

SMPTE STANDARD

SMPTE 211M-2001

Revision of
ANSI/SMPTE 211M-1996

for Motion-Picture Film — 16- and 35-mm Variable-Area Photographic Audio Records — Signal-to-Noise Ratio



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1 Scope

This standard specifies a method for measuring the signal-to-noise ratio of 16- and 35-mm variable-area photographic audio records.

2 Definitions

2.1 biased, unmodulated audio record: A variable-area audio record with no input to the photographic audio recorder, but with noise-reduction biasing used in accordance with normal practice for the recorder being used.

2.2 fully-modulated audio record: A variable-area audio record which has an amplitude equal to the maximum amplitude permitted by the applicable standard defining the dimensions of the photographic audio records (see annex B).

2.3 system noise: The noise output of the reproducer itself.

2.4 unbiased, unmodulated audio record: A variable-area audio record recorded with no input to the photographic audio recorder, and with no noise-reduction biasing.

2.5 weighting network: A circuit which alters the frequency response of the measuring apparatus by a prescribed amount to provide agreement between the measured signal-to-noise ratio and the subjective impression of noisiness.

3 Test method

3.1 Test track

The test track shall consist of three sections, recorded in sequence at the same lamp-current setting and printed at the same light step.

3.1.1 Section 1 shall consist of an audio record of 1000 Hz recorded at 80% of full modulation and shall serve as the reference signal. The length of this section shall provide about 10 seconds of running time. When reproduced, this section shall have less than 5% harmonic distortion.

3.1.2 Section 2 shall be recorded with an unbiased, unmodulated audio record. The length of this section shall provide about 15 seconds of running time.

3.1.3 Section 3 shall be recorded with a biased, unmodulated audio record. The length of this section shall provide about 15 seconds of running time.

3.2 Test measurements

3.2.1 The test track described in 3.1 shall be recorded and developed under standard conditions for the system being checked. There shall be sufficient unspliced film ahead of the test track to permit stabilization of printer speed.

3.2.2 The test track shall be reproduced, and the output of the reproducer shall be measured with the required test apparatus (see 4.1 through 4.4). The signal level of section 1 (the reference signal) shall be measured without the weighting

network, and the signal level of sections 2 and 3 shall be measured with the weighting network. The unbiased, unmodulated signal-to-noise ratio (A) in decibels, shall be calculated as follows:

$$A = 20 \log \frac{V_{s1}}{V_{s2}} + 2 \text{ dB}$$

where V_{s1} is the signal level of section 1 in volts and V_{s2} is the signal level of section 2 in volts.

The biased, unmodulated signal-to-noise ratio (B), in decibels, shall be calculated as follows:

$$B = 20 \log \frac{V_{s1}}{V_{s3}} + 2 \text{ dB}$$

where V_{s1} is the signal level of section 1 in volts and V_{s3} is the signal level of section 3 in volts.

3.2.3 Following the above measurements, the system noise shall be measured with the required test apparatus with the exciter lamp on, all driving and take-up motors on, and a 0.4 neutral-density filter placed at or near the film plane. The signal-to-system-noise ratio (C), in decibels, shall be calculated as follows:

$$C = 20 \log \frac{V_{s1}}{V_n} + 2 \text{ dB}$$

where V_{s1} is the signal level of section 1 in volts and V_n is the signal level of system noise in volts.

If the signal-to-system-noise ratio is not at least 10 dB greater than the unbiased, unmodulated signal-to-

noise ratio or the biased, unmodulated signal-to-noise ratio, whichever is greater, the system signal-to-noise ratio measurement shall be reported with the audio track signal-to-noise ratios.

4 Test equipment

4.1 Measuring devices

Two types of measuring devices may be used:

Type ITU/ARM consists of a weighting circuit with unity gain at 2000 Hz and an average response voltmeter. The system is described in 4.2.

Type ITU consists of a weighting network with unity gain at 1000 Hz and a quasi-peak response voltmeter. The system is described in 4.3.

Type ITU measurements should be made when the system to be measured contains significant amounts of impulse noise. The readings made on the two measuring systems are generally different and cannot be compared. The type of measurement used shall be stated when giving the result.

4.2 ITU/ARM measuring apparatus

An acceptable signal-to-noise measuring apparatus is shown in figure 1.

4.2.1 Weighting network

4.2.1.1 The nominal response of the weighting network shall vary with frequency in accordance with the numerical values shown in the second column in table 1.

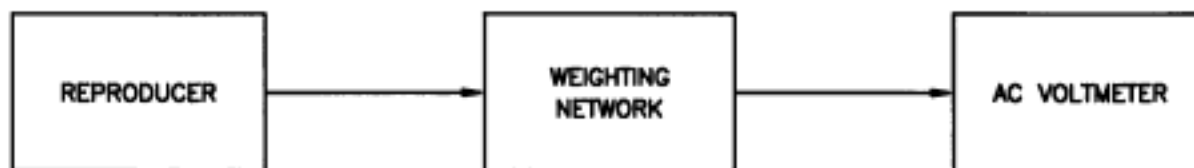


Figure 1 – Measuring apparatus for signal-to-noise ratio