SMPTE STANDARD

ANSI/SMPTE 59-1991

Revision and consolidation of
ANSI/SMPTE 59-1989
and
ANSI/SMPTE 219-1985

for Motion-Picture Film (35-mm) — Camera Aperture Images and Usage

1 Scope

1.1 This standard specifies the dimensions of the camera aperture images and the relative positions of the vertical and horizontal centerlines of the intended image area with respect to the reference edge and the perforations of the camera negative film for 35-mm motion-picture cameras.

1.2 Motion-picture cameras used for different purposes require different aperture sizes. This standard specifies the image dimensions resulting from three styles of apertures used for the following purposes:

Style A: Nonanamorphic sound motion pictures

Style B: Anamorphic sound motion pictures

Style C: Instrumentation photography and special processes

1.3 This standard also specifies the position of the photographic emulsion and the frame rate for 35-mm motion-picture cameras.

2 Dimensions

The dimensions shall be as specified in figures 1 and 2 and the tables. They shall apply to measurements of the images formed on fresh film, properly exposed and processed.

3 Emulsion position

The emulsion shall be toward the camera lens, as shown in figure 3.

4 Frame rate

The standard frame rate for motion-picture photography is 24 frames per second. However, it is recognized that nonstandard frame rates are sometimes used for specific applications. For example, 24, 25, or 30 frames per second may be used for motion pictures intended for television; higher or lower frame rates may be used for special motion-picture effects and analysis. The use of nonstandard frame rates requires notification and agreement of all parties concerned with the use of the particular film.

NOTE - The displacement of 0.050 in (1.27 mm), dimension G, of the vertical centerline of the image area for styles A and B is in accord with current usage of low-shrinkage film base. However, there are in use many cameras in which the vertical centerline is displaced by 0.055 in (1.40 mm), which is the dimension used prior to the development of low-shrinkage film base.

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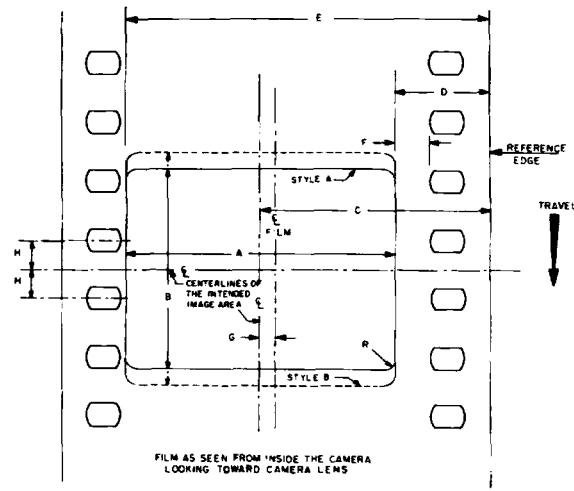

Figure 1 – Styles A and B camera aperture image area

Table 1 – Style A

Dimensions	Inches	Millimeters
A	0.864 nom	21.95 nom
B	0.63 $^{+0.02}_{-0.00}$	16.0 $^{+0.5}_{-0.0}$
C	0.738 ± 0.002	18.75 ± 0.05
D	0.307 max	7.80 max
E	1.171 min	29.74 min
F	0.115 nom	2.92 nom
G	0.050 nom	1.27 nom
H	0.093 ± 0.002	2.36 ± 0.05
R	0.03 max	0.8 max

