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SMPTE STANDARD

SMPTE 86-2005
Revision of
ANSI/SMPTE 86-1996

for Motion-Picture Film — Magnetic Audio Records — Two, Three, Four and Six Records on 35-mm and One Record on 17.5-mm Magnetic Film

1 Scope

This standard specifies the position, dimensions, reproducing speed, and identity of the two-, three-, four-, or six-track magnetic audio records on 35-mm magnetic film, and one single-track record on 17.5-mm magnetic film. It also specifies the assignment of records to the various tracks on the magnetic coating on the film in relation to the direction of film travel.

2 Audio records

2.1 The lateral location and width of the magnetic audio records shall be as specified in the figures and tables.

2.2 The recordings shall be made so that the azimuth of the record is at an angle of 90° ± 3' to the reference edge of the film.

2.3 The audio records shall be recorded in such a manner that they can be reproduced properly by reproducing heads whose gaps are positioned along a common plane and in line. The gap width for erase heads shall be a minimum of 10% wider than the gap width of the record being erased.

3 Reproducing speed

The recordings shall be made and clearly identified so that the audio records will reproduce properly at 96 or 120 perforations per second, corresponding to 24 or 30 frames per second, respectively. Twenty-four frames per second correspond to a linear speed of 18 in (457 mm) per second; 30 frames per second correspond to 22.4 in (570 mm) per second.

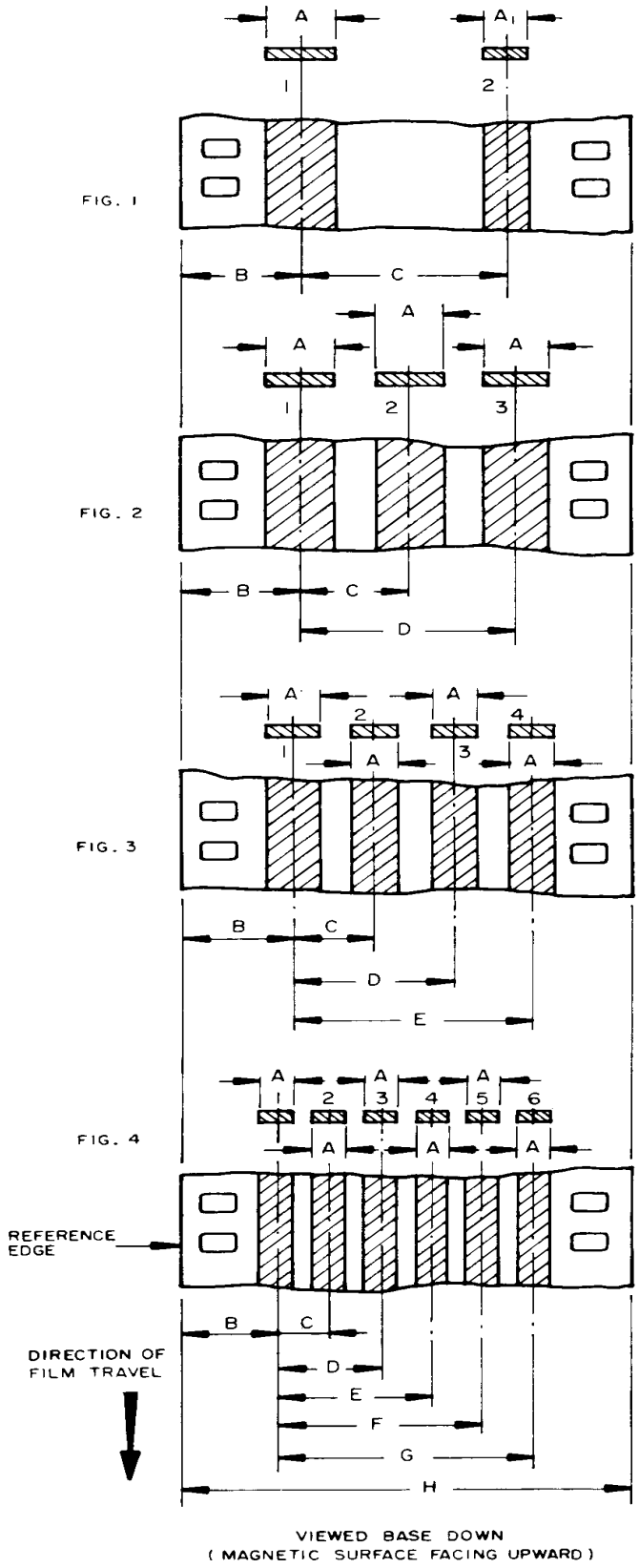
4 Assignment of records

4.1 The principal assignment for the two-track format (see figure 1) is for the prime audio record on track No. 1 and time code on track No. 2.

4.2 Formats of 17.5-mm usually result from slitting 35-mm film into two equal strips; in this case, the record adjacent to the perforation shall be the No. 1 record as specified in figure 2 and table 2. This shall also be the No. 1 record if it is a single recording made for 35-mm film.

