SMPTE ST 185:2011
Revision of SMPTE 185-2003

SMPTE STANDARD

for Motion-Picture Film (70-mm) — Six Magnetic Records on Release Prints — Position, Dimensions, Reproducing Speed and Identity

Table of Contents

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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 Part XIII of its Administrative Practices.

SMPTE ST 185 was prepared by Technology Committee 20F on Film.

Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Standard. 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

1.1 This standard specifies the position, dimensions, reproducing speed, identity, and use of the six magnetic audio records on 70-mm motion-picture release prints.

1.2 The standard also specifies the longitudinal picture-audio displacement on the film.

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 References

The following standard contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were 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 202:2010, Motion-Pictures — Dubbing Stages (Mixing Rooms), Screening Rooms and Indoor Theaters — B-Chain Electroacoustic Response

4 Audio Records

4.1 The lateral location and width of the six magnetic audio records shall be as specified in Figure 1 and Table 1.

4.1.1 The records shall be referred to by number, as shown in Figure 1, with record No. 1 nearest the reference edge. The left and right channel apply to a listener facing the screen.

4.2 Channel Assignments

4.2.1 There have been three most common channel assignments for 70-mm striped release prints.

4.2.2 Type I. Almost all 70-mm releases prior to 1977.

Intended for playback over Curve N of SMPTE ST 202:

Stripe No. 1 – for the extreme left channel

Stripe No. 2 – for the left center channel

Stripe No. 3 – for the center channel

Stripe No. 4 – for the right center channel

Stripe No. 5 – for the extreme right channel

Stripe No. 6 – for loudspeakers in the auditorium – typically known as “effects” or later as “surround” loudspeakers. Very occasionally Stripe No. 6 was used for control or monitoring signals inaudible to a spectator.

4.2.3 Type II. Most 70-mm releases after 1977.

Intended for playback over Curve X of SMPTE ST 202. Invariably uses noise reduction companding. Designed to use inner left and right loudspeakers to augment inadequate low-frequency response of typical stage loudspeakers manufactured before the mid-1980’s.

Stripe No. 1 – for the left channel

Stripe No. 2 – for low-frequency effects – typically below 180 Hz

Stripe No. 3 – for the center channel

Stripe No. 4 – for low-frequency effects – typically below 180 Hz. Normally the same information as stripe No. 2

Stripe No. 5 – for the right channel

Stripe No. 6 – for loudspeakers in the auditorium – typically known as “effects” or later as “surround” loudspeakers.

4.2.4 Type III. Selected 70-mm releases after 1978.

Intended for playback over Curve X of SMPTE ST 202. Invariably uses noise reduction companding. As with Type II, designed to use inner left and right loudspeakers to augment inadequate low-frequency response of typical stage loudspeakers manufactured before the mid-1980’s. In addition, Stripe No 2 and Stripe No 4 carry stereo (independent left and right) surround channels.

Stripe No. 1 – for the left channel

Stripe No. 2 – for low-frequency effects – typically below 180 Hz – for both Type II and Type III playback, combined with the mid- and high-frequency signal for the left surround channel, typically above 500 Hz, when used for Type III playback.

Stripe No. 3 – for the center channel

Stripe No. 4 – for low-frequency effects – typically below 180 Hz – for both Type II and Type III playback, combined with the mid- and high-frequency signal for the right surround channel, typically above 500 Hz, when used for Type III playback.

Stripe No. 5 – for the right channel

Stripe No. 6 – monaural surround channel. Used as such when played back in a theatre only equipped for playback of a Type II 70-mm release. Low-frequency component (up to 500 Hz) is used to provide low frequencies for left and right surrounds in a theatre set up for Type III playback.

4.3 The recordings shall be made so that the azimuth of the record is at an angle of 90° ± 2' to the reference edge of the film.

4.4 With the direction of film travel as shown in Figure 1, the magnetic striping shall be on the surface of the film facing the projector lens.

4.5 The audio records shall be recorded in such a manner that they can be reproduced properly by reproducing heads whose gaps are positioned in a straight line within the film plane and conforming in orientation to 4.3.

5 Reproducing Speed

The recording shall be made so that the audio records will reproduce properly at 120 perforations per second (approximately 34 m [112 ft] per minute or 569 mm [22.4 in] per second) which is 24 frames (5 perforations each) per second.

6 Picture-Audio Displacement

The magnetic audio records on the film shall lag behind the center of the corresponding picture by a distance of 23 frames ± 1/2 frame (see Annex A).

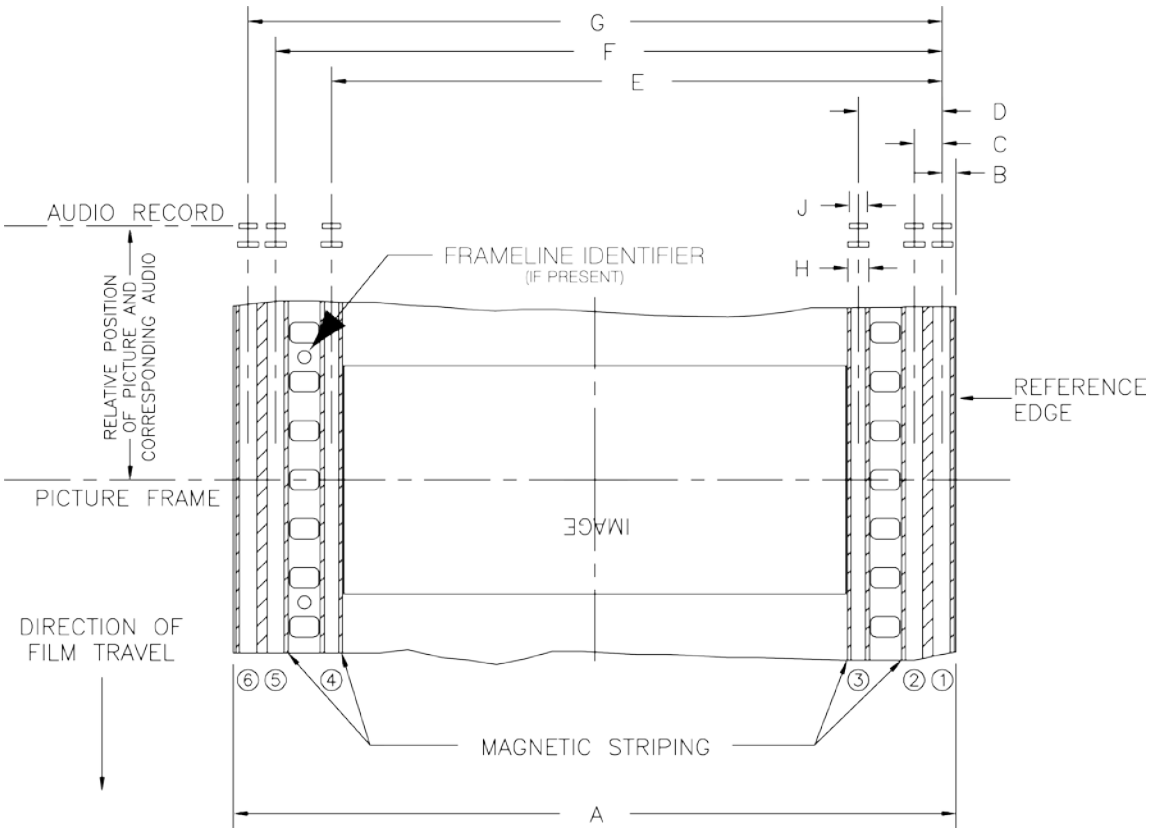

Figure 1 – Record location and width

Table 1 – Record dimensions

Dimensions		Millimeters	Inches
A	[see Note 1]	69.95 ref	2.754 ref
B		1.27 ± 0.05	0.050 ± 0.002
C		2.92 ± 0.05	0.115 ± 0.002
D		8.20 ± 0.05	0.323 ± 0.002
E		59.21 ± 0.05	2.331 ± 0.002
F		64.49 ± 0.05	2.539 ± 0.002
G		67.41 ± 0.05	2.654 ± 0.002
H (recording gap width)	[see Note 1]	1.90 ± 0.05	0.075 ± 0.002
J (reproducing gap width)	[see Note 2]	1.78 ± 0.05	0.070 ± 0.002

Notes:

1 Locations and width dimensions of magnetic stripes and recording gaps of magnetic heads are chosen on the assumption that the lateral film shrinkage is within range of 0% to 0.2% at the time of striping and/or recording.

2 The locations of reproducing gaps of magnetic heads for projectors are chosen on the assumption that the lateral film shrinkage at the time of presentation is 0.2% greater than at the time of striping. The locations of reproducing gaps of magnetic heads in the equipment used for the production of release prints should be the same as those for the recording heads.

Annex A Projector Thread Path (Informative)

As a working procedure, the accuracy of picture-audio displacement in a projection print is frequently judged by screening in a review room. It is important that the standard thread path in this review room projector be set accurately to the value specified in this standard plus one frame for every 50 ft (15 m) separating the loudspeaker from the observer. Otherwise, nonstandard prints may be produced.

Annex B Bibliography (Informative)

Note: All references in this document to other SMPTE documents use the current numbering style (e.g. SMPTE ST 152:2003) although, during a transitional phase, the document as published (printed or PDF) may bear an older designation (such as SMPTE 152-2003). Documents with the same root number (e.g. 152) and publication year (e.g. 2003) are functionally identical.

SMPTE ST 119-2011, Motion-Picture Film (70-mm) — Perforated 65-mm, KS-1870

SMPTE ST 152:2003, Motion-Picture Film (70-mm) — Projectable Image Area

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