Table 2 – Style B

B	0.732 $^{+0.008}_{-0.000}$	18.59 $^{+0.20}_{-0.00}$

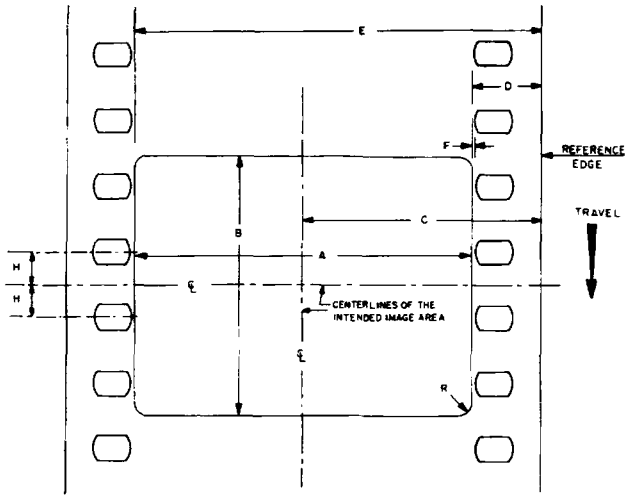

Figure 2 – Style C camera aperture image area

Table 3 – Style C

Dimensions	Inches	Millimeters
A	0.981 nom	24.92 nom
B	0.735 ± 0.002	18.67 ± 0.05
C	0.688 ± 0.002	17.48 ± 0.05
D	0.198 max	5.03 max
E	1.179 min	29.95 min
F	0.009 nom	0.23 nom
H	0.093 ± 0.002	2.36 ± 0.05
R	0.03 max	0.8 max

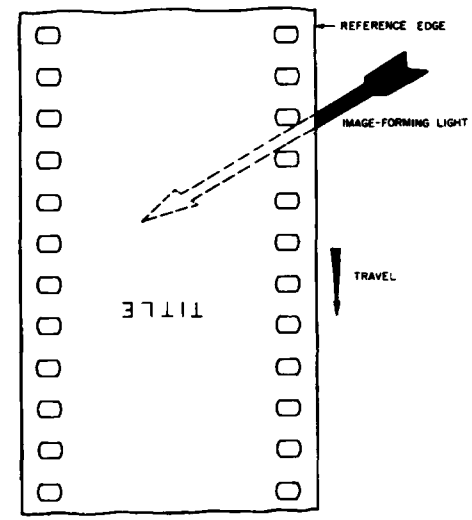

Figure 3 – Film viewed from inside camera looking toward camera lens

Annex A (informative)
Relationship between photographic audio and picture

Displacement of the picture and corresponding photographic audio as recorded in single-system cameras is dependent upon the camera design, and may vary among camera models. When prints are made, the picture-audio displacement should be in accordance with ANSI/SMPTE 40-1991. The location and dimensions of the photographic audio record should also be in accordance with ANSI/SMPTE 40-1991.

Annex B (informative)
Bibliography

ANSI/SMPTE 40-1991, Motion-Picture Film (35-mm) — Photographic Audio Records — Release Prints

SMPTE STANDARD

ANSI/SMPTE 192-1991
Revision of
ANSI/SMPTE 192-1985

for Motion-Picture Equipment (35-mm)— Shipping Reels for Prints

1 Scope

This standard specifies the dimensions of shipping reels for 35-mm motion-picture prints having a nominal film capacity of 2000 ft (610 m). The use of 1000-ft capacity shipping reels is not recommended for the reasons specified in annex A.1.

2 Dimensions

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

2.2 Dimension F defines the area over which the reel thickness, specified by dimension C_2, applies.

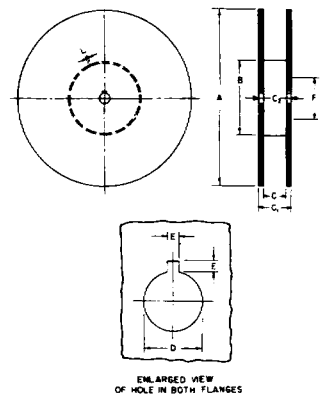

Figure 1 – Plan view and cross section of reel

Table 1 – Reel dimensions

Dimensions	Inches	Millimeters
A	14.50 ± 0.03	368.3 ± 0.8
B	4.10 $^{+0.00}_{-0.15}$	104.1 $^{+0.0}_{-3.8}$
C	1.53 ± 0.03	38.9 ± 0.8
C_1	1.885 ± 0.030	47.88 ± 0.76
C_2	1.625 $^{+0.115}_{-0.030}$	41.28 $^{+2.92}_{-0.76}$
D	0.317 $^{+0.002}_{-0.000}$	8.05 $^{+0.05}_{-0.00}$
E	0.150 ± 0.010	3.81 ± 0.25
F	2.25 min	57.2 min
L	0.035 nom	0.89 nom

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Annex A (informative)
Additional data

A.1 The use of shipping reels with small hubs (those resulting in a flange-to-hub ratio of 3:1 or greater) on projectors and rewind equipment already adjusted for reels with large hubs (flange-to-hub ratio of 3:1 or less) can subject film tension to drastic increases which may result in perforation damage by the sprocket.

