

rules which shall be applied to the vocabulary (tokens) to construct control messages.

**4.6 System service messages**

System service messages can affect all participants on the bus, tributaries as well as the bus controller; their effect, however, differs as between tributaries and the bus controller.

Some system service messages address the bus controller only. These originate in a tributary and cause the bus controller to set up a new internal condition, or to originate further messages.

Other system service messages are sent by the bus controller to accomplish linkage tasks in tributaries. The content of the system service messages is described in SMPTE RP 163.

**4.7 Common messages**

Common messages are used to perform certain functions common to all equipment types within a general-purpose communications channel of an interface system.

The content of the common messages is described in SMPTE RP 172.

**4.8 Type-specific machine messages**

The documents listed in this section define the type-specific virtual machine messages which are applicable to specific types of machines. Type-specific messages applicable to various categories of equipment shall be as follows:

- Audio tape recorders: SMPTE RP 171;
- Video tape recorders: SMPTE RP 170.

**for Motion-Picture Film (70-mm) —  
 Perforated 65-mm, KS-1870**

**1 Scope**

This standard specifies the cutting and perforating dimensions for 70-mm motion-picture film perforated 65-mm, with a KS-type perforation and a perforation pitch of 0.1870 in (4.750 mm).

**2 Dimensions**

2.1 The dimensions shall be as given in figure 1 and table 1.

2.2 The dimensions pertain to a safety film as defined in ANSI/SMPTE 223M.

2.3 The dimensions apply at the time of cutting and perforating for film adjusted to a temperature of 23°C ± 1°C (nominally converted to 73°F ± 2°F) and a relative humidity of (50 ± 2)%. The manufacturer may indicate other nominal temperature and humidity conditions under which the dimensions apply.

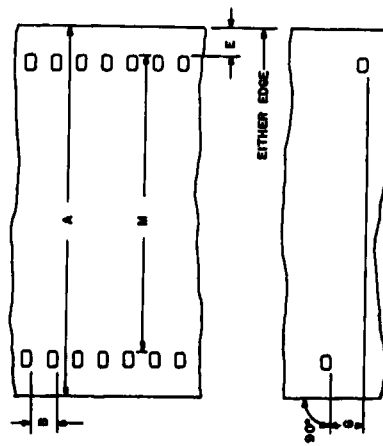


Figure 1 - 70-mm film perforated 65-mm

Table 1 - Specifications

	Dimensions	
	Inches	Millimeters
A Film width	2.754 ± 0.002	69.95 ± 0.05
B Perforation pitch	0.1870 ± 0.0004	4.750 ± 0.010
C Perforation width	0.1100 ± 0.0004	2.794 ± 0.010
D Perforation height	0.0780 ± 0.0004	1.981 ± 0.010
E Edge to perforation	0.215 ± 0.002	5.46 ± 0.05
G Perforation misalignment	0.001 max	0.03 max
L 100 consecutive perforation pitches	18.700 ± 0.015	474.98 ± 0.38
M Lateral perforation displacement	2.214 ± 0.003	56.24 ± 0.08
R Radius of perforation fillet	0.020 ± 0.001	0.51 ± 0.03

2.4 A frameline location identifier, i.e., a punched perforation, an inked spot, or a latent image, shall be positioned at an interval of every five perforations along one edge, as shown in figure 1. (The identifier is used for positioning audio records on release prints.)

**Annex A (informative)  
Additional data**

A.1 The user is reminded that, as a plastic, film can change dimensions temporarily due to moisture or temperature, or permanently due to solvent loss or strain effect.

A.2 Film for positive use has a longitudinal pitch 0.2% longer than its companion negative. Shrinkage of the negative during aging and processing prior to printing will generally not exceed 0.2%. Thus, the negative stock is expected to be 0.3% ± 0.1% shorter than the positive. This difference will minimize slippage between the two on the 12-in (305-mm) circumference sprocket of the printer, assuming a film thickness of 0.0065 in to 0.0085 in (0.140 mm to 0.165 mm).

