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 modulometer, 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 employed, 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 ± 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.

Table 1 — A-chain frequency response for reproduction of 35 mm photographic sound

Frequency	Type 1 sound track for use with curve N B-chain	Type 1 sound track for use with curve X B-chain	Type 3 sound track for use with curve X B-chain	Tolerances
Hz	dB	dB	dB	dB
40	0	0	0	± 2
63	0	0	0	
125	0	0	0	± 1
250	0	0	0	
500	0	0	0	
1 000	0	0	0	
2 000	− 1,0	− 1,0	0	
2 500	− 2,0	− 2,0	0	
3 150	− 3,0	− 3,0	0	
4 000	− 4,0	− 4,5	0	
5 000	− 5,0	− 6,5	0	
6 300	− 6,0	− 9,0	0	
7 100	− 7,0	− 10,5	0	
8 000	− 7,5	− 12,0	0	
9 000	− 8,0	− 14,0	0	
10 000	− 9,0	− 16,0	0	

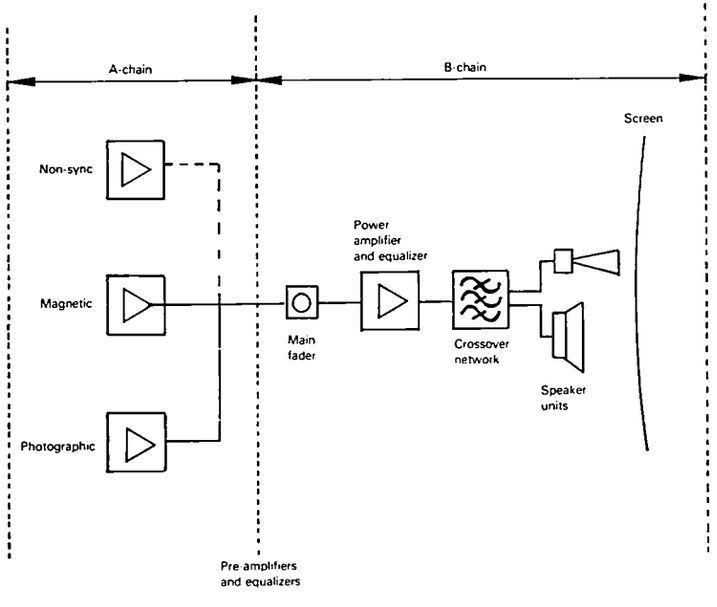

Figure 1 — Complete sound reproducing system

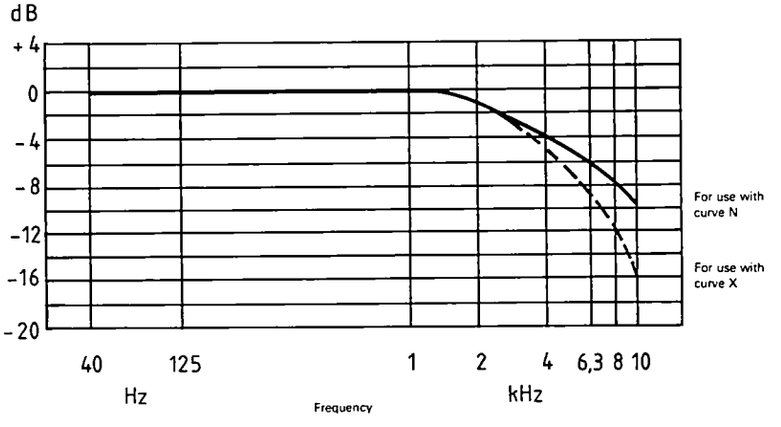

Figure 2 — A-chain characteristics for type 1 photographic sound tracks

Annex

Overall A + B response for the replay of type 1 and type 3 photographic sound track

(This annex does not form a part of the standard.)

A.1 For reference purposes only, table 2 and figure 3 show the overall A + B response for the replay of type 1 and type 3 photographic sound-track.

NOTE — The B-chain contribution to the overall A + B response is derived from the measurement techniques described in ISO 2969.

Table 2 — Overall A + B response

Frequency	Type 1 sound track	Type 3 sound track
Hz	dB	dB
40	− 8,0	−2,0
63	− 3,0	0
125	0	0
250	0	0
500	0	0
1 000	0	0
2 000	− 1,0	0
2 500	− 3,0	−1,0
3 150	− 5,0	−2,0
4 000	− 7,5	−3,0
5 000	−10,5	−4,0
6 300	−14,0	−5,0
7 100	−16,0	−5,5
8 000	−18,0	−6,0
9 000	−20,5	−6,5
10 000	−23,0	−7,0

A.2 The figures in table 2 (column two) and figure 3 (solid curve) represent the average of 150 theatre replay curves measured in six countries between 1971 and 1975, adjusted slightly to take account of current international practice. This curve is intended to ensure satisfactory replay of typically pre-emphasized sound tracks.

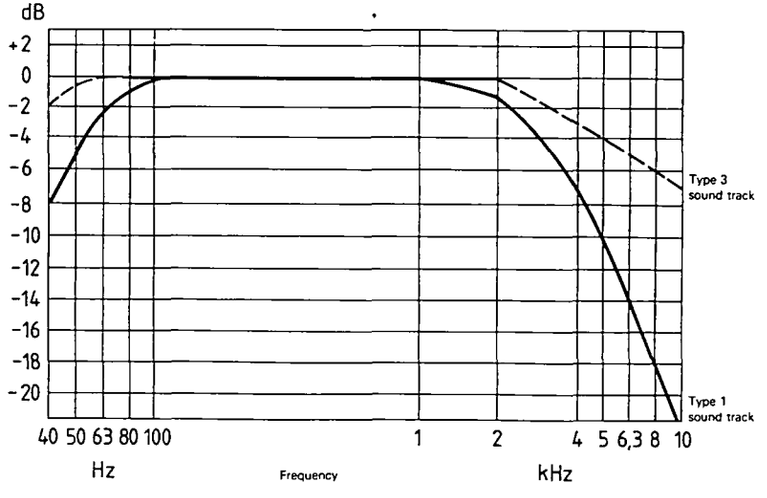

Figure 3 — Overall A + B response