A.2 Some auxiliary projection equipment, such as makeup tables for platters, have an adjustable noncentral spindle and a special hole may need to be placed in plastic and metal reels to accommodate the spindle. Figures A.1 and A.2 specify reels in current use. The use of plastic shipping reels is deprecated because they produce static electricity which attracts dust to the film surface.

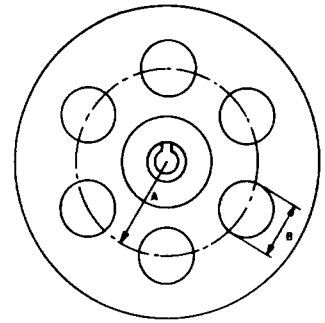

Figure A.1 – 2000-ft steel reel hub

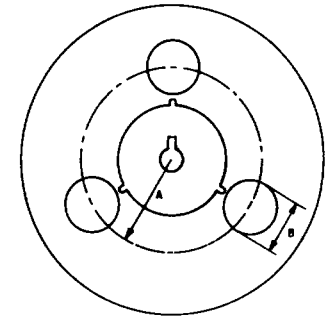

Figure A.2 – 2000-ft plastic reel hub

Table A.1 – Steel hub dimensions

Dimensions	Inches	Millimeters
A	1.313 ± 0.002	33.35 ± 0.05
B	0.803 ± 0.002	20.40 ± 0.05

Table A.2 – Plastic hub dimensions

Dimensions	Inches	Millimeters
A	1.379 ± 0.002	35.03 ± 0.05
B	0.805 ± 0.002	20.45 ± 0.05

Annex B (informative)
Bibliography

ANSI/SMPTE 241-1989, Motion-Picture Equipment — 35- and 70-mm Projection Reels

SMPTE STANDARD

for Television — Specifications for Video Tape Leader

ANSI/SMPTE 256M-1991

Revision and consolidation of
ANSI V98.2-1982
and
ANSI V98.9-1983

1 Scope

1.1 This standard specifies the minimum requirements for the content and duration of signals recorded prior to the start of the recorded program material to permit setup and adjustment of equipment for optimum performance during reproduction.

1.2 The standard also specifies a visual and aural countdown sequence to facilitate program cuing and specifies the duration of video tape that precedes and follows the recorded material to provide the minimum lengths of tape required to ensure proper threading in video tape systems which do not employ tape cassettes.

2 Normative references

The following documents contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All documents 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 documents listed below:

EIA RS-189-A, Encoded Color Bar Signal

SMPTE EG 1-1990, Alignment Color Bar Test Signal for Television Picture Monitors

SMPTE RP 142-1986, Stereo Audio Track Allocations and Identification of Noise Reduction for Video Tape Recording

3 Runup section

In video tape systems which do not employ a tape cassette, there shall be a 10-second minimum duration runup section of blank tape (see figure 1(A)) prior to the recording of any signals on the tape.

4 Noise reduction

This segment of the video tape leader shall be used only if an external audio noise-reduction encoding system, not inherent to the video tape format being used, is applied to the program audio material and decoding is required during the playback. The use of external audio noise reduction is not covered by SMPTE specifications, and must be by mutual agreement. The tape shall be labelled with information about the form of external audio noise reduction used.

4.1 Video

A video signal as specified in 5.1 shall be recorded in this video segment (see figure 1(B)) for a duration equal to the total duration of the audio signals specified in 4.2.1 and 4.2.2.

4.2 Audio

4.2.1 Noise reduction identification

An interrupted tone of 5-second minimum duration shall be recorded in this audio segment (see figure 1(C)) at the level and frequency specified in 5.2.1. The interruptions may be of any duration and frequency that will be observed or heard by the operator during playback, nominally of 1-second duration at 1-second intervals.

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4.2.2 Noise reduction alignment

If the external audio noise reduction system being used requires an alignment signal or signals, they shall be recorded in this audio segment (see figure 1(D)) for a minimum of 30 seconds. This signal must not be recorded unless the noise reduction identification specified in 4.2.1 is also recorded.

