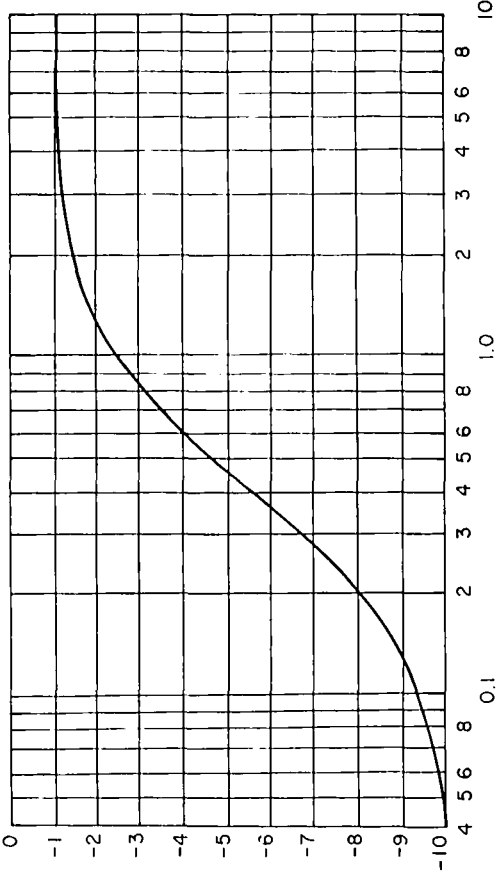


# SMPTÉ ENGINEERING GUIDELINE

## Recording Level for Dialog in Motion-Picture Production



Video Pre-emphasis Characteristic

### 1. Purpose

This guideline provides specifications for recording dialog under conditions normally encountered in motion-picture production. The use of a typical portable analog 1/4-in. tape recorder operating at 7.5 in/s is assumed. Variations on typical uses are described in the appendix.

### 2. Scope

Many factors can limit the performance of production audio recordings; among them are acoustic noise and reverberation on the set; placement, directionality, and frequency response of microphones; microphone preamplifier performance; and many others. The objective of this guideline is to outline only those factors which are controlled by the setting of level controls which result in how much flux is recorded on the tape. A background section enumerates some of the problems resulting from under- and over-recording, with the objective being the best possible level-setting practice.

A specification section gives recommendations for the levels to be used for the peaks of dialog as measured by vu meters or by quasi-peak-responding meters. The specifications were developed from accumulated experience with varying recording conditions, tape types, etc.

The guideline describes two methods for production recording of dialog: (a) when a production mixer is fed to a 1/4-in. recorder, or (b) when audio from microphones is fed directly into a 1/4-in. production recorder.

### 3. Background

3.1 This guideline was developed with input from the Subcommittee on Audio Production and Post-Production for Motion-Picture and Television Entertainment Programming. The subcommittee found that tapes made in production were often over recorded, leading to excessive print-through and distortion. Thus, a guideline outlining good practice was desirable. Several reasons may exist for the tendency to over-record, including a low sound pressure level available in headphone moni-

tors which the recordist must use to remain on the set.

3.2 Under-recording. Under-recording causes excessive noise due to tape hiss when the recorded level must subsequently be raised when dubbing to further generations.

3.3 Over-recording. Over-recording may result in

3.3.1 Audible Distortion on Peaks of Modulation. Such distortion can only become worse in subsequent dubbing because the distortion accumulates from generation to generation.

3.3.2 Print-through. "Print" from layer-to-layer of the stored tape occurs because the most susceptible magnetic domains in a given layer of oxide can be magnetized by flux from adjacent layers. The result is pre- and post-echoes polluting recordings. Print-through is often the single most limiting factor in the performance of dialog recordings, since dialog recorded on a quiet, non-reverberant set or location consists of syllables of speech interspersed with virtual silence, which affords an opportunity for print-through to become audible.

### 4. Specifications

4.1 When a production mixer which uses a vu meter is connected to a 1/4-in. recorder with a quasi-peak-responding meter, a reference tone of 1 kHz shall be used to set an indication of "0" on the vu meter of the mixer, and the line input control of the recorder shall be set to read -10 dB on the quasi-peak-responding meter.

4.2 With this calibration, peaks of dialog should normally be recorded no higher than 0 dB on the vu meter. With a 10-dB offset between the vu meter and the quasi-peak-responding meter, the peaks of dialog on the quasi-peak-responding meter should, for most typical dialog recordings, also read no higher than 0 dB.

4.3 When no external mixer is used for recording, peaks of dialog should normally not exceed 0 dB on the quasi-peak-responding meter.

## Appendix

(This Appendix is not part of the SMPTE Engineering Guideline, but is included for information only.)