4.3 For monophonic recordings, the prime audio record shall be placed on track No. 1 for all formats.

Approved
July 13, 2005



VIEWED BASE DOWN
(MAGNETIC SURFACE FACING UPWARD)

Table 1 – Dimensions for two magnetic audio records (as shown in figure 1)

Dimensions	Inches		Millimeters	
A	0.200	+ 0.004 – 0	5.0	+ 0.1 – 0
A_1	0.015	+ 0.004 – 0	3.8	+ 0.1 – 0
B	0.339	± 0.002	8.6	± 0.05
C	0.725	± 0.002	18.4	± 0.05

Table 2 – Dimensions for three magnetic audio records (as shown in figure 2)

Dimensions	Inches		Millimeters	
A	0.200	+ 0.004 – 0	5.0	+ 0.1 – 0
B	0.339	+ 0.002	8.6	+ 0.05
C	0.350	± 0.002	8.9	± 0.05
D	0.700	± 0.002	17.8	± 0.05
H	1.377	ref	34.97	ref

Table 3 – Dimensions for four magnetic audio records (as shown in figure 3)

Dimensions	Inches		Millimeters	
A	0.150	+ 0.004 – 0	3.8	+ 0.1 – 0
B	0.314	+ 0.002	7.9	+ 0.05
C	0.250	± 0.002	6.4	± 0.05
D	0.500	± 0.002	12.8	± 0.05
E	0.750	± 0.002	19.2	± 0.05
H	1.377	ref	34.97	ref

Table 4 – Dimensions for six magnetic audio records (as shown in figure 4)

Dimensions	Inches		Millimeters	
A	0.100	+ 0.002	2.4	+ 0.05
B	0.289	+ 0.002	7.34	+ 0.05
C	0.160	± 0.002	4.06	± 0.05
D	0.320	± 0.002	8.12	± 0.05
E	0.480	± 0.002	12.18	± 0.05
F	0.640	± 0.002	16.24	± 0.05
G	0.800	± 0.002	20.30	± 0.05

NOTE – The metric values listed in the tables are not exact conversions and deviate from accepted practice. They are based upon the practice of those countries using the metric system. Head assemblies made to either system of dimensions will be, for all practical purposes, interchangeable.

4.4 For stereophonic recordings, the track assignment shall be as follows:

Three-track format

1	2	3
Left	Center	Right

Four-track format

1	2	3	4
Left	Center	Right	(Surround)

For two-track stereophonic records containing phase-related material, two adjacent tracks shall be used (preferably in the three-track format, see figure 2). These shall be clearly identified on all reels and containers, giving the format and the assignment of the tracks. Head tones shall only be placed on the two tracks containing audio program.

The two-track format (see figure 1) is specifically excluded for recording two-track stereophonic records.

4.5 Because of the diversity of practices applied in the use of the six-track format, track assignments shall be clearly identified with each roll of film. (All reels and containers shall indicate the format and assignment of the tracks.)

5 Supplementary records

Supplementary records for recording time and control codes and other ancillary signals shall be located as shown in figure 5 and table 5.

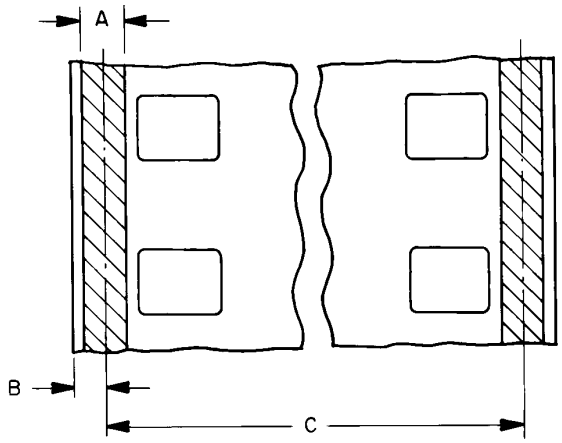


Figure 5 – Supplementary records

Table 5 – Dimensions of supplementary records

Dimensions	Inches		Millimeters	
A	0.045	+ 0.004 – 0	1.14	+ 0.1 – 0
B	0.038	+ 0.002	0.97	+ 0.05
C	1.310	± 0.002	33.27	± 0.05

Annex A (informative)
Additional data

A.1 Record width

The width of the recorded area must be measured with great care because it relates directly to the calculation of flux per unit track width.

When the recording head gap is narrower than the width of the coating or stripe, there is a measurement complication involving both the uncertainties in viewing the track and in determining the fringing effect.

If the recording head is available, the track width is best measured indirectly by measuring the gap width and adding to this dimension twice the thickness of the test record magnetic coating. This correction will usually be 0.0003 in to 0.0006 in (8 mm to 15 mm).

If the recording head is unavailable, the record may be made visible by the use of a carbonyl iron suspension. Care should be taken to apply the minimum amount sufficient to make the recording visible, so that the developed image is not wider than the actual recorded area.

A.2 Reproducing head gap width

If precision measurements or calibrations are to be made on magnetic audio records made in accordance with this standard, reproducing head gaps of the same width or wider than the recorded track must be used to prevent edge effects or fringing.

A.3 Erase heads

Erasing head gaps used to erase the records specified in this standard should be substantially wider than the record specified.

A.4 Magnetic coating

The dimensions of the magnetic coating are not specified, but shall be wide enough to permit the placement of the audio records in accordance with the appropriate formats in this standard. If the recordings are made on striped motion-picture stock, the width of the stripes shall be at least 0.010 in (0.25 mm) beyond both edges of each record.

Annex B (informative)
Bibliography

SMPTE 139-2003, Motion-Picture Film (35-mm) — Perforated KS