4.3 Leader noise reduction

If an external audio noise reduction encoding system is used for the program material, the audio signals specified in 5.2 should be recorded without external audio noise reduction encoding whenever practical.

5 Basic leader

5.1 Video

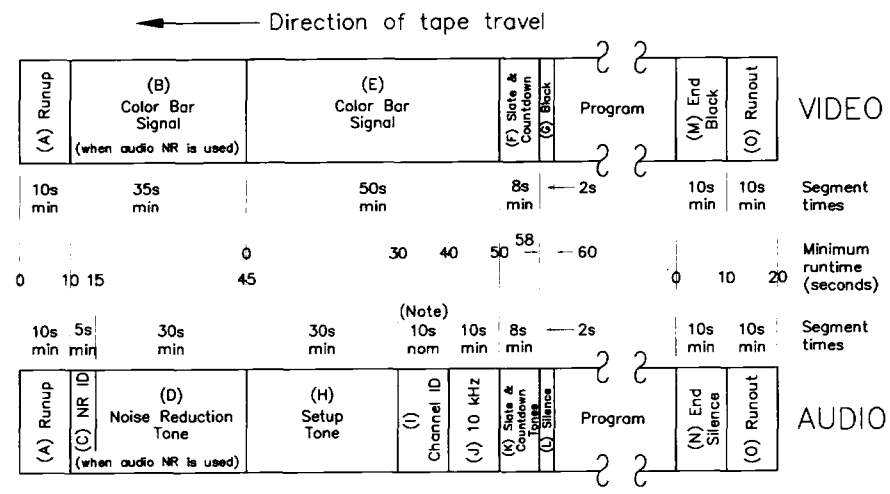
5.1.1 Color bar signal

A color bar pattern as defined by EIA RS-189-A or SMPTE EG 1-1990 shall be recorded in this video segment (see figure 1(E)) for a duration equal to the total duration of the audio signals specified in 5.2.1, 5.2.2, and 5.2.3. Color bar signals shall be recorded with maximum luminance at 77 IRE units corresponding to a 75 percent chroma level, and shall include a reference white bar and a reference black bar. The recording of the color bar signal shall be made under the same conditions of equipment adjustment as used for recording the program video material. For original recording, the color bar signal shall originate in and be fed through the same studio and equipment used for the program. In the case of monochrome recordings, a stairstep signal may be substituted for the color bar signal.

5.1.2 Slate and countdown

Visual identification information shall be recorded in this video segment (see figure 1(F)) for a duration equal to the duration of the audio signals specified in 5.2.4. The identification shall contain the following information (if known):

(1) title
(2) subject
(3) production number



NOTE – See 5.2.2 for content of this audio segment.

Figure 1 – Video tape leader

(4) take number
(5) name of recording studio
(6) date of recording
(7) broadcast date

In addition, a visual seconds countdown shall be recorded in this video segment, beginning with the number representing the seconds remaining until the start of program, decreasing with each elapsed second, and ending with the number 2. Each visual countdown number shall appear coincident with the beginning of the corresponding tone burst specified in 5.2.4 and shall remain until the beginning of the next tone burst, with the exception of the number 2, which shall appear for a single video frame beginning 2 seconds before the program start.

5.1.3 Black

A video black signal (sync, color burst, and setup) shall be recorded in this video segment (see figure 1(G)), beginning with the video frame following the countdown number 2 and ending with the video frame preceding the start of program.

5.2 Audio

5.2.1 Setup tone

An audio setup tone shall be recorded in this audio segment (see figure 1(H)) for a minimum of 30 seconds. The tone shall consist of a sine wave of a single frequency between 400 Hz (nominal) and 1000 Hz (nominal) at a level matching the operating level of the program material (normally reference level flux for the tape format being used). The tone recorded on all audio tracks shall originate from the same oscillator and be coherent in phase on all audio tracks.

5.2.2 Channel identification

5.2.2.1 Monophonic audio recording

When the program audio is a monophonic recording, the audio setup tone specified in 5.2.1 shall continue on all audio tracks in this audio segment (see figure 1(I)) for a 10-second nominal duration.