A1. The majority of production recorders are factory set to record a flux level of 320 nanowebers per meter (nWb/m) with a "0" reading at 1 kHz on a quasi-peak-responding meter for 7.5 in/s recording. This guideline is for these recorders; for recorders with other reference levels, the peaks should correspond to 320 nWb/m.

A2. The vu meter is specified in American National Standard Volume Measurements of Electrical Speech and Program Waves, ANSI/IEEE 152-1953 (R1976). The quasi-peak-responding meter, often called a modulator, is specified in IEC Publication 268-10A (1978), Programme Level Meters. The faster integration time of the quasi-peak-responding meter, a factor of approximately 30, leads to the higher levels shown by the quasi-peak-responding meter on speech and other program material than on sine-wave tones.

A3. The guideline is written for analog recorders without companding noise reduction. If noise reduction is em-

ployed, greater freedom from the audibility of print-through and lower noise permits leaving greater headroom for unexpected peaks of dialog, so the recommendation to record peaks of dialog at "0" is retained, but additional headroom is available for unexpected peaks.

A4. Magnetic tapes vary by as much as 10 dB in their signal-to-print characteristics. Choice of a "low print" tape could be as much as 10 dB better than another choice.

A5. Measures which can be used to minimize print-through, besides use of special "low print" tape, are to maintain proper storage conditions, especially not exposing the tape to excessively high temperatures, and storing the tape tails out.

### Reference

William A. Manly, "Thinking about Print-Through," Audio, 61:54 ff., Sept. 1977.

# Cinematography — A-chain frequency response for reproduction of 35 mm photographic sound — Reproduction characteristics

## 1 Scope and field of application

This International Standard specifies the A-chain electrical frequency response characteristic for photographic sound reproduction in motion-picture control rooms and indoor theatres. It is intended, in conjunction with ISO 2969, to assist in the standardization of recording monitor and reproduction characteristics of motion-picture sound dubbing theatres, review rooms and indoor theatres. This International Standard covers that part of the motion-picture sound system from the transducer to the input terminals of the main fader.

## 2 References

ISO 2969, *Cinematography — Electro-acoustic response of motion-picture control rooms and indoor theatres — Specifications and measurements.*  
ISO 6025, *Cinematography — Photographic-monophonic sound test films — Specifications.*

## 3 Definitions

For the purpose of this International Standard, the following definitions apply.

**3.1 complete sound reproduction system :** A system used (see figure 1) in sound dubbing theatres, review rooms and indoor theatres; by convention consists of an "A-chain and a B-chain".

**3.2 type 1 sound track** (also known as an academy sound track): A conventional pre-emphasized photographic sound track, which is intended for replay over conventionally de-emphasized theatre playback systems.

**3.3 type 2 sound track :** This equalization in recording and reproduction is only applied to some magnetic tracks and is outside the scope of this International Standard.

**3.4 type 3 sound track :** A photographic sound track which has been pre-emphasized and is intended for replay over a theatre loudspeaker system aligned to Curve X of ISO 2969.

NOTE — A type 3 sound track will normally require decoding with an electronic noise reduction system decoder.

**3.5 A-chain (transducer system):** The "A" part of a motion-picture sound system (see figure 1), which extends from the transducer to the input terminals of the main fader.

NOTE — It is customary for the A-chain to contain the necessary de-emphasis network for the replay of type 1 sound tracks. In some theatres part of the de-emphasis characteristic may result from aperture loss. Type 3 sound tracks do not require use of a de-emphasis network and aperture loss will normally require the use of noise reduction decoding circuitry.

**3.6 B-chain (final chain):** The "B" part of a motion-picture reproduction system (see figure 1), which extends from the input terminals of the main fader to the listening area of the room or auditorium.

NOTE — Two B-chain characteristics are described in ISO 2969, identified as curves N and X.

## 4 Method of measurement

The electrical response shall be measured across the fader input terminals or at an equivalent position, using a high impedance voltmeter accurate from 20 Hz to 20 kHz  $\pm$  1 dB.

## 5 Characteristics

When a multi-frequency photographic test film, conforming to ISO 6025, is played on the reproducer, the measured frequency response characteristic shall be within the tolerances of the curves given in tables 1 and 2.

**5.1** Column two of table 1 represents current practice for the replay of type 1 sound tracks over curve N B-chain.

**5.2** Column three of table 1 represents current practice for the replay of type 1 sound tracks over a curve X B-chain.

**5.3** Column four of table 1 represents current practice for the replay of type 3 sound tracks over a curve X B-chain.

NOTE — In some theatres, it may not be possible to separate the overall A + B responses. For reference purposes, therefore, table 2 and figure 3 show the total "A + B" responses.