SMPTE ST 217:2015
Revision of
SMPTE 217-1998

SMPTE STANDARD

Motion-Picture Film (70-mm) — Striped Release Prints — Recorded Characteristics of Magnetic Audio Records

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Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices, and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual.

SMPTE ST 217 was prepared by Technology Committee 20F.

Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Engineering Document. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

1 Scope

This standard specifies the recorded characteristic of magnetic audio records on 70-mm striped motion-picture release prints, when reproduced at 120 perforations per second (approximately 112 ft [34 m] per minute or 22.4 in [569 mm] per second) which is 24 frames (5 perforations) per second.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword “reserved” indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword “forbidden” indicates “reserved” and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows: Normative prose shall be the authoritative definition; Tables shall be next; followed by formal languages; then figures; and then any other language forms.

3 Normative Reference

Note: All references in this document to other SMPTE documents use the current numbering style (e.g. SMPTE ST 221:2003) although, during a transitional phase, the document as published (printed or PDF) may bear an older designation (such as SMPTE 221-2003). Documents with the same root number (e.g. 221) and publication year (e.g. 2003) are functionally identical.

The following standard contains provisions that, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below.

SMPTE ST 221:2003, Motion-Picture Film (70-mm) — Six-Track Audio Release Prints — Magnetic Striping

4 Recorded Characteristic

With a constant-amplitude sine-wave signal applied to the input of the recording system, the relative characteristic in effective values of the short circuit magnetic flux versus frequency shall decrease with increasing frequency proportionately to the impedance of a parallel combination of a capacitance and a resistance having time constants of 35 and 3180 µs (see note 1). The characteristic defined above is obtained by the following equation:

$$L_\varphi = C_0 - 10 \log_{10}\left(\frac{1 + (2\pi\tau_h)^2 f^2}{1 + 1/[(2\pi\tau_l)^2 f^2]}\right)$$

where L_φ is the recorded relative short circuit magnetic flux level in decibels, f is the frequency in hertz for which L_φ is computed, τ_l is the low-frequency time constant of 3180 µs, τ_h is the high-frequency time constant of 35 µs, and C_0 is a constant with a value of 0.19424 calculated to make $L_\varphi = 0$ at the reference frequency of 1000 Hz. The approximate numerical values are given in the table (see Note 2).

Frequency, Hz f	Relative Level L_φ
31.5	+ 5.66
40	+ 4.29
50	+ 3.21
80	+ 1.63
100	+ 1.16
160	+ 0.59
400	+ 0.23
1000	0.00
2500	– 0.95
4000	– 2.29
6300	– 4.46
8000	– 5.93
10 000	– 7.47
12 500	– 9.13
16 000	–11.07

5 Tolerances

Magnetic audio records on the film shall be recorded to the characteristic specified in clause 2 within the tolerances given in Figure 1.

Notes:

1 A time constant is a shorthand notation, such as illustrated by a frequency response curve, having a shape which results from a time constant of one or more microseconds. This is a convenient way of defining a response curve and is not intended as a recommended electrical circuit.

2 The corresponding reproducing characteristic is that which gives a flat response.

3 It can be shown that a low-frequency time constant of infinity would ideally be used for best headroom versus frequency of the medium. However, some theatre equipment in the field is incapable of meeting the tolerances when using a time constant of infinity. As a result, a low-frequency pre-emphasis of 3180 µs was adopted as an essential compromise. In addition, some older prints exist which were recorded with a 1590 µs time constant.

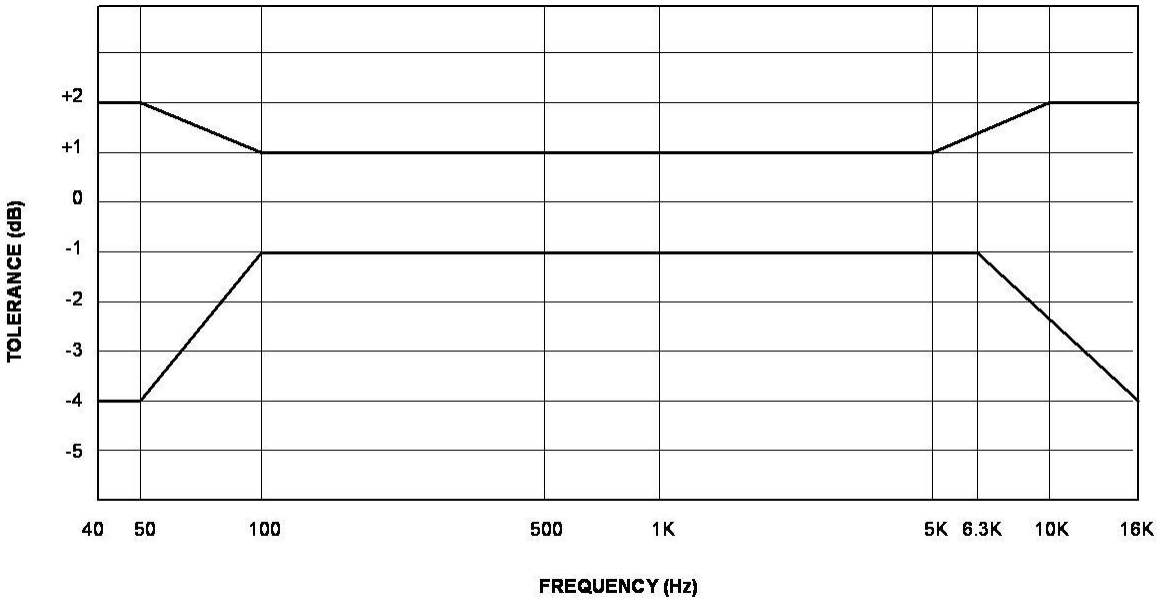

Figure 1 – Tolerances on recorded levels