5.2.2.2 Stereophonic audio recording

When the program audio is a stereophonic recording, a sequence of audio tones of frequency and level as specified in 5.2.1 shall be recorded in this audio segment (see figure 1(I)) for a 10-second nominal duration. The pattern of this sequence of audio tones shall be as given in table 1. The exact duration of these tones is not critical providing there is a single burst of audible tone on the left channel followed by two bursts of audible tone on the right channel. The left and right channels are defined in SMPTE RP 142-1986 and the individual recording format standards.

5.2.3 10 kHz

A 10-kHz sine wave with the same input level as the signal specified in 5.2.1 shall be recorded on all tracks in this audio segment (see figure 1(J)) for a minimum of 10 seconds.

Table 1 – Sequence of audio tones for stereophonic audio channel identification

	Left channel	Right channel	Nominal duration
Segment 1	Silence	Silence	1.4 seconds
Segment 2	Tone burst	Silence	1.4 seconds
Segment 3	Silence	Silence	1.4 seconds
Segment 4	Silence	Tone burst	1.4 seconds
Segment 5	Silence	Silence	1.4 seconds
Segment 6	Silence	Tone burst	1.4 seconds
Segment 7	Silence	Silence	1.4 seconds

5.2.4 Slate and countdown tone bursts

A series of countdown tone bursts shall be recorded on all tracks in this audio segment (see figure 1(K)). The tone bursts shall be of a frequency and level as specified in 5.2.1, and shall each be of 1 video frame duration. The start of each tone burst shall be coincident with the corresponding seconds transition before the program start (see figure 2). The tone bursts shall begin 8 or more seconds preceding the program start and shall end with the tone burst 2 seconds before the program start. In addition, an aural recording of all or part of the information in 5.1.2 may be recorded in this audio segment, but it shall not interfere with the intelligibility of the countdown tone bursts.

5.2.5 Silence

Silence shall be recorded on all tracks in this audio segment (see figure 1(L)) from the end of the 2-second tone burst to the beginning of the program.

6 End

6.1 Video

A video black signal (sync, color burst, and setup) shall be recorded in this video segment (see figure 1(M)) for a minimum of 10 seconds.

6.2 Audio

Silence shall be recorded on all tracks in this audio segment (see figure 1(N)) for a minimum of 10 seconds.

7 Runout section

In video tape systems which do not employ a tape cassette, there shall be a 10 second minimum duration runout section of blank tape (see figure 1(O)) following the recording of all signals on the tape.

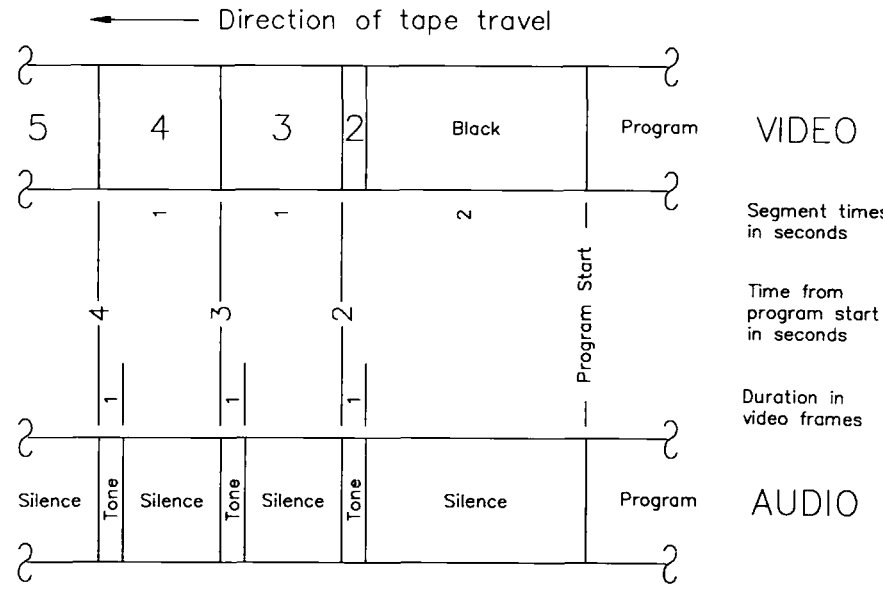


Figure 2 – Countdown signal alignment