400	− 7.8	±0.7(1)
800	− 1.9	±0.55(1)
1 000	0	±0.5
2 000	+ 5.6	±0.5
3 150	+ 9.0	±0.5(1)
4 000	+10.5	±0.5(1)
5 000	+11.7	±0.5
6 300	+12.2	0
7 100	+12.0	±0.2(1)
8 000	+11.4	±0.4(1)
9 000	+10.1	±0.6(1)
10 000	+ 8.1	±0.8(1)
12 500	0	±1.2(1)
14 000	− 5.3	±1.4(1)
16 000	−11.7	±1.6(1)
20 000	−22.2	±2.0
31 500	−42.7	+2.8(1) − ∞

(1) This tolerance is obtained by a linear interpolation on a logarithmic graph on the basis of values specified for the frequencies used to define the mask, i.e., 31.5, 100, 1000, 5000, 6300 and 20000 Hz.

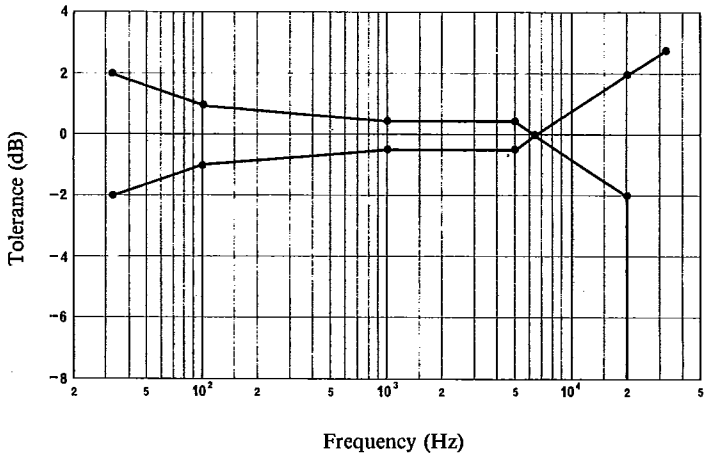

FIGURE 2 – *Maximum tolerances for the frequency response of the weighting network and the amplifier*

Note 1 – When a weighting filter conforming to § 1 is used to measure audio-frequency noise, the measuring device should be a quasi-peak meter conforming to § 2. Indeed, the use of any other meter (e.g. an r.m.s. meter) for such a measurement would lead to figures for the signal-to-noise ratio that are not directly comparable with those obtained by using the characteristics that are described in the present Recommendation.

Note 2 – The whole instrument is calibrated at 1 kHz (see § 2.6).

2. Characteristics of the measuring device

A quasi-peak value method of measurement shall be used. The required dynamic performance of the measuring set may be realized in a variety of ways (see Note). It is defined in the following sections. Tests of the measuring equipment, except those for § 2.4, should be made through the weighting network.

Note – After full wave rectification of the input signal, a possible arrangement would consist of two peak rectifier circuits of different time constants connected in tandem [CCIR, 1974-78].

2.1 *Dynamic characteristic in response to single tone-bursts*

Method of measurement

Single bursts of 5 kHz tone are applied to the input at an amplitude such that the steady signal would give a reading of 80% of full scale. The burst should start at the zero-crossing of the 5 kHz tone and should consist of an integral number of full periods. The limits of reading corresponding to each duration of tone burst are given in Table II.

The tests should be performed both without adjustment of the attenuators, the readings being observed directly from the instrument scale, and also with the attenuators adjusted for each burst duration to maintain the reading as nearly constant at 80% of full scale as the attenuator steps will permit.

2.2 *Dynamic characteristic in response to repetitive tone-bursts*

Method of measurement

A series of 5 ms bursts of 5 kHz tone starting at zero-crossing is applied to the input at an amplitude such that the steady signal would give a reading of 80% of full scale. The limits of the reading corresponding to each repetition frequency are given in Table III.

The tests should be performed without adjustment of the attenuators but the characteristic should be within tolerance on all ranges.