A.3 The uniformity of pitch, hole size, and margin (dimensions B, C, D, and E) is an important variable affecting steadiness. Variations in these dimensions, from roll to roll, are of little significance compared to variations from one perforation to the next within any small group of consecutive perforations. As an example, the uniformity of the margin is uniquely critical for optical printing. During the printing process, the placement of the image on the film is usually with respect to successive lateral pairs of perforations at one-frame intervals. During subsequent projection, however, the portion of the image projected is usually located, not by

**Annex B (informative)  
Bibliography**

ANSI PH1.10-1981 (R1990), Dimensions for Unperforated and Perforated Photographic Film in Rolls, Including Leaders and Trailers, for Aerial and Related Uses  
ANSI/SMPTE 145, Motion-Picture Film (65-mm) — Perforated KS

NOTE — The title of this standard was established by the application of a nomenclature system developed for all film dimension standards. Each title provides an indication of the film width, a code designation for the perforation shape (BH, KS, DH, or CS), or the number of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, or the perforation pitch without the decimal point.

these perforations, but by the edge of the film. The lateral steadiness of the projected image is, therefore, directly related to the frame-to-frame uniformity of the margin.

A.4 Film described in this standard is used in making prints from 65-mm film described in ANSI/SMPTE 145.

Note that the 70-mm film used with 65-mm negative differs in its dimensions from the two films described by ANSI PH1.10. The perforations have the same size and pitch as those described by ANSI PH1.10, type II, but the margin and distance between perforations are different. Consequently, dimension M is the same in both 65-mm KS-1870 and KS-1868 films and also for 70-mm film perforated 65-mm. E is used to make room for magnetic audio records.

Note that the image usually placed on this film is five pitches high. The manufacture of the film is based on this idea and best results accrue from using this format.

A.5 For historical background on the development of this standard, refer to Miller, A. J. and Robertson, A. C. Motion-picture film — Its size and dimensional characteristics. Journal of the SMPTE 74: 3-11, January 1965.

ANSI/SMPTE 223M-1991, Motion-Picture Film — Safety Film

**PROPOSED  
SMPTE STANDARD  
for Motion-Picture Film (65-mm) —  
Perforated KS**

**1 Scope**

This standard specifies the cutting and perforating dimensions for 65-mm motion-picture film with a KS-type perforation and a perforation pitch of either 0.1866 in or 0.1870 in (4.740 mm or 4.750 mm).

**2 Dimensions**

2.1 The dimensions shall be as given in figure 1 and table 1.

2.2 The dimensions pertain to a safety film as defined in ANSI/SMPTE 223M.

2.3 The dimensions apply at the time of cutting and perforating for film adjusted to a temperature of 23°C ± 1°C (nominally converted to 73°F ± 2°F) and a relative humidity of (50 ± 2)%. The manufacturer may indicate other nominal temperature and humidity conditions under which the dimensions apply.

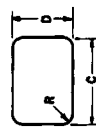
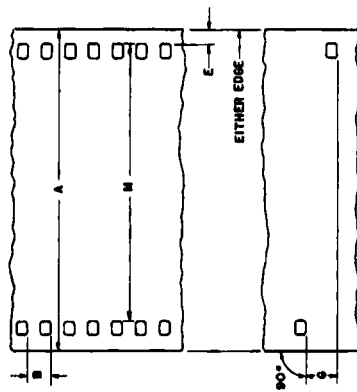


Figure 1 — 65-mm film

Table 1 — Specifications

Dimensions	Inches		Millimeters	
A Film width	2.558 ± 0.002	64.97 ± 0.05		
B Perforation pitch (long)	0.1870 ± 0.0004	4.750 ± 0.010		
B' Perforation pitch (short)	0.1866 ± 0.0004	4.740 ± 0.010		
C Perforation width	0.1100 ± 0.0004	2.794 ± 0.010		
D Perforation height	0.0780 ± 0.0004	1.981 ± 0.010		
E Edge to perforation	0.117 ± 0.002	2.97 ± 0.05		
G Perforation misalignment	0.001 max	0.03 max		
L 100 consecutive perforation pitches	18.700 ± 0.015	474.98 ± 0.38		
L' 100 consecutive perforation pitches	18.660 ± 0.015	473.96 ± 0.38		
M Lateral perforation displacement	2.214 ± 0.003	56.24 ± 0.08		
R Radius of perforation fillet	0.020 ± 0.001	0.51 ± 0.03		

**NOTE** — The title of this standard was established by the application of a nomenclature system developed for all film dimension standards. Each title provides an indication of the film width, a code designation for the perforation

shape (BH, KS, DH, or CS) or the number of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, or the perforation pitch without the decimal point.

#### Annex A (informative) Additional data

**A.1** The user is reminded that, as a plastic, film can change dimensions temporarily due to moisture or temperature, or permanently due to solvent loss or strain effect.

**A.2** Film for positive use has a longitudinal pitch 0.2% longer than its companion unprocessed negative. Shrinkage of the negative during aging and processing prior to printing will generally not exceed 0.2%. Thus, the processed negative stock is expected to be 0.3%  $\pm$  0.1% shorter than the unprocessed positive. This difference will minimize slippage between the two on the 12-in (305-mm) circumference sprocket of the printer, assuming a film thickness of 0.0055 in to 0.0065 in (0.140 mm to 0.165 mm).

**A.3** The uniformity of pitch, hole size, and margin (dimensions B, C, D, and E) is an important variable affecting steadiness. Variations in these dimensions, from roll to roll, are of little significance compared to variations from one perforation to the next within any small group of consecutive perforations. As an example, the uniformity of the margin is uniquely critical for optical printing. During the printing process, the placement of the image on the film is usually with respect to successive lateral pairs of perforations at one-frame intervals. During subsequent projection, however, the portion of the image projected is usually located, not by these perforations, but by the edge of the film. The lateral steadiness of the projected image is therefore directly related to the frame-to-frame uniformity of the margin.

**A.4** Film this size is generally used as a camera negative. There are two advantages in using this larger size. One is

#### Annex B (informative) Bibliography

ANSI PH1.10-1981 (R1980), Dimensions for Unperforated and Perforated Photographic Film in Rolls, Including Leaders and Trailers, for Aerial and Related Uses

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

the possibility of producing large prints by contact printing for exhibition in special theaters designed to provide the audience with a large viewing angle. The other purpose is to serve as an original from which 35-mm prints can be produced by reduction with less grain and better definition than can be obtained by making contact prints from 35-mm negatives.

Prints may be made on 70-mm film. The appropriate film is described in ANSI/SMPTE 119.

Note that the 70-mm film used with 65-mm negative differs in its dimensions from the two films described by ANSI PH1.10. The perforations have the same size and pitch as those described by ANSI PH1.10, type II, but the margin and distance between perforations are different. Consequently, dimension M is the same in both 65-mm, KS-1870 and KS-1866 films and also for 70-mm perforated 65-mm, KS-1870. The increased space provided by a larger margin E is used to make room for magnetic audio records.

Note that the image usually placed on this film is five pitches high. The manufacture of the film is based on this idea and best results accrue from using this format.

**A.5** For historical background on the development of this standard, refer to Miller, A.J. and Robertson, A.C. Motion-picture film — its size and dimensional characteristics. Journal of the SMPTE 74: 3-11; January 1965.

ANSI/SMPTE 223M-1991, Motion-Picture Film — Safety Film

# PROPOSED SMPTE STANDARD

## for Motion-Picture Film (35-mm) — Photographic Audio Reproduction Characteristic

SMPTE 214M  
Revision of  
ANSI/SMPTE 214M-1964

Page 1 of 4 pages

### 1 Scope

This standard specifies the electrical frequency response characteristics for photographic audio reproduction in motion-picture control rooms and indoor theaters. It is intended to assist in standardization of recording monitor and reproduction characteristics of motion-picture audio in studio dubbing theaters, review rooms, and indoor theaters. The standard covers that part of the motion-picture audio system from the transducer to the input terminals of the main fader.

### 2 Normative reference

The following standard contains provisions which, 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.

ANSI/SMPTE 202M-1991, Motion-Pictures — B-Chain Electroacoustic Response — Dubbing Theaters, Review Rooms, and Indoor Theaters

### 3 Definitions

**3.1 complete audio reproduction system:** Represented diagrammatically in figure A.2 and used in studio dubbing theaters, review rooms, and indoor theaters; by convention consists of an A-chain and a B-chain.

**3.2 deemphasized audio track:** A conventional photographic audio track, also known as Academy sound track, which is intended for play-

back over normally deemphasized theater playback systems.

**3.3 wide-range audio track:** A photographic audio track which has not been deemphasized and is intended for playback over a theater system whose B-chain has been aligned to curve X of ANSI/SMPTE 202M.

**3.4 A-chain (transducer system):** The A part of a motion-picture audio system, as shown in figure A.2, which extends from the transducer to the input terminals of the main fader. It is customary for the playback of pre-emphasized audio tracks. In some theaters, part of the deemphasis characteristic may result from aperture loss. Wide-range audio tracks do not require use of this deemphasis network and aperture loss will normally require correction. In addition, wide-range audio tracks may require the use of noise reduction decoding circuitry.

**3.5 B-chain (final chain):** The B part of a motion-picture reproduction system, as shown in figure A.2, which extends from the input terminals of the main fader to the listening area of the room or auditorium. Two B-chain characteristics are described in ANSI/SMPTE 202M; a normal curve, N, typical of current practice, and a wide-range curve referred to as curve X.

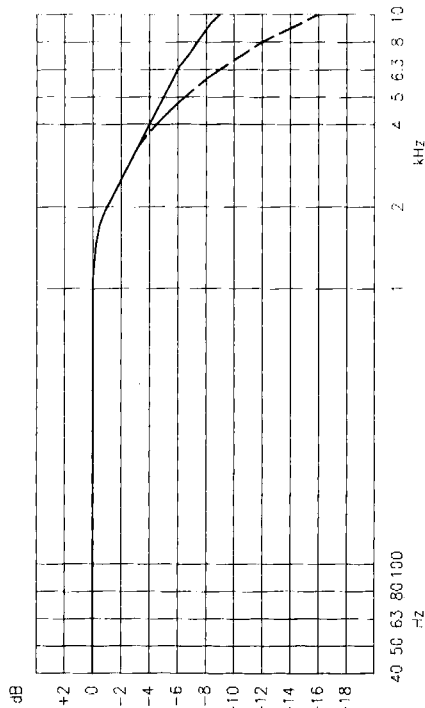
**3.6 type O theater:** A theater in which only conventionally deemphasized motion pictures will be played.

**3.7 type N theater:** A theater in which both conventionally deemphasized motion pictures and wide-range pictures will be played.

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

#### 4 Method of measurement

The electrical response of the A-chain shall be measured at the fader input terminals, or at an equivalent position, using a high-impedance voltmeter accurate from 20 Hz to 20 kHz  $\pm$  0.25 dB.



— Preemphasized photographic audio track for use with Curve N, B-chain  
 - - - Preemphasized photographic audio track for use with Curve X, B-chain

Figure 1 - A-chain characteristic

Table 1 - A-chain frequency response characteristics (dB)

Frequencies (Hz)	Preemphasized audio track curve N, B-chain	Preemphasized audio track curve X, B-chain	Wide-range audio track curve X, B-chain	Tolerances (dB)
40	0	0	0	$\pm$ 2
63	0	0	0	$\pm$ 2
125	0	0	0	$\pm$ 1
250	0	0	0	$\pm$ 1
500	0	0	0	$\pm$ 1
1000	0	0	0	$\pm$ 1
2000	-1.0	-1.0	0	$\pm$ 1
2500	-2.0	-2.0	0	$\pm$ 1
3150	-3.0	-3.0	0	$\pm$ 1
4000	-4.0	-4.5	0	$\pm$ 1
5000	-5.0	-6.5	0	$\pm$ 1
6300	-6.0	-9.0	0	$\pm$ 1
7100	-7.0	-10.5	0	$\pm$ 1
8000	-7.5	-12.0	0	$\pm$ 1
9000	-8.0	-14.0	0	$\pm$ 1
10,000	-9.0	-16.0	0	$\pm$ 1

#### 5 Characteristics

5.1 When a multifrequency photographic test film is played on the reproducer, the measured frequency response characteristic shall match the curves given in figure 1 and table 1 within the tolerances given in table 1.

5.1.1 Column 2 of table 1 represents current practice for playback of preemphasized audio tracks over a normal B-chain described as curve N in ANSI/SMPTE 202M.

5.1.2 Column 3 of table 1 represents current practice for playback of preemphasized audio tracks over a B-chain described as curve X in ANSI/SMPTE 202M.

#### Annex A (informative) Additional data

A.1 For reference purposes only, figure A.1 and table A.1 show the overall A + B chain figures for the playback of preemphasized (column 2) and wide-range (column 3) photographic audio tracks. The wide-range characteristic uses curve X.

A.2 The figures in figure A.1 (solid curve) and table A.1 (column 2) represent the average of 150 theater replay curves measured in six countries between 1971 and 1975, adjusted slightly to take into account current international practice. This curve is intended to ensure satisfactory playback of typically preemphasized photographic audio tracks.

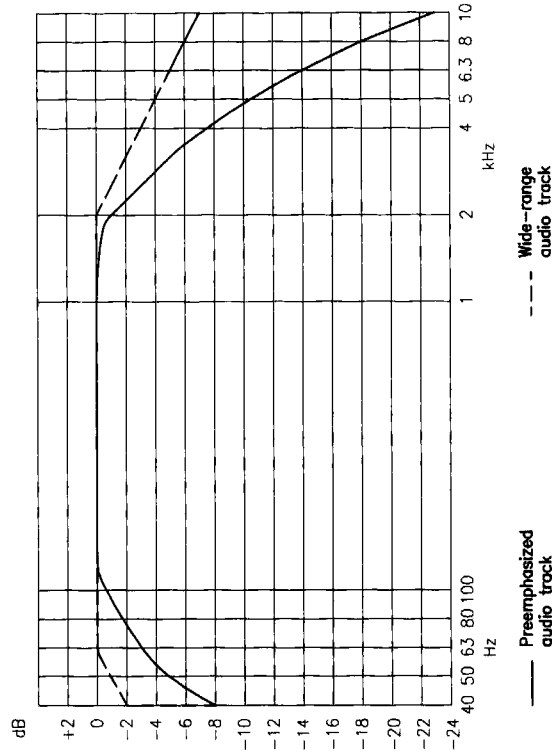


Figure A.1 - A + B chain characteristic

Table A.1 – Electroacoustic characteristics (dB)

Frequencies (Hz)	Preemphasized audio track curve N B-chain	Preemphasized audio track curve X B-chain
40	- 8.0	-2.0
63	- 3.0	0
125	0	0
250	0	0
500	0	0
1000	0	0
2000	- 1.0	0
2500	- 3.0	-1.0
3150	- 5.0	-2.0
4000	- 7.5	-3.0
5000	-10.5	-4.0
6300	-14.0	-5.0
7100	-16.0	-5.5
8000	-18.0	-6.0
9000	-20.5	-6.5
10 000	-23.0	-7.0

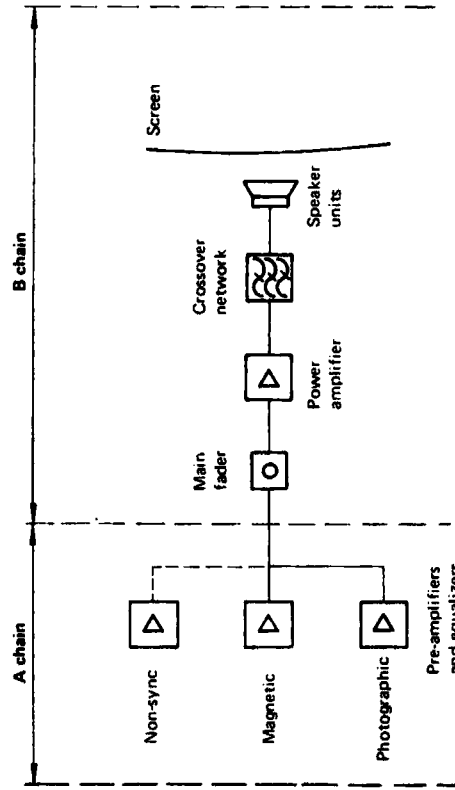


Figure A.2 – Complete theatrical audio